

PROJECT MANUAL 70125.11

**FOOTHILL HIGH SCHOOL
MODULAR CTE WORKSHOP BUILDING
BUILDING PACKAGE, INCREMENT 2
PLEASANTON, CALIFORNIA**

Pleasanton Unified School District

October 29, 2021

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[BID] FOOTHILL HIGH SCHOOL CTE WORKSHOP PROJECT MANUAL

PROJECT/CONTRACT NUMBER: _____

PLEASANTON UNIFIED SCHOOL DISTRICT

_____, 20__

SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access Conditions and Requirements;
- B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of this Contract consists of the following:

1.03 CONTRACTS

- A. Perform the Work under a single, fixed-price Contract.

1.04 WORK BY OTHERS

- A. Work on the Project that will be performed by others concurrent with the Work of this Contract:

(1) _____

(2) _____

1.05 CODES, REGULATIONS, AND STANDARDS

- A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.
- B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.06 PROJECT RECORD DOCUMENTS

- A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:

(1) Contract Drawings.

(2) Specifications.

- (3) Addenda.
 - (4) Change Orders and other modifications to the Contract.
 - (5) Reviewed shop drawings, product data, and samples.
 - (6) Field test records.
 - (7) Inspection certificates.
 - (8) Manufacturer's certificates.
- B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.
 - C. Contractor shall record information concurrent with construction progress.
 - D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) installed, including the following:
 - (1) Manufacturer's name and product model and number.
 - (2) Product substitutions or alternates utilized.
 - (3) Changes made by Addenda and Change Orders and written directives.

1.07 EXAMINATION OF EXISTING CONDITIONS

- A. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets or roads approaching the Site.
- B. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.
- C. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.08 CONTRACTOR'S USE OF PREMISES

- A. If unoccupied and only with District's prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.

- B. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.
- C. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.
- D. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.
- E. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.
- F. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.09 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

- A. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.
- B. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.10 UTILITY SHUTDOWNS AND INTERRUPTIONS

- A. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.
- B. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.11 STRUCTURAL INTEGRITY

- A. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.
- B. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

ALLOWANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-specified work.

1.2 RELATED SECTIONS

A. Document 01 10 00 (Summary of Work)

B. Document 01 29 00 (Payments and Completion)

C. Document 01 32 19 (Submittal Procedures)

1.3 ALLOWANCES

- A. Included in the Contract, a stipulated sum/price of **10% of the base bid** as an allowance for Unforeseen Conditions and Owner changes within the limits set forth in the Contract Documents. This Allowance shall not be utilized without written approval by the District.
- B. Contractor's costs, without overhead and profit, for products, delivery, installation, labor, insurance, payroll, taxes, bonding and equipment rental will be included in Allowance Expenditure Directive authorizing expenditure of funds from this Allowance. No overhead and profit shall be added to the Allowance Expenditure Directive.
- C. Funds will be drawn from Allowance only with District approval evidenced by an Allowance Expenditure Directive.
- D. At Contract closeout, funds remaining in Allowance will be credited to District by Change Order.
- E. Whenever costs are more than the Allowance, the amount covered by the Allowance will be approved at cost. The Contract Price shall be adjusted by Change Order for amounts in excess of the Allowance.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF DOCUMENT

ALTERNATES AND UNIT PRICING

PART 1 – ALTERNATES

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A.** General Conditions;
- B.** Special Conditions;
- C.** Bid Form and Proposal;
- D.** Instruction to Bidders.

1.02 DESCRIPTION

The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.

1.03 GENERAL

Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an item is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

1.04 BASE BID

The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

1.05 ALTERNATES

- A.** _____
- B.** _____

The above Alternate descriptions are general in nature and for reference purposes only. The Contract Documents, including, without limitation, the Drawings and Specifications, must be referred to for the complete scope of Work.

PART 2 - UNIT PRICING

2.01 GENERAL

Contractor shall completely state all required figures based on Unit Prices listed below. Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

2.02 UNIT PRICES

Furnish unit prices for each of the named items on a square foot, lineal foot, or per each basis, as applies. Unit prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and supplier(s).

A. _____

B. _____

END OF DOCUMENT

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. Instructions to Bidders;
- B. General Conditions, including, without limitation, Substitutions For Specified Items; and
- C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

- A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.
- B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.
- C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District's Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.
- D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:
 - (1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.

- (2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.
- E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.
- F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.
- G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.
- H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit. In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.
- I. In no event shall the District be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 26 00

CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF DOCUMENT

DOCUMENT 01 29 00

**APPLICATION FOR PAYMENT AND
CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS**

**CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS IN THE GENERAL
CONDITIONS RELATED TO APPLICATIONS FOR PAYMENT AND/OR PAYMENTS.**

**CONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)**

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check: _____

Amount of Check: \$_____

Check Payable to: _____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:

Date(s) of waiver and release: _____

Amount(s) of unpaid progress payment(s): \$_____

PLEASANTON UNIFIED SCHOOL DISTRICT

**APPLICATION FOR PAYMENT AND
CONDITIONAL AND UNCONDITIONAL
WAIVER AND RELEASE FORMS
DOCUMENT 01 29 00-2**

- (4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**UNCONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8134)**

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Through Date: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment: \$_____

Exceptions

This document does not affect any of the following:

- (1) Retentions.
- (2) Extras for which the claimant has not received payment.
- (3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**CONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT**
(CIVIL CODE SECTION 8136)

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:

Amount of Check: \$_____

Check Payable to: _____

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

**UNCONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT**
(CIVIL CODE SECTION 8138)

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: _____

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions

This document does not affect any of the following: _____

Disputed claims for extras in the amount of: \$_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions; and
- B. Special Conditions.

1.02 PROGRESS MEETINGS:

- A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.
- B. Location: Contractor's field office.
- C. The Contractor shall notify and invite the following entities ("Invitees"):
 - (1) District Representative.
 - (2) Contractor.
 - (3) Contractor's Project Manager.
 - (4) Contractor's Superintendent.
 - (5) Subcontractors, as appropriate to the agenda of the meeting.
 - (6) Suppliers, as appropriate to the agenda of the meeting.
 - (7) Construction Manager, if any.
 - (8) Architect
 - (9) Engineer(s), if any and as appropriate to the agenda of the meeting.
 - (10) Others, as appropriate to the agenda of the meeting.
- D. The District's and/or the Architect's Consultants will attend at their discretion, in response to the agenda.
- E. The District representative, the Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other concerned parties. If exceptions are taken to anything in the meeting notes,

those exceptions shall be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION/PERFORMANCE MEETING:

- A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: cutting and patching of plaster and roofing, and other weather-exposed and moisture-resistant products. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.
- B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.
- C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.
- D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Summary of Work; and
- D. Submittals.

1.02 SECTION INCLUDES

- A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.
 - (1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").
 - (2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.
 - (3) Submit schedules and reports as specified in the General Conditions.
- B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

- A. Within ten (10) days of issuance of the Notice to Proceed and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.
- B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

C. Milestone Schedule:

ACTIVITY DESCRIPTION

REQUIRED COMPLETION

CONSTRUCTION STARTS _____ **[DATE]**

1.04 QUALIFICATIONS

- A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of [i.e., Primavera Project Planner]. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.
- (1) The written statement shall identify the individual who will perform CPM scheduling.
 - (2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.
 - (3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths ($\frac{3}{4}$) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.
- B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

- A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.
- B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.
- (1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.
 - (2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.
 - (3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to

have Project Float. The Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.

- C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.
 - (1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.
 - (2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.
- D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.
- E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.
- F. Software: Use **Microsoft Project**. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.
- G. Transmit each item under the form approved by District.
 - (1) Identify Project with District Contract number and name of Contractor.
 - (2) Provide space for Contractor's approval stamp and District's review stamps.
 - (3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

- A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.
- B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment;

sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.

- C. Initial CPM Schedule shall be time scaled.
- D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.
- E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.
 - (1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).
 - (2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.
- F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

- A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.
- B. Progress Schedule shall include or comply with following requirements:
 - (1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.
 - (2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.
 - (a) Activity durations shall be total number of actual work days required to perform that activity.
 - (3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.
 - (4) District furnished materials and equipment, if any, identified as separate activities.

- (5) Activities for maintaining Project Record Documents.
- (6) Dependencies (or relationships) between activities.
- (7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.
 - (a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.
 - (b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.
- (8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.
 - (a) Include time for fabrication and delivery of manufactured products for the Work.
 - (b) Show dependencies between procurement and construction.
- (9) Activity description; what Work is to be accomplished and where.
- (10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.
- (11) Resources required (labor and major equipment) to perform each activity.
- (12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.
- (13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.
- (14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.
- (15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.
- (16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.

- (a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.
 - (b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.
 - (c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.
 - (d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.
- (17) Activity durations shall be in Work days.
- (18) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.
- C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.
 - (1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.
 - (2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:
 - (a) Clarifications of Contract Requirements.
 - (b) Directions to include activities and information missing from submittal.
 - (c) Requests to Contractor to clarify its schedule.
 - (3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

- A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.
 - (1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:
 - (a) Accept schedule and cost and resource loaded activities as submitted, or
 - (b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.
 - (2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.
 - (3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.
 - (4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.
- B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.
 - (1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.
 - (2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.
 - (3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.
- C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.

- D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

- A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.
 - (1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.
 - (2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.
- B. A meeting will be held on approximately the twenty-fifth (25th) of each month to review the schedule update submittal and progress payment application.
 - (1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.
 - (2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.
 - (3) Contractor shall plan on the meeting taking no less than four (4) hours.
- C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.
- D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.
 - (1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.
 - (2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.
- E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall

have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

- A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.
- B. To reflect revisions to the Schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.
- C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.
- D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.
- E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

- A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.
- B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.

- C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.
- D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACT EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

- A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.
- B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.
- C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.
- D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

- A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.
- B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.

- C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.
- D. No time will be granted under this Contract for cumulative effect of changes.
- E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.
- F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.
- G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

- A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.
- B. Required Reports:
 - (1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.
 - (2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.
 - (3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.
 - (4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.
 - (5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

- C. Other Reports:

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

- (1) Activities by early start.
- (2) Activities by late start.

- (3) Activities grouped by Subcontractors or selected trades.
- (4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.
- D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

- A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.
- B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:
 - (1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.
 - (2) Progress made on critical activities indicated on CPM Schedule.
 - (3) Explanations for any lack of work on critical path activities planned to be performed during last month.
 - (4) Explanations for any schedule changes, including changes to logic or to activity durations.
 - (5) List of critical activities scheduled to be performed next month.
 - (6) Status of major material and equipment procurement.
 - (7) Any delays encountered during reporting period.
 - (8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.
 - (a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.
 - (b) Contractor shall explain all variances and mitigation measures.
 - (9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.

- (10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and man-hours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

- A. Project name and Project number.
- B. Contractor's name and address.
- C. Weather, temperature, and any unusual site conditions.
- D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.
- E. Worker quantities for its own Work force and for Subcontractors of any tier.
- F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;
- B. Special Conditions.

1.02 SECTION INCLUDES:

- A. Definitions:
 - (1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.
 - (2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.
 - (3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.
- B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:
 - (1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.

- (2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.
- (3) Contractor shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.
- (4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.
- (5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and "cuts" shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.
- (6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.
- (7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. Also certify that Contractor-furnished equipment can be installed in allocated space. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Submittals shall not be used as a means of requesting a substitution.
- (8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.
- (9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

C. Submittal Schedule:

- (1) Contractor shall prepare its proposed submittal schedule that is coordinated with the proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.

- (2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revise and resubmit", etc.
- (3) All Submittals shall be forwarded to the District by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those Submittals shall be forwarded to the District so as not to delay the Construction Schedule.
- (4) Contractor may be assessed \$100 a day for each day it is late in submitting a shop drawing or sample. No extensions of time will be granted to Trade Contractor or any Subcontractor because of its failure to have shop drawings and samples submitted in accordance with the Schedule.

1.03 SHOP DRAWINGS:

- A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.
- B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.
- C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.
- D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.
- E. District shall not review Shop Drawings for quantities of materials or number of items supplied.
- F. District's and/or Architect's review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. The District's and/or Architect's review of Shop Drawings is not to be construed as approving departures from Contract Documents.
- G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.
- H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work

contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.

- I. Submitted drawings and details must bear stamp of approval of Contractor:
 - (1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.
 - (2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.
- J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.
- K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.
- L. Shop Drawings must clearly delineate the following information:
 - (1) Project name and address.
 - (2) Specification number and description.
 - (3) Architect's name and project number.
 - (4) Shop Drawing title, number, date, and scale.
 - (5) Names of Contractor, Subcontractor(s) and fabricator.
 - (6) Working and erection dimensions.
 - (7) Arrangements and sectional views.
 - (8) Necessary details, including complete information for making connections with other Work.
 - (9) Kinds of materials and finishes.
 - (10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.

- M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.
- (1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.
 - (2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON REPRODUCIBLE SUBMITTALS:

- A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contractor must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.
- B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.
- C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.
- D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.
- E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES:

- A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.
- B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.

- (1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.
 - (2) Samples must show full range of texture, color, and pattern.
- C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.
- D. Samples to be shipped prepaid or hand-delivered to the District.
- E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.
- F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.
- G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.
- H. After a material has been approved, no change in brand or make will be permitted.
- I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.
- J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.
- K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:
 - (1) Size: As Specified.
 - (2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS:

- A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.
- B. One (1) copy of product or materials data will be returned to Contractor with the review status.

- C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.
- D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.
- E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.
- F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.
- G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.
- H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.
- I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;
- B. Special Conditions;
- C. Drug-Free Workplace Certification;
- D. Tobacco-Free Environment Certification;
- E. Criminal Background Investigation/Fingerprinting Certification;
- F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT:

- A. Drug-Free Schools and Safety Requirements:
 - (1) All school sites and other District Facilities have been declared "Drug-Free Zones." No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.
 - (2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.
 - (3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.
- B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.

C. Disturbing the Peace (Noise and Lighting):

- (1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.
- (2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.
- (3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

- (1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.
- (2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.
- (3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.
- (4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.

- E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;
- B. Special Conditions; and
- C. Quality Control.

1.02 DESCRIPTION:

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

- A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").
 - (1) California Building Standards Administrative Code, Part 1, Title 24, CCR.
 - (2) California Building Code (CBC), Part 2, Title 24, CCR; (International Building Code volumes 1-2 and California Amendments).
 - (3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).
 - (4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).
 - (5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).

- (6) California Fire Code (CFC), Part 9, Title 24, CCR; (International Fire Code and California Amendments).
- (7) California Green Building Standards Code (CALGreen), Part 11, Title 24, CCR.
- (8) California Referenced Standards Code, Part 12, Title 24, CCR.
- (9) State Fire Marshal Regulations, Public Safety, Title 19, CCR.
- (10) Partial List of Applicable National Fire Protection Association (NFPA) Standards:
 - (a) NFPA 13 - Automatic Sprinkler System.
 - (b) NFPA 14 - Standpipes Systems.
 - (c) NFPA 17A - Wet Chemical System
 - (d) NFPA 24 - Private Fire Mains.
 - (e) (California Amended) NFPA 72 - National Fire Alarm Codes.
 - (f) NFPA 253 - Critical Radiant Flux of Floor Covering System.
 - (g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.
- (11) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:
 - (a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.
 - (b) DSA IR A-7 — Project Inspector Certification and Approval.
 - (c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.
 - (d) DSA IR A-12 — Assistant Inspector Approval.
- (12) DSA Procedures ("DSA PR")
 - (a) DSA PR 13-01 – Construction Oversight Process
 - (b) DSA PR 13-02 – Project Certification Process

B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

- (1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.
- (2) Special inspections per Section 4-333(c).
- (3) Deferred Approvals per section 4-317(g).
- (4) Verified reports per Sections 4-336 & 4-343(c).
- (5) Duties of the Architect & Engineers shall be per Sections 4-333(a) and 4-341.
- (6) Duties of the Contractor shall be per Section 4-343.
- (7) Duties of Project Inspector shall be per Section 4-334.
- (8) Addenda and Construction Change Documents per Section 4-338.

Contractor shall keep and make available all applicable parts of the most current version of Title 24 referred to in the plans and specifications at the Site during construction.

- C. Items of deferred approval shall be clearly marked on the first sheet of the Architect's and/or Engineer's approved Drawings. All items later submitted for approval shall be per Title 24 requirements to the DSA.
- (1) Contractor shall submit the following to Architect for review and endorsement:
 - (a) Product information on proposed material/system supplier.
 - (b) Drawings, specifications, and calculations prepared, signed, and stamped by an architect or engineer licensed in the State of California for that portion of the Work.
 - (c) All other requirements as may be required by DSA.
 - (2) Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor.
 - (3) Contractor shall not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.
 - (4) Schedule of Work Subject to DSA Deferred Approval: Window wall systems exceeding 10 feet in span.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 DOCUMENT INCLUDES:

- A. Abbreviations used throughout the Contract Documents.
- B. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	The Aluminum Association
2.	AASHTO	American Association of State Highway and Transportation Officials
3.	ABPA	Acoustical and Board Products Association
4.	ACI	American Concrete Institute
5.	AGA	American Gas Association
6.	AGC	Associated General Contractors of America
7.	AHC	Architectural Hardware Consultant
8.	AHRI	Air Conditioning, Heating, Refrigeration Institute
9.	AI	Asphalt Institute
10.	AIA	American Institute of Architects
11.	AISC	American Institute of Steel Construction
12.	AISI	American Iron and Steel Institute
13.	AMCA	Air Movement and Control Association
14.	ANSI	American National Standards Institute
15.	APA	APA – The Engineered Wood Association
16.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
17.	ASSE	American Society of Civil Engineers
18.	ASME	American Society of Mechanical Engineers
19.	ASTM	American Society of Testing and Materials
20.	AWPA	American Wood Protection Association
21.	AWPI	American Wood preservers Institute
22.	AWS	American Welding Society
23.	AWSC	American Welding Society Code
24.	AWI	Architectural Woodwork Institute
25.	AWWA	American Water Works Association
26.	BIA	The Brick Industry Association
27.	CCR	California Code of Regulations

28.	CLFMI	Chain Link Fence Manufacturers Institute
29.	CRA	California Redwood Association
30.	CRSI	Concrete Reinforcing Steel Institute
31.	CS	Commercial Standards
32.	CSI	Construction Specifications Institute
33.	CTI	Cooling Technology Institute
34.	FGIA	Fenestration and Glazing Industry Alliance
35.	FGMA	Flat Glass Manufacturer's Association
36.	FIA	Factory Insurance Association
37.	FM	Factory Mutual Global
38.	FS/FED SPEC	Federal Specification
39.	FTI	Facing Title Institute
40.	GA	Gypsum Association
41.	IAPMO	International Association of Plumbing and Mechanical Officials
42.	ICC	International Code Council
43.	IEEE	Institute of Electrical and Electronic Engineers
44.	IES	Illuminating Engineering Society
45.	MCAC	Mason Contractors Association of California
46.	MIMA	Mineral Wool Insulation Manufacturers Association
47.	MLMA	Metal Lath Manufacturers Association
48.	MS/MIL SPEC	Military Specifications
49.	NAAMM	National Association of Architectural Metal Manufacturers
50.	NBHA	National Builders Hardware Association
51.	NCMA	National Concrete Masonry Association
52.	NCSEA	National Council of Structural Engineers Associations
53.	NEC	National Electrical Code
54.	NEMA	National Electrical Manufacturers Association
55.	NIST	National Institute of Standards and Technology
56.	NSI	Natural Stone Institute
57.	NTMA	National Terrazzo and Mosaic Association
58.	ORS	Office of Regulatory Services (California)
59.	OSHA	Occupational Safety and Health Act
60.	PCI	Precast Concrete Institute
61.	PCA	Portland Cement Association
62.	PCA	Painting Contractors Association
63.	PDI	Plumbing Drainage Institute
64.	PEI	Porcelain Enamel Institute
65.	PG&E	Pacific Gas & Electric Company
66.	PS	Product Standards
67.	SDI	Steel Door Institute; Steel Deck Institute
68.	SJI	Steel Joist Institute
69.	SSPC	Society for Protective Coatings
70.	TCNA	Tile Council of North America
71.	TPI	Truss Plate Institute
72.	UBC	Uniform Building Code
73.	UL	Underwriters Laboratories Code
74.	UMC	Uniform Mechanical Code

75.	USDA	United States Department of Agriculture
76.	VI	Vermiculite Institute
77.	WCLIB	West Coast Lumber Inspection Bureau
78.	WDMA	Window and Door Manufacturers Association
79.	WEUSER	Western Electric Utilities Service Engineering Requirements
80.	WIC	Woodwork Institute of California

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions including without limitation, Definitions;
- B. Special Conditions.

1.02 QUALITY ASSURANCE

- A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents, or are required by applicable codes.
- B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.
- C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.
- D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.
- E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and/or the Architect before proceeding.
- F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.
- G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

END OF DOCUMENT

REFERENCES**PART 1 - GENERAL****1.01 SCHEDULE OF REFERENCES:**

The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.

AA	The Aluminum Association 1400 Crystal Drive, Suite 430 Arlington, VA 22202 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 2401 Pennsylvania Avenue NW, Suite 330 Washington, DC 20037 www.aabc.com	202/737-0202
AASHTO	American Association of State Highway and Transportation Officials 555 12th St. NW - Suite 1000 Washington, DC 20004 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215 One Davis Drive Research Triangle Park, NC 27709 2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 901 New York Ave., NW, Suite 300 West Washington DC, 20001 www.paint.org	202/462-6272
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.concrete.org	248/848-3800
ACPA	American Concrete Pipe Association 5605 N. MacArthur Blvd., Suite 340 Irving, TX 75038 www.concrete-pipe.org	972/506-7216

ADC	Air Duct Council 1901 N. Roselle Road, Suite 800 Schaumburg, Illinois 60195 www.flexibleduct.org	847/706-6750
AF&PA	American Forest and Paper Association 1101 K Street, NW, Suite 700 Washington, DC 20005 www.afandpa.org	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW, Suite 450 Washington, DC 20001 www.aga.org	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 300 Arlington, VA 22201 www.agc.org	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 domensino.com/AHA/default.htm	847/934-880
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 www.asphaltinstitute.org	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 www.aia.org	202/626-7300
AISC	American Institute of Steel Construction 130 East Randolph Street Suite 2000 Chicago, IL 60601 www.aisc.org	312.670.2400
AIA	American Insurance Association (formerly the National Board of Fire Underwriters) 555 12th St, NW, Suite 550 Washington DC 20004 www.aiadc.org	800/242-3837
AISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 www.steel.org	202/452.7100

AITC	American Institute of Timber Construction 1010 South 336th Street, #210 Federal Way, WA 98003-7394 www.aitc-glulam.org	253/835.3344
ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 www.assoc-labs.com	214/565-0593
ALSC	American Lumber Standards Committee, Inc. 7470 New Technology Way, Suite F Frederick, MD 21703 www.alsc.org	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 www.amca.org	847/394-0150
ANLA	American Nursery & Landscape Association (now AmericanHort) 2130 Stella Court Columbus, OH 43215 www.americanhort.org	202/789-2900
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC, 20036 www.ansi.org	202/293.8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253/565-6600
APA	Architectural Precast Association 325 John Know Rd, Ste L103 Tallahassee, FL 32303 www.archprecast.org	850/205.5637
ARI	Air Conditioning and Refrigeration Institute (now Air- Conditioning, Heating, & Refrigeration Institute) 2311 Wilson Blvd, Suite 400 Arlington, VA 22201 www.ahrinet.org	703/524-8800

ARMA	Asphalt Roofing Manufacturers Association Public Information Department 529 14th Street, NW Suite 1280 Washington, DC 20045 www.asphaltroofing.org	202/591-2490
ASA	The Acoustical Society of America Suite 300 1305 Walt Whitman Road Melville, NY 11747-4300 https://acousticalsociety.org/	516/576-2360
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 www.asce.org	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 180 Technology Parkway Peachtree Corners, GA 30092 www.ashrae.org	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 www.asla.org	202/898-2444
ASME	American Society of Mechanical Engineers Two Park Avenue New York, NY 10016-5990 www.asme.org	800/834-2763
ASPE	American Society of Plumbing Engineers 6400 Shafer Court, Suite 350 Rosemont, IL 60018 http://aspe.org	847/296-0002
ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 http://asq.org	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 18927 Hickory Creek Dr., Suite 220 Mokena, IL 60448 www.asse-plumbing.org	708/995-3019

ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 www.astm.org	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 www.awci.org	703/538-1600
AWPA	American Wood Protection Association P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077
AWPI	American Wood Preservers Institute 2750 Prosperity Ave. Suite 550 Fairfax, VA 22031-4312 www.arcat.com	800/356-AWPI 703/204-0500
AWS	American Welding Society 8669 NW 36 Street, Suite 130 Miami, Florida 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794 7711
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 12007 Sunrise Valley Drive, Suite 430 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 8484 Westpark Drive, Suite 220 McLean VA 22102 www.cganet.com	703/788-2700

CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 2401 Fieldcrest Dr. Mundelein, IL 60060 www.cispi.org	224/864-2910
CLFMI	Chain Link Fence Manufacturers Institute 10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 chainlinkinfo.org	301/596-2583
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 www.compositepanel.org	703/724-1128
CPSC	Consumer Product Safety Commission 4330 East West Highway Bethesda, MD 20814 www.cpsc.gov	800/638-2772
CRA	California Redwood Association 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 www.calredwood.org	925/935-1499
CRI	Carpet and Rug Institute 100 S. Hamilton Street Dalton, Georgia 30722-2048 www.carpet-rug.org	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173 4758 www.crsi.org	847/517-1200
CSI	The Construction Specifications Institute 123 North Pitt St, Ste 450 Alexandria VA 22314 www.csinet.org	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 www.ctioa.org	310/574-7800

DHA	Decorative Hardwoods Association (formerly Hardwood Plywood & Veneer Association) 42777 Trade West Dr. Sterling, VA 20166 https://www.decorativehardwoods.org/	703/435-2900
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 2001 K Street NW, 3rd Floor North Washington, DC 20006 www.dhi.org	202/367-1134
DIPRA	Ductile Iron Pipe Research Association P.O. Box 190306 Birmingham, AL 35219 www.dipra.org	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, D.C. 20230 www.commerce.gov	202/482-2000
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 www.dot.gov	855/368-4200
EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 www.ejma.org	914/332-0040
EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 www.epa.gov	202/272-0167
FCICA	Floor Covering Installation Contractors Association 800 Roosevelt Rd., Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.fcica.com	630/672-3702
FGIA	Fenestration and Glazing Industry Alliance 1900 E Golf Rd, Suite 1250 Schaumburg, IL 60173 www.aamanet.org	847/303-5664

FM Global	Factory Mutual Insurance Company Amy Daley Global Practice Leader – Education, Public Entities, Health Care FM Global 270 Central Avenue Johnston, RI 02919-4949 www.fmglobal.com	401/275-3000 401/275-3029
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	202/619-8925
GA	The Gypsum Association 962 Wayne Ave., Suite 620 Silver Spring, MD 20910 www.gypsum.org	301/277-8686
GANA	Glass Association of North America 1945 Old Gallows Road Suite 750 Vienna, VA 22182 www.glasswebsite.com	866/342-5642 Ext 127
HMA	Hardwood Manufacturers Association 665 Rodi Road, Suite 305 Pittsburgh, PA 15235 http://hmamembers.org	412/244-0440
IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900

IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889
MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry 127 Park Street, NE Vienna, VA 22180-4602 http://mss-hq.org	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.naamm.org	630/942-6591
NAIMA	North American Insulation Manufacturers Association 11 Canal Center Plaza, Suite 103 Alexandria, VA 22314 www.naima.org	703/684-0084
NALP	National Association of Landscape Professionals (formerly Professional Landcare Network) 12500 Fair Lakes Circle, Suite 200 Fairfax, VA 22033 https://www.landscapeprofessionals.org/	703/736-9666
NAPA	National Asphalt Pavement Association 6406 Ivy Lane, Suite 350 Greenbelt, MD USA 20770-1441 www.asphaltpavement.org	888/468-6499 301/731-4748

NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 LB9 Dallas, TX 75244 www.ncspa.org	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 www.ncma.org	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	301/977-3698
NECA	National Electrical Contractors Association 1201 Pennsylvania Ave. NW Washington, D.C., 20004 www.necanet.org	202/991-6300
NEMA	National Electrical Manufacturers Association 1300 North 17th Street, Suite 1752 Rosslyn, Virginia 22209 www.nema.org	703/841-3200
NEII	National Elevator Industry, Inc. 5537 SW Urish Road Topeka, KS 66610 https://nationalelevatorindustry.org/	703/589-9985
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, Massachusetts USA 02169-7471 www.nfpa.org	617/770-3000
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818
NIA	National Insulation Association 516 Herndon Pkwy., Ste. D Herndon, VA 20170 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070

NSF	NSF International 789 N. Dixboro Road Ann Arbor, MI 48113-0140, USA www.nsf.org	800/673-6275 734/769-8010
NSI	Natural Stone Institute (formerly Marble Institute of America) 380 E. Lorain St. Oberlin, OH 44074 https://www.naturalstoneinstitute.org/	440/250-9222
NTMA	National Terrazzo and Mosaic Association PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, D.C. 20210 www.osha.gov	800/321-OSHA (6742)
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 200 Massachusetts Ave NW, Suite 200 Washington, D.C. 20001 www.cement.org	847/966-6200 202/408-9494
PCA	Painting Contractors Association (formerly Painting and Decorating Contractors of America) 2316 Millpark Drive Maryland Heights, MO https://www.pcapainted.org/	800/322-7322
PCI	Precast/Prestressed Concrete Institute 8770 W. Bryn Mawr Ave., Suite 1150 Chicago, IL 60631 www.pci.org	312/786-0300
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 http://pdionline.org	978/557-0720 800/589-8956

PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 www.porcelainenamel.com	770/676-9366
PG&E	Pacific Gas & Electric Company www.pge.com	800/743-5000
PLIB	Pacific Lumber Inspection Bureau (formerly West Coast Lumber Inspection Bureau) 1010 South 336th Street #210 Federal Way, WA 98003-7394 https://www.plib.org/	253/835-3344
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange GA 30240 www.rfci.com	706/882-3833
SDI	Steel Deck Institute P.O. Box 426 Glenshaw, PA 15116 www.sdi.org	412/487-3325
SDI	Steel Door Institute 30200 Detroit Road Westlake, Ohio 44145 www.steeldoor.org	440/899-0010
SJI	Steel Joist Institute 140 West Evans Street Suite 203 Florence, SC 29501 http://steeljoist.org	843/407-4091
SMA	Stucco Manufacturers Association 5753 E Santa Ana Cyn Rd, #G-156 Anaheim, CA 92807 www.stuccomfgassoc.com	714/473-9579
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, Virginia 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1425 K St. NW, Suite 500 Washington, DC 20005 www.plasticsindustry.org	202/974-5200

SSPC	Society for Protective Coatings (formerly the Steel Structures Painting Council) 800 Trumbull Drive Pittsburgh, PA 15205 www.sspc.org	412/281-2331 877/281-7772
TCA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 2670 Crain Highway, Ste. 203 Waldorf, MD 20601 www.tpinst.org	240/587-5582
TPI	Turfgrass Producers International 444 E. Roosevelt Road #346 Lombard, IL 60148 www.turfgrasssod.org	800/405-8873 847/649-5555
TCIA	Tree Care Industry Association (formerly the National Arborist Association) 670 N Commercial Street Suite #201 Manchester, NH 03101 www.tcia.org	800/733-2622
TVI	The Vermiculite Institute c/o The Schundler Company 10 Central Street Nahant, MA 01908 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association 201 E. John Carpenter Freeway, Suite 750 Irving, TX 75062 www.uni-bell.org	972/243-3902
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 www.usda.gov	202/720-2791

WA	Wallcoverings Association 35 E Wacker Dr Suite 850 Chicago, IL 60601 www.wallcoverings.org	312/224-2574
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, New York 10017 www.wcmanet.org	212/297-2122
WDMA	Window & Door Manufacturers Association 330 N Wabash Avenue, Suite 2000 Chicago, IL 60611 or 2001 K Street NW, 3rd Floor North Washington, D.C. 20006 www.wdma.com	312/321-6802 202/367-1157
WI	Woodwork Institute 1455 Response Road, Suite 110 Sacramento, CA 95815 www.wicnet.org	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street Hartford, CT 06103 www.wirereinforcementinstitute.org	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, California 92865 www.wwcca.org	714/221-5520
WWPA	Western Wood Products Association (formerly Redwood Inspection Service) 1500 SW First Ave., STE 870 Portland, OR 97201 www.wwpa.org	503/224-3930

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Purchase of Materials and Equipment;
- B. Special Conditions;
- C. Imported Materials Certification.

1.02 MATERIAL AND EQUIPMENT

- A. Only items approved by the District and/or Design Professional shall be used.
- B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

1.03 MATERIAL AND EQUIPMENT COLORS

- A. The District and/or Architect will provide a schedule of colors.
- B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.
- C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.
- B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.
- C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.

- D. Materials are not acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.
- E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, access to the Site or buildings, and underground services. Contractor shall protect material and equipment furnished under Contract.
- F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.
- G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.
- B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

2.02 FACILITIES AND EQUIPMENT

Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

2.03 MATERIAL REFERENCE STANDARDS

Where material is specified solely by reference to "standard specifications" and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

PART 3 - EXECUTION

3.01 WORKMANSHIP

- A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).
- B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

3.02 COORDINATION

- A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.
- B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

3.03 COMPLETENESS

Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

3.04 APPROVED INSTALLER OR APPLICATOR

Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

3.05 MANUFACTURER'S RECOMMENDATIONS

All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF DOCUMENT

QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;
- B. Special Conditions.

1.02 RELATED CODES:

- A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.
- B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION:

- A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.
- B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:
 - (1) The Project Inspector and Special Inspector(s) shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.
 - (2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.
 - (3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES:

- A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.
- B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."
- C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.05 TESTS AND INSPECTIONS:

- A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.
- B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.
- C. The District will pay for first inspections and tests required by the "CCR", and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:
 - (1) Tests and observations for earthwork and paving.
 - (2) Tests for concrete mix designs, including tests of trial batches.
 - (3) Tests and inspections for structural steel work.
 - (4) Field tests for framing lumber moisture content.
 - (5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.
 - (6) Tests and observations of welding and expansion anchors.

- D. The District may at its discretion, pay and then back charge the Contractor for:
 - (1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.
 - (2) Uncovering of work in accordance with Contract Documents.
 - (3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.
 - (4) Testing done off Site.
- E. Testing and inspection reports and certifications:
 - (1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.
 - (a) The District;
 - (b) The Construction Manager, if any;
 - (c) The Architect;
 - (d) The Consulting Engineer, if any;
 - (e) Other engineers on the Project, as appropriate;
 - (f) The Project Inspector; and
 - (g) The Contractor.
 - (2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 - PRODUCTS

2.01 TYPE OF TESTS AND INSPECTIONS

- A. Testing and inspection shall be in accordance with DSA Form 103 (or current version)
- B. Slump Test
ASTM C 143
- C. Concrete Tests

Testing agency shall test concrete used in the work per the following paragraphs:

- (1) Compressive Strength:

- (a) Minimum number of tests required: One (1) set of three (3) cylinders for each 100 cubic yards (Sec. 2604(h) 01) of concrete or major fraction thereof, placed in one (1) day. See Title 24, Section 2605(g).
- (b) Two cylinders of each set shall be tested at twenty-eight (28) days. One (1) cylinder shall be held in reserve and tested only when directed by the Architect or District.
- (c) Concrete shall test the minimum ultimate compressive strength in twenty-eight 28 days, as specified on the structural drawings.
- (d) In the event that the twenty-eight (28) day test falls below the minimum specified strength, the effective concrete in place shall be tested by taking cores in accordance with UBC Standard No. 26-13 and tested as required for cylinders.
- (e) In the event that the test on core specimens falls below the minimum specified strength, the concrete will be deemed defective and shall be removed and replaced upon such direction of the Architect, and in a manner acceptable to the Division of the State Architect.

D. Reinforcing, Steel

E. Structural Steel Per Title 24 and as noted:

- (1) Material: Steel per Table in Title 24, Section 2712.
- (2) Qualification of Welders (UBC Std. 27-6).
- (3) Shop fabrication (Section 2712(d). Structural steel only).
- (4) Shop and field welding (Section 2712(e)).

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions;
- C. Site Standards; and
- D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES:

- A. Electric Power and Lighting:
 - (1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.
 - (2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.
 - (3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.
 - (4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.
- B. Heat and Ventilation:
 - (1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to

protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.

- (2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.
- (3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

- (1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s), on the Site, or other location approved by the local water agency, to point of intended use.
- (2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.
- (3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

- (1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.
- (2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

- (1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work. Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.
- (2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

- (1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.
- (2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

- (1) Contractor shall provide trash removal on a Weekly basis. Under no circumstance shall Contractor use District trash service.

H. Field Office:

- (1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use the corridor adjacent to the construction area for an office area, if approved in writing by District.
- (2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

1.03 CONSTRUCTION AIDS:

A. Plant and Equipment:

- (1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.
- (2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES:

A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.

- B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.
- C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.
- D. Tree and Plant Protection:
 - (1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.
 - (2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.
 - (3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.
 - (4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.
 - (5) Excavation around Trees:
 - (a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.
 - (b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.

- (c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.
- (d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.
- (e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.
- (f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY:

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS:

A. Noise Control:

- (1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.
- (2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

- (1) Equipment and impact tools shall have intake and exhaust mufflers.
- (2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

- (1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.
- (2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.
- (3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.
- (4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

- (1) Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

- (1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.
- (2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

- (1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S):

A. General:

- (1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.
- (2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

- (1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.
- (2) Sign Surface: Minimum 3/4-inch exterior grade plywood.
- (3) Rough Hardware: Galvanized.
- (4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

- (1) Contractor shall fabricate to provide smooth, even surface for painting.
- (2) Size: 4'-0" x 8'-0", unless otherwise indicated.
- (3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.
- (4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES:

- A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

- A. Administrative and procedural requirements for the following:
 - (1) Salvaging non-hazardous construction waste.
 - (2) Recycling non-hazardous construction waste.
 - (3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS:

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS:

- A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of sixty-five percent (65%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS:

- A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:
 - (1) Material category.
 - (2) Generation point of waste.
 - (3) Total quantity of waste in tons or cubic yards.
 - (4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.
 - (5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.
 - (6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.
 - (7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

- H. Qualification Data: For Waste Management Coordinator.
- I. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- J. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE:

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:
 - (1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - (2) Review requirements for documenting quantities of each type of waste and its disposition.
 - (3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - (4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - (5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN:

- A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measurement throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

- (1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
- (2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
- (3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
- (4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
- (5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
- (6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION:

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - (1) Comply with Document 01 50 00 for operation, termination, and removal requirements.
- B. [Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.]
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - (1) Distribute waste management plan to everyone concerned within 3 days of submittal return.

- (2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - (1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - (2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE:

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - (1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.
 - (a) Inspect containers and bins for contamination and remove contaminated materials if found.
 - (2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - (3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - (4) Store components off the ground and protect from the weather.
 - (5) Remove recyclable waste off District property and transport to recycling receiver or processor.
- D. Packaging:
 - (1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - (2) Polystyrene Packaging: Separate and bag material.

- (3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - (4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- E. Site-Clearing Wastes: Chip brush, branches, and trees on site.
- F. Wood Materials:
 - (1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - (2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - (1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE:

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - (1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.
 - (2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF DOCUMENT

FIELD OFFICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

- A. Requirements for Field Offices and Field Office Trailers.

1.03 SUMMARY:

- A. General: Contractor shall provide District's Field Office Trailer and contents, for District's use exclusively, during the term of the Contract.
- B. Property: Trailer, furniture, furnishings, equipment, and the like, supplied by the Contractor with the Office Trailer shall remain the property of the Contractor; District property items installed, delivered, and the like by District within the Office Trailer will remain District's property.
- C. Modifications: District reserves the right to modify the trailer or contents, or both, as may be deemed proper by District.
- D. Condition: Trailer and contents shall be clean, neat, substantially finished, in good, proper, and safe condition for use, operation, and the like; the trailer and contents shall not be required to be new.
- E. Installation Timing: Provide safe, fully furnished, functional, proper, complete, and finished trailer properly ready for entire use, within fourteen (14) calendar days of District's notification of the issuance of Notice to Proceed.

1.04 SUBMITTALS:

- A. General: Submit submittals to District in quantity, format, type, and the like, as specified herein.
- B. Office Trailer Data: One (1) copy of manufacturer's descriptive data, technical descriptions, regulatory compliance, industry standards, installation, removal, and maintenance instructions.

- C. Equipment Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- D. Furniture and Furnishings Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.
- E. Plans: One (1) reproducible copy of appropriately scaled plans of trailer layout. Plans shall include, but not be limited to: lighting; furniture; equipment; telephone and electrical outlets; and the like.
- F. Product Samples: One (1) complete and entire unit of each type, if directed by District.

1.05 QUALITY ASSURANCE

- A. Standards: In the event that provisions of codes, regulations, safety orders, Contract Documents, referenced manufacturer's specifications, manufacturer's instructions, industry standards, and the like, are in conflict, the more restrictive and higher quality shall govern.
- B. Installer: Installer or Installers engaged by Contractor must have a minimum of five (5) years of documented and properly authenticated successful experience of specialization in the installation of the items or systems, or both, specified herein.
- C. Manufacturer: Contractor shall obtain products from nationally and industry recognized Manufacturer with five (5) years minimum, of immediately recent, continuous, documented and properly authenticated successful experience of specialization in the manufacture of the product specified herein.
- D. State Personnel Training: Provide proper training for maintenance and operations, including emergency procedures, and the like, as directed by District.
- E. Units: Shall be sound and free of defects, and shall not include any damage or defect that will impair the safety, installation, performance, or the durability of the entire Office Trailer and appurtenant systems.

1.06 REGULATORY REQUIREMENTS

- A. General: Work shall be executed in accordance with applicable Codes, Regulations, Statutes, Enactments, Rulings, Laws, each authority having jurisdiction, and including, but not limited to, Regulatory Requirements specified herein.
- B. California Building Standards Code ("CBSC").
- C. California Code of Regulations, Title 25, Chapter 3, Sub Chapter 2, Article 3 ("CCR").
- D. Coach Insignia: Trailer shall display California Commercial Coach Insignia; such insignia shall be deemed to show that the trailer is in accordance with the Construction and Fire Safety requirements of CCR.

PART 2 – PRODUCTS

2.01 FIELD OFFICE TRAILER

- A. General: Provide entire Field Office Trailer of type, function, operation, capacity, size, complete with controls, safety devices, accessories, and the like, for proper and durable installation. Partitions, walls, ceiling, and other interior and exterior surfaces shall be appropriately finished, including, but not limited to, trim, painting, wall base, floor covering, suspended or similar ceiling, and the like; provide systems, components, units, nuts, bolts, screws, anchoring devices, fastening devices, washers, accessories, adhesives, sealants, and other items of type, grade, and class required for the particular use, not identified but required for a complete, weather-tight, appropriately operating, and finished installation.
- B. Manufacturers: General Electric Capital Modular Space; The Space Place, Inc.; or equal.
- C. Program: Provide a wheel-mounted trailer with stairs, landings, platforms, ramps, and the like, in good, proper, safe, clean, and properly finished condition; with proper heavy duty locks, and other proper and effective security at all doors, windows, and the like. Trailer shall be maintained in good, proper, safe, clean, and properly finished condition during the Contract.
 - (1) Nominal Trailer Size: Four hundred eighty (480) square feet, minimum.
 - (2) Stairs, Platform: Properly finished stairs, platforms, and ramps.
 - (3) Doors: Two (2), three (3) foot wide exterior doors with locksets; finished ramp, steps, and entry platform at each exterior door.
 - (4) Keys: Submit five (5) keys for each door, window, furniture unit, and the like. There shall be no other key copies or originals available; each key shall be identified for District; and shall be labeled, or tagged or both, as directed by District.
 - (5) HVAC: Built in with the Trailer
 - (6) Lighting: Sixty-five (65) foot-candles illumination minimum at any point, at thirty (30) inches above finished floor throughout from fluorescent light source, exclusively, or as directed by District.
 - (7) Electrical Outlets: One (1) duplex outlet evenly spaced every twelve (12) linear horizontal feet of wall face, and electrical service ready for use.
 - (8) Telephones and Telephone Outlets: Two (2) telephone lines wired, connected to telephone utility service, and ready for use, and two (2) telephone instruments, each with two (2)-line capability, speed dial and hands-free feature. Locate each outlet as directed by District.

- (9) Voicemail Messaging System or Answering Machine: One (1) unit, two (2)-line; digital.

2.02 FIELD OFFICE TRAILER ITEMS

- A. General: Provide the Field Office Trailer with the following arranged into two (2) workstations:
 - (1) Desks: Two (2) desks: thirty-six (36) inches by sixty (60) inches; steel, laminated plastic top; locking, one (1) or two (2) file drawers single pedestal; steel; provide five (5) keys to District.
 - (2) Tables: Two (2) tables; thirty-six (36) inches by sixty (60) inches; twenty-nine (29) inches high; steel, laminated plastic top tables; one (1) at each desk.
 - (3) Chairs: Two (2) chairs: swivel; steel; with seat cushion and arms; one (1) at each desk.
 - (4) Waste Baskets: Two (2) waste baskets, one at each desk.
- B. Furniture and Equipment: Provide in the space located to effect efficient and logical use.
 - (1) File cabinet: One (1); four (4) drawer; lateral; steel locking.
 - (2) Plan Table: One (1) plan table: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawers.
 - (3) Drafting Stool: One (1) drafting stool; swiveling; steel; padded; adjustable; with footrest and casters.
 - (4) Bookshelf: One (1) bookshelf: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawer.
 - (5) Plan Rack: One (1) wheel mounted plan rack.
 - (6) Waste Baskets: One (1) large waste basket.
 - (7) Coat/Hat Hanger: Wall mounted with minimum capacity for four (4) garments and ten (10) hats.
 - (8) Document Management System: Shall include an integrated high-volume printer, copier, and facsimile machine, including stand, base, and storage cabinet; and shall include the following features:
 - (a) Type: Laser, dry electrostatic transfer, plain paper, digital, multi-function imaging system.
 - (b) Network: Ethernet or Token Ring network ready, Plug-and-Play.

- (c) Print, send/receive facsimile from any connected workstation.
- (d) Resolution: Six hundred (600) dots per inch by six hundred (600) dots per inch, minimum.
- (e) Print Speed: Twenty (20) pages per minute, minimum.
- (f) Copies: Twenty (20) copies per minute, minimum.
- (g) Document Handler: Forty (40) sheet, minimum
- (h) Collator: Forty (40) bin, minimum, with stapling.
- (i) Duplexing: Capable.
- (j) Paper Size: Capable of handling paper sizes to eleven (11) inches by seventeen (17) inches.
- (k) Paper Cassettes: One (1) each for eight and one half (8.5) inches by eleven (11) inches, eight and one half (8.5) inches by fourteen (14) inches, and eleven (11) inches by seventeen (17) inches paper sizes; minimum two hundred fifty (250) sheets per cassette.
- (l) Reduction/Enlargement: Capable of reduction to twenty-five percent (25%) and enlargement to two hundred percent (200%).
- (m) Facsimile Electronic Storage: Capable of storing minimum of fifty (50) speed dial numbers, group faxing and broadcast faxing.
- (n) Facsimile Scanning: Capable of scanning into memory a minimum of one hundred (100) pages with maximum scan time of three (3) seconds per page.
- (o) Halftone: Sixty-four (64) levels.
- (p) Redial: Automatic and Manual.
- (9) Maintenance: Contractor shall purchase service agreements for each unit of equipment for the duration of the project plus two (2) months, and shall maintain all equipment in proper working condition. Service agreements shall include provision for replacement of toner cartridges and other items required to effect proper unit use. Service agreements shall also provide for:
 - (a) Unlimited Service Calls.
 - (b) Same Day Response.
 - (c) All parts, labor, preventative maintenance and mileage.

- (d) All chemicals, such as toner, fixing agent, and the like.
 - (e) System training and setup.
- (10) Portable Toilets: Two (2); each shall include a urinal; each unit shall be a properly enclosed chemical unit conforming to ANSI Z4.3.
 - (a) Location: As directed by District.
 - (b) Maintenance: Maintain each unit and surrounding areas in a clean, hygienic and orderly manner, at all time. Empty, clean, and sanitize each unit each day at a location and time as directed by District.
 - (c) Removal: Relocate, or remove from the site, each Portable Toilet. Upon such directive by District, the Contractor shall forthwith relocate or remove each Portable Toilet and submit the affected areas to a condition which existed prior to the installation of each Portable Toilet, within three (3) calendar days, or as directed by District in writing, at no cost to District.

2.03 UTILITY AND SERVICES

- A. Telephone Service: Contractor shall provide and interface the entire telephone service, and shall properly and timely pay for telephone service for District's non-long-distance use.
- B. Electrical Service: Provide all proper connections and continuously pay for service for the duration of the Work.

2.04 FINISHES

- A. General: Manufacturer standard finish system over surfaces properly cleaned, pretreated, and prepared to obtain proper bond; all visible surfaces shall be coated.
- B. Finish: Color as selected by District from manufacturer standard palette.

PART 3 – EXECUTION

3.01 INSTALLATION

- A. General: Properly prepare area and affected items to receive the Work. Set Work accurately in location, alignment, and elevation; rigidly, securely, and firmly anchor to appropriate structure; install plumb, straight, square, level, true, without racking, rigidly anchored to proper solid blocking, substrate, and the like; provide appropriate type and quantity of reinforcements, fasteners, adhesives, self-adhesive and other tapes; lubricants, coatings, accessories, and the like, as required for a complete, structurally rigid, stable, sound, and appropriately finished installation, in accordance with manufacturer's published instructions, and as indicated. The more restrictive and higher quality requirement shall govern. Moving parts shall be properly secured, without binding, looseness, noise, and the like.

- B. Installation: Install in accordance with 25 CCR 3.2.3 and as directed by District; jack up trailer and level both ways; mount on proper concrete piers with all load off wheels; provide required tie down and accessories per Section 4368 of referenced CCR, and as directed by District.
- C. Rejected Work: Work, materials, unit, items, systems, and the like, not accepted by District shall be deemed rejected, and shall forthwith be removed and replaced with proper and new Work, materials, unit, items, systems, and the like at no cost to District.
- D. Standard: Comply with manufacturer's published instructions, or with instructions as shown or indicated; the more restrictive and higher quality requirement shall govern.
- E. Location: As directed by District.
- F. Fire Resistance: Construct and install in accordance with UL requirements.
- G. Maintenance: Contractor shall maintain trailer and adjacent areas in a safe, clean and hygienic condition throughout the duration of the Work, and as directed by District. Properly repair or replace furniture or other items, as directed by District. Properly remove unsafe, damaged, or broken furniture, or similar items, and replace with safe and proper items. Contractor shall pay cost of all services, repair, and maintenance, or replacement of each item.
- H. Janitorial Service: Provide professional janitorial services, including, but not limited to, trash, waste paper baskets, fill paper dispensers; clean and dust all furniture, files, and the like; sweep and mop resilient and similar flooring; and vacuum carpeting and similar flooring.
 - (1) Frequency: Two (2) times per week, minimum.
- I. Removal: Properly remove the Office Trailer and contents from the Site upon completion of the Contract, or as directed by District in writing. Forthwith properly patch and repair affected areas; replace damaged items with new items. Carefully and properly inventory, clean, pack, store, and protect District property; submit District property to District at a date, time and location as directed by District.

END OF DOCUMENT

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions;
- B. Special Conditions; and
- C. Materials and Equipment.

1.02 SECTION INCLUDES

- A. Requirements for the following:
 - (1) Installing Owner-furnished materials and equipment.
 - (2) Providing necessary utilities, connections and rough-ins.

1.03 DEFINITIONS

- A. Owner: District, who is providing/furnishing materials and equipment.
- B. Installing Contactor: Contractor, who is installing the materials and equipment furnished by the Owner.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Receive, store and handle products in accordance with the manufacturer's instructions.
- B. Protect equipment items as required to prevent damage during storage and construction.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Installing Contractor's Responsibilities:
 - (1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.
 - (2) Provide mounting and utility rough in for all items where required.

- (a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.

B. Owner and Installing Contractor(s) Responsibilities:

- (1) Owner-Furnished/Contractor Installed ("OFCI"): Furnished by the Owner; installed by the Installing Contractor.
 - (a) General: Owner and Installing Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.
 - (b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04.
 - (c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installing Contractor.
 - (d) The Installing Contractor shall:
 - 1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.
 - 2) Coordinate timely delivery. Installing Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installing Contractor shall assume responsibility for such defects and omissions.
 - 3) Store materials and equipment until ready for installation and protect from loss and damage. Installing Contractor is responsible for providing adequate storage space.
 - 4) Coordinate with other bid package contractors and field measurement to ensure complete installation.
 - 5) Uncrate, assemble, and set in place.
 - 6) Provide adequate supports.
 - 7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and

Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.

- 8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.
- 9) Provide anchorage and/or bracing as required for seismic restraint per Title 24, UBC Standard 27-11 and all other applicable codes.
- 10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:

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

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

2.02 FURNISHED MATERIALS AND EQUIPMENT

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

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install equipment items in accordance with the manufacturer's instructions.
- B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.
- C. Make electrical and mechanical connections as indicated and required.
- D. Touch-up and restore damaged or defaced finishes to the Owner's satisfaction.

3.02 CLEANING AND PROTECTION

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

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

END OF DOCUMENT

SECTION 01 66 00

PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;
- B. Special Conditions.

1.02 PRODUCTS

- A. Products are as defined in the General Conditions.
- B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.
- C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

- A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.
- B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.
- C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

- A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.
- B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.
- C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.

- D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.
- E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.
- F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;
- B. Special Conditions;
- C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

- A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:
 - (1) Survey work required in execution of the Project.
 - (2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

- A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.
- B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:
 - (1) Make no changes or relocation without prior written notice to District and Architect.
 - (2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
 - (3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

- A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.
- B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.
- C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.**PART 3 - EXECUTION****3.01 COMPLIANCE WITH LAWS:**

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK:

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;
- B. Special Conditions;
- C. Hazardous Materials Procedures and Requirements;
- D. Hazardous Materials Certification;
- E. Lead-Based Paint Certification;
- F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

- A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:
 - (1) Make several parts fit together properly.
 - (2) Uncover portions of Work to provide for installation of ill-timed Work.
 - (3) Remove and replace defective Work.
 - (4) Remove and replace Work not conforming to requirements of Contract Documents.
 - (5) Remove Samples of installed Work as specified for testing.
 - (6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
 - (7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.
- B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

- C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

- A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:
 - (1) The work of the District or other trades.
 - (2) Structural value or integrity of any element of Project.
 - (3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.
 - (4) Efficiency, operational life, maintenance or safety of operational elements.
 - (5) Visual qualities of sight-exposed elements.
- B. Contractor's Request shall also include:
 - (1) Identification of Project.
 - (2) Description of affected Work.
 - (3) Necessity for cutting, alteration, or excavations.
 - (4) Effects of Work on District, other trades, or structural or weatherproof integrity of Project.
 - (5) Description of proposed Work:
 - (a) Scope of cutting, patching, alteration, or excavation.
 - (b) Trades that will execute Work.
 - (c) Products proposed to be used.
 - (d) Extent of refinishing to be done.
 - (6) Alternates to cutting and patching.
 - (7) Cost proposal, when applicable.
 - (8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.

- (9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE:

- A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.
- B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

- A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.
- B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.
- B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

- A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.

- B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

- A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.
- B. Contractor shall provide devices and methods to protect other portions of Project from damage.
- C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

- A. With respect to performance, Contractor shall:
 - (1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.
 - (2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.
 - (3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.
- B. Contractor shall employ original installer or fabricator to perform cutting and patching for:
 - (1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.
 - (2) Sight-exposed finished surfaces.
- C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.
- D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.
- E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with

requirements of the Contract Documents and as required to match surrounding areas and surfaces.

- F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;
- B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

- A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.
- B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION:

- A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.
- B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION:

- A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.
- B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

- C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.
- D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.
- E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

- A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.
- B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.
- C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.
- D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.
- E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

- A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.
- B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

- A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
- B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

- C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.
- D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES:

- A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.
- B. Contractor shall repair substrate prior to patching finish.

3.07 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 by Contractor to their original condition or better, where indicated.
- B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.
- C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

- A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.
- B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING:

- A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

CONTRACT CLOSEOUT AND FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of Work;
- B. Special Conditions;
- C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

- A. Contractor shall execute final cleaning prior to final inspection.
- B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.
- C. Contractor shall clean equipment and fixtures to a sanitary condition.
- D. Contractor shall replace filters of operating equipment.
- E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.
- F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.
- G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

- A. Contractor shall legibly mark each item to record actual construction, including:
 - (1) Measured depths of foundation in relation to finish floor datum.
 - (2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit surface improvements.
 - (3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - (4) Field changes of dimension and detail.
 - (5) Details not on original Contract Drawings
 - (6) Changes made by modification(s).
 - (7) References to related Shop Drawings and modifications.
- B. Contractor will provide one set of Record Drawings to District.
- C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

- A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.
- C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.
- E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.

- B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Completion of the Work;
- B. Special Conditions.

1.02 QUALITY ASSURANCE:

Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT:

- A. Contractor shall prepare data in the form of an instructional manual entitled "OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS" ("Manual").
- B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.
- C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.
- D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.
- E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.
- F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.
- G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME:

- A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants, Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.

- B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.
- E. Text: Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.
- F. Warranties and Bonds: Contractor shall bind in one copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES:

- A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Contractor shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture Protection and Weather Exposed Products: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.
- E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:

- A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.
- B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.

- C. Contractor shall include color coded wiring diagrams as installed.
- D. Operating Procedures: Contractor shall include start-up, break-in, and routine normal operating instructions and sequences. Contractor shall include regulation, control, stopping, shut-down, and emergency instructions. Contractor shall include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.
- G. Contractor shall include manufacturer's printed operation and maintenance instructions.
- H. Contractor shall include sequence of operation by controls manufacturer.
- I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Contractor shall provide control diagrams by controls manufacturer as installed.
- K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).
- O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 SUBMITTAL:

- A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor's start of Work.
- B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.

- C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.
- D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Warranty/Guarantee Information;
- B. Special Conditions.

1.02 FORMAT

- A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.
- B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.
- C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.
- D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.03 PREPARATION:

- A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty blank until the date of completion is determined.
- B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.
- C. Contractor shall co-execute submittals when required.
- D. Contractor shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS:

- A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.
- B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.
- C. For items of work delayed beyond date of completion, Contractor shall provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as start of warranty period.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Documents on Work;
- B. Special Conditions.

PART 2 - RECORD DRAWINGS

2.01 GENERAL:

- A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible, full size original Contract Drawings (mylars).
- B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible vellums of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible vellums at the conclusion of the Project following review of the blueline prints.
- C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.
- D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.
- E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

2.02 RECORD DRAWING INFORMATION:

- A. Contractor shall record the following information:
 - (1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.

- (2) Actual numbering of each electrical circuit to match panel schedule.
- (3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.
- (4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.
- (5) Installed location of all cathodic protection anodes.
- (6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.
- (7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.
- (8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

- B. Contractor shall provide additional drawings as necessary for clarification.
- C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."
- D. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide electronic copies of the drawings (in PDF format) with one file with all of the sheets and one set of individual sheet files at the conclusion of the Project.

PART 3 - RECORD SPECIFICATIONS

3.01 GENERAL:

- A. Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.
- B. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide one electronic copy of the specifications (in PDF format) at the conclusion of the Project.

PART 4 - MAINTENANCE OF RECORD DOCUMENTS

4.01 GENERAL

- A. Contractor shall store Record Documents apart from documents used for construction as follows:

- (1) Provide files and racks for storage of Record Documents.
- (2) Maintain Record Documents in a clean, dry, legible condition and in good order.

B. Contractor shall not use Record Documents for construction purposes.

PART 5 – PRODUCTS Not Used.

END OF DOCUMENT

COMMISSIONING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

- A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;
- B. Special Conditions.
- C. Submittal Procedures: Procedures for submittal of product data and quality assurance submittals.
- D. Closeout Procedures: General closeout requirements.
- E. Sustainable Design Closeout Documentation: Closeout requirements relating to sustainable design certification.
- F. Appropriate Sections of Divisions 15 and 16 specify closeout and/or commissioning related requirements for specific pieces of equipment or building operating systems.

1.02 SECTION INCLUDES

- A. Equipment and system commissioning, including the following:
 - (1) Completion of commissioning procedures on specific equipment and systems as indicated under "Related Documents and Provisions" above.
 - (2) Verification of operational and functional performance of specific equipment and systems for compliance with the "Design Intent" as described in the "Related Documents and Provisions" indicated above.

1.03 REFERENCES

- A. [ASTM International (ASTM)]:
 - (1) [ASTM X000-00, Title of Standard].
 - (2) [ASTM X000-00, Title of Standard].
- B. [Name of Organization (Organization Acronym)]:
 - (1) [Acronym, Standard or Document Number and Date of Issue, Title of Standard or Document].

1.04 DEFINITIONS

- A. Commissioning: The process of verifying that the installation and performance of selected building systems meet or exceed the specified design criteria and therefore satisfy the design intent.
- B. Deficiencies and Resolutions List: List of noted deficiencies discovered as result of commissioning process.
- C. Final Commissioning Report: Overall final commissioning document, prepared by the Systems Commissioning Authority, which details the actual commissioning procedures performed, inspection and testing results, and the final version of the deficiencies and resolutions list indicating that all issues discovered through the commissioning process have been verified as resolved.
- D. Functional Performance Testing Process: Documented testing of system parameters, under actual or simulated operating conditions.
- E. Pre-Commissioning Checklists: Installation and start-up items to be completed by the appropriate party prior to operational verification through functional testing.
- F. Physical Inspection Process: On-site inspection and review of related system components for conformance to the specifications.
- G. Systems Commissioning Authority (SCA): Independent entity under contract directly with the District or District's Representative responsible for performing the specified commissioning procedures.

1.05 DESCRIPTION OF CONSTRUCTION PHASE COMMISSIONING PROCESS

- A. As soon as practicable after the [bid award] [start of construction] the Systems Commissioning Authority (SCA) will conduct a pre-installation commissioning "kick-off" meeting with the contractors. Parties directly affected by the commissioning work will be required to attend. The SCA will explain the commissioning process in detail, and identify specific commissioning related responsibilities of the various parties.
- B. Commissioning status meetings will be scheduled to occur during construction to monitor progress and to help facilitate the commissioning process. Contractor representatives will be required to attend these meetings.
- C. Once contractors have provided the SCA with written verification indicating completion of installation and startup procedures, the SCA will conduct an on-site physical inspection of the specific systems and equipment.
- D. Upon confirmation of system readiness, the SCA will schedule with the contractors to perform functional compliance with the project specifications and drawings. The SCA will oversee the process and will provide the format and documentation for these tests.

- E. Deficiencies noted during these tests will be documented on the Deficiencies and Resolutions list. When corrected, issues will be resolved at the time of discovery. The responsible Contractor will resolve all other issues at a later date. All deficiencies will be noted by the SCA as either resolved or pending resolution.
- F. The construction commissioning process will be complete when all noted deficiencies have been corrected, proved to be compliance with the project specifications or otherwise resolved to the satisfaction of the District.

1.06 SYSTEMS COMMISSIONING AUTHORITY'S DUTIES AND RESPONSIBILITIES

- A. Meet and communicate with the District's representatives, Construction Manager, if any, Contractors, equipment manufacturers' representatives, Architect, Engineer and others as needed, to facilitate the commissioning process.
- B. Review commissioning related specifications, submittals and construction documents. Communicate noted deficiencies and concerns to the District, Architect and Engineer.
- C. Develop detailed and specific functional testing procedures for equipment and systems to be commissioned.
- D. Develop testing, adjusting and balancing (TAB) specifications. Oversee the TAB process.
- E. Perform site inspections and verify contractor readiness for the functional testing process. Document deficiencies for future resolution.
- F. Witness contractor performed functional testing process as appropriate to verify contractor compliance with the functional testing procedures. Document deficiencies for future resolution.
- G. Provide the District, Construction Manager, Contractor, Architect, and Engineer with a Final Commissioning Report to document the commissioning process and to verify that the commissioning process is complete.

1.07 DUTIES AND RESPONSIBILITIES OF OTHERS FOR COMMISSIONING

- A. The commissioning process will require the active participation of persons qualified to represent the District, Mechanical Engineer, Electrical Engineer, General Contractor, Equipment Manufacturers' Representatives, Mechanical Contractor, HVAC Contractor, Controls Contractor, TAB Contractor, Electrical Contractor, and other specific subcontractors, as deemed appropriate. The SCA will witness the final functional performance commissioning process. Participants shall include in their contracts all costs necessary to participate in and complete the commissioning process.
- B. Contractor will assure the participation and co-operation of Subcontractors, as required to complete the commissioning process.

- C. The District will assure the participation of their chosen representatives as required to complete the commissioning process.
- D. The Architect will assure the participation of necessary representatives from the Design Team as required to complete the commissioning process. Design team members will provide prompt replies to requests for information issued during the commissioning process.
- E. It is the Contractor's specific responsibility to complete their respective start-up and checkout procedures, and to insure the complete readiness of equipment and systems, prior to the start of the functional performance testing phase. The SCA shall request written confirmation of system readiness for performance testing, from the appropriate subcontractor or Contractor. Once the SCA is provided with confirmation of all related systems completion, the actual date and times for the functional performance testing process will be confirmed. Contractors shall provide sufficient time, and qualified representatives, to complete this process.
- F. After a second failure of a system to successfully meet the criteria as set forth in the functional performance testing process, the Contractor shall reimburse the District for all costs associated with any additional re-testing efforts made necessary due to remaining Contractor related system deficiencies previously reported by the Contractor as corrected. These costs shall include salary, travel costs and per diem lodging costs (where applicable) for the SCA. Rates to be used:

Mileage: \$0.35/Mile
Per Diem Lodging: \$115.00/Day
Salary: \$100.00/Hour

- G. Training on related systems and equipment operation and maintenance shall only be scheduled to commence after final performance commissioning is satisfactorily completed, and systems are verified to be 100 percent complete and functional.

1.08 SUBMITTALS

- A. Submit under provisions of Document 01 33 00 Submittals.
- B. Pre-Commissioning Checklist Forms: Submit two (2) signed copies of the checklist forms to the SCA upon completion of all listed items.
- C. Equipment Manufacturer's Startup Forms: Submit two (2) completed copies of the installation and startup checklists provided by the equipment manufacturers to the SCA.
- D. Test Reports: Submit two (2) copies of test reports for equipment and systems to the SCA.
- E. Control Schematics: Submit two (2) copies of the control schematics for equipment, systems, and subsystems to the SCA.

- F. Inspection Records: Submit two (2) copies of the records of inspections for code compliance, and approved permits and licenses to operate the equipment and systems to the SCA.
- G. Operating Data: Submit two (2) copies of equipment and system operating data including all necessary instructions to facilitate operation to specified performance standards to the District.
- H. Maintenance Data: Submit two (2) copies of equipment and system maintenance data including all necessary information required to maintain the equipment and systems in continuous operation, such as the testing, balancing and adjusting report and the as-built drawings.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 01 81 13

CALGREEN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with 2019 California Green Building Standards Code, "CALGreen", California Code of Regulations, Title 24, Part 11 as adopted by Division of the State Architect (DSA).

- 1. Project shall comply with all CALGreen "Nonresidential Mandatory Measures" as adopted by Division of the State Architect (DSA).

- B. Related Sections:

- 1. Divisions 01 through 33 Sections for specific building measures applicable to those Sections.

1.3 DEFINITIONS

- A. "CALGreen": Shall mean "2019 California Green Building Standards Code, CALGreen, California Code of Regulations, Title 24, Part 11" as adopted by Division of the State Architect (DSA).

- 1. Definitions, abbreviations and acronyms that are a part of "CALGreen" apply to this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Meetings: Conduct meeting at Project site. Review CALGreen requirements and action plans for complying with requirements.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and submit documentation for CALGreen prerequisites and credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures. Document responses as informational submittals.

1.6 ACTION SUBMITTALS

- A. Submit CALGreen submittals in accordance with requirements of Division 01 through 33 Sections.

- B. CALGreen submittals are in addition to other submittals.

CALGREEN REQUIREMENTS 01 81 13 - 1

- C. If submitted item is identical to that submitted to comply with other requirements, include an additional copy with other submittal as a record copy of compliance with indicated CALGreen requirements instead of separate sustainable design submittal. Mark additional copy "CALGreen Submittal."

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For CALGreen coordinator.

1.4 QUALITY ASSURANCE

- A. Project Management and Coordination: Contractor to identify one person on Contractor's staff to be responsible for CALGreen compliance and coordination.
 - 1. Experience: Environmental project manager to have experience relating to CALGreen building construction.
 - 2. Responsibilities: Review Contract Documents for CALGreen requirements and coordinate work of trades, subcontractors and suppliers.
 - a. Assemble and retain approved CALGreen Submittals, tabulation charts and other records to document progress toward meeting CALGreen requirements.
 - b. Provide records in secure jobsite location, available for review by Architect or Owner.
 - c. Provide Action Plans, Progress Reports and final documentation according to specified requirements and schedule.
 - d. Meetings: Lead Contractor and trade discussion of CALGreen goals and requirements at following meetings:
 - a. Pre-construction meetings, including pre-construction CALGreen trades and training meeting.
 - b. Waste management conference.
 - c. Pre-installation meetings.
 - d. Regularly scheduled job-site meetings.
 - e. Special CALGreen issues meetings.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- 1. Provide products and procedures necessary to comply with CALGreen building requirements. General CALGreen compliance requirements are specified herein. Specific CALGreen requirements for work of each Section are specified in Divisions 02 through 33. Where required Contractor shall determine additional materials and procedures necessary to comply with all required CALGreen requirements.

2.2 ENVIRONMENTAL QUALITY

- A. CALGreen Section 5.504.1, Temporary Ventilation: The permanent HVAC system shall only be used during construction if necessary, to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999 or an average efficiency of 30

percent based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

- B. CALGreen Section 5.504.3, Covering of Duct Openings and Protection of Mechanical Equipment During Construction: At time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to enforcing agency to reduce the amount of dust, water and debris which may enter the system.
- C. CALGreen Section 5.504.4, Finish Material Pollutant Control: Finish material shall comply with Sections 5.504.4.1 through 5.504.4.6.
- D. CALGreen Section 5.504.4.1, Adhesives, Sealants and Caulks: Adhesives and sealants used on Project shall meet requirements of CALGreen 5.504.4.1 and shall be compliant with VOC and other toxic compound limits in accordance with attached CALGreen Table 5.504.4.1 and Table 5.504.4.2.
- E. CALGreen Section 5.504.4.3, Paints and Coatings: Paints, stains and other coatings used on Project shall meet requirements of CALGreen 5.504.4.3 and shall be compliant with VOC and other toxic compound limits in accordance with attached CALGreen Table 5.504.4.3.
- F. CALGreen Section 5.504.4.3.1, Aerosol Paints and Coatings: Aerosol paints and other coatings used on Project shall meet the PWMIR Limits for ROC in Section 94522 (a) (3) and other requirements of this Section. See CALGreen for full requirements. Verification of compliance with this section shall be provided at the request of the enforcing agency.
- G. CALGreen Sections 5.504.4.4, Carpet Systems through 5.504.4.4.2, Carpet Adhesives:
 - 1. All carpet installed in the building interior shall meet at least one of the following testing and product requirements:
 - a. Carpet and Rug Institute's Green Label Plus Program.
 - b. Compliant with the VOC-emission and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers", Version 1.1, February 2010 (also known as CDPH Standard Method V1.1 or Specification 01350);
 - c. NSF/ANSI 140 at the Gold level or higher;
 - d. Scientific Certifications Systems Sustainable Choice; or
 - e. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria as listed in the CHPS High Performance Product Database.
 - 2. Carpeting Cushions: All carpet cushion installed in the Building interior shall meet the requirements of the Carpet and Rug Institute's Green Label program.
 - 3. Carpet Adhesive: All carpet adhesives shall meet the requirements of (attached) Table 4.504.4.1.
- H. CALGreen Section 5.504.4.5, Composite Wood Products: Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics

Control measure (ATCM) for Composite Wood (17 CR 93120 et seq.). Those materials not exempted by the ATCM must meet the specified emission limits as shown in Table 5.504.4.5.

1. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall be in accordance with CALGreen 5.504.4.5.3.
- I. CALGreen Section 5.504.4.6, Resilient Flooring Systems: For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:
1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
 2. Compliant with the VOC emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
 3. Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria as listed in the CHPS High Performance Product Database; or
 4. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program).
 5. CALGreen Section 5.504.4.6.1, Verification of Compliance: Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.
- J. CALGreen Section 5.504.5.3, Filters: In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.
1. Exceptions:
 - a. Existing mechanical equipment.
 2. CALGreen 5.504.5.3.1, Labeling: Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.
- K. CALGreen Section 5.504.7, Environmental Tobacco Smoke (ETS) Control: Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any Authority Having Jurisdiction. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.
- L. CALGreen Section 5.505.1, Indoor Moisture Control: Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1202 (Ventilation) and Chapter 14 (Exterior Walls) for additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of this code.
- M. CALGreen Section 5.506.1 Outside Air Delivery: For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements for Ventilation) of the California Energy Code, or the applicable local code, whichever is more stringent, and Division 1, Chapter 4 of CCR, Title 8.

- N. CALGreen Section 5.507.4, Acoustical Control: Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E 90 and ASTM E413 or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E 1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.
1. Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.
 2. Exception: [DSA-SS] For public schools and community colleges, the requirement of this section and all subsections apply only to new construction.
 3. CALGreen Section 5.507.4.1, Exteriors Noise Transmission, Prescriptive Method: Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:
 - a. Within the 65 CNEL noise contour of an airport.
 - 1) Exceptions:
 - a) L_{dn} or CNEL for military airports shall be determined by the facility Air Installation Compatible land Use Zone (AICUZ) plan.
 - b) L_{dn} or CNEL for other airports shall and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.
 - 2) Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway source as determined by the Noise Element of the General Plan.
 - b. CALGreen Section 5.507.4.1.1, Noise Exposure Where Noise Contours are not Readily Available: Buildings exposed to a noise level of 65 $dB_{Leq-1-hr}$ during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).
- O. CALGreen Section 5.507.4.2, Performance Method: For building located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (L_{eq-Hr}) of 50 dBA in occupied areas during any hour of operation.
1. CALGreen 5.507.4.2.1, Site Features: Exterior features such as sound wall or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.
- P. CALGreen Section 5.507.4.3, Interior Sound Transmission: Wall and floor-ceiling assemblies separating tenant spaces and public places shall have an STC of at least 40.

1. Note: Examples of assemblies and their various STC rating may be found at the California Office of Noise Control website.
- Q. CALGreen Section 5.508.1 Ozone Depletion and Greenhouse Gas Reductions: Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.
 1. CALGreen Section 5.508.1.1 Chlorofluorocarbons (CFC's): Install HVAC, refrigeration and fire suppression equipment that do not contain CFC's.
 2. CALGreen Section 5.508.1.2 Halons: Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

PART 3 - EXECUTION

3.1 VERIFICATION

- A. Verification, certification and performance testing for compliance with CALGreen requirements shall be provided by the Contractor. Documentation shall be provided by Contractor to verify that compliance with CALGreen materials and measures above.

END OF SECTION

~~LONG RADIUS ELBOW.
LOW-GWP REFRIGERANT.
MERV.
MAXIMUM INCREMENTAL REACTIVITY (MIR).
PRODUCT-WEIGHTED MIR (PWMIR).
PSIG.
REACTIVE ORGANIC COMPOUND (ROC).
SCHRADER ACCESS VALVES.
SHORT RADIUS ELBOW.
SUPERMARKET.
VOC.~~

SECTION 5.503 FIREPLACES

5.503.1 Fireplaces. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove or pellet stove, and refer to residential requirements in the *California Energy Code*, Title 24, Part 6, Subchapter 7, Section 150. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

5.503.1.1 Woodstoves. Woodstove and pellet stoves shall comply with U.S. EPA New Source Performance Standards (NSPS) emission limits as applicable, and shall have a permanent label indicating they are certified to meet the emission limits.

SECTION 5.504 POLLUTANT CONTROL

5.504.1 Temporary ventilation. The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30 percent based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy, or, if the building is occupied during alteration, at the conclusion of construction.

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.

5.504.4 Finish material pollutant control. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

5.504.4.1 Adhesives, sealants and caulks. Adhesives, sealants, and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall

comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

**TABLE 5.504.4.1
ADHESIVE VOC LIMIT^{1,2}**

Less Water and Less Exempt Compounds in Grams Per Liter

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesive	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesive not specifically listed	50
SPECIALTY APPLICATIONS	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
SUBSTRATE SPECIFIC APPLICATIONS	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

1. If an adhesive is used to bond dissimilar substrates together the adhesive with the highest VOC content shall be allowed.
2. For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168, <http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF>.

**TABLE 5.504.4.2
SEALANT VOC LIMIT**

Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS	CURRENT VOC LIMIT
Architectural	250
Marine deck	760
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
SEALANT PRIMERS	
Architectural	
Nonporous	250
Porous	775
Modified bituminous	500
Marine deck	760
Other	750

Note: For additional information regarding methods to measure the VOC content specified in these tables, see South Coast Air Quality Management District Rule 1168.

5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 5.504.4.3 shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board Suggested Control Measure, and the corresponding Flat, Nonflat or Nonflat-High Gloss VOC limit in Table 5.504.4.3 shall apply.

5.504.4.3.1 Aerosol paints and coatings. Aerosol paints and coatings shall meet the PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

5.504.4.3.2 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification
2. Field verification of on-site product containers

**TABLE 5.504.4.3
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS^{2,3}**
Grams of VOC per Liter of Coating,
Less Water and Less Exempt Compounds

COATING CATEGORY	CURRENT LIMIT
Flat coatings	50
Nonflat coatings	100
Nonflat-high gloss coatings	150
SPECIALTY COATINGS	
Aluminum roof coatings	400
Basement specialty coatings	400
Bituminous roof coatings	50
Bituminous roof primers	350
Bond breakers	350
Concrete curing compounds	350
Concrete/masonry sealers	100
Driveway sealers	50
Dry fog coatings	150
Faux finishing coatings	350
Fire resistive coatings	350
Floor coatings	100
Form-release compounds	250
Graphic arts coatings (sign paints)	500
High temperature coatings	420
Industrial maintenance coatings	250
Low solids coatings ¹	120
Magnesite cement coatings	450
Mastic texture coatings	100
Metallic pigmented coatings	500
Multicolor coatings	250
Pretreatment wash primers	420
Primers, sealers, and undercoaters	100
Reactive penetrating sealers	350
Recycled coatings	250
Roof coatings	50
Rust preventative coatings	250
Shellacs	
Clear	730
Opaque	550
Specialty primers, sealers and undercoaters	100
Stains	250
Stone consolidants	450
Swimming pool coatings	340
Traffic marking coatings	100
Tub and tile refinish coatings	420
Waterproofing membranes	250
Wood coatings	275
Wood preservatives	350
Zinc-rich primers	340

1. Grams of VOC per liter of coating, including water and including exempt compounds.
2. The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.
3. Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available from the Air Resources Board.

5.504.4.4 Carpet systems. All carpet installed in the building interior shall meet at least one of the following testing and product requirements:

1. Carpet and Rug Institute's Green Label Plus Program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method VI.1 or *Specification 01350*);
3. NSF/ANSI 140 at the Gold level or higher;
4. Scientific Certifications Systems Sustainable Choice; or
5. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database.

5.504.4.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute's Green Label program.

5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 5.504.4.1.

5.504.4.5 Composite wood products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.) Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

**TABLE 5.504.4.5
FORMALDEHYDE LIMITS¹
Maximum Formaldehyde Emissions in Parts per Million**

PRODUCT	CURRENT LIMIT
Hardwood plywood veneer core	0.05
Hardwood plywood composite core	0.05
Particleboard	0.09
Medium density fiberboard	0.11
Thin medium density fiberboard ²	0.13

1. Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333. For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.
2. Thin medium density fiberboard has a maximum thickness of $\frac{7}{16}$ inch (8 mm).

5.504.4.5.1 Early compliance. Reserved.

5.504.4.5.3 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.

2. Chain of custody certifications.
3. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, *et seq.*).
4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
5. Other methods acceptable to the enforcing agency.

5.504.4.6 Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Compliant with the Collaborative for High Performance Schools California (2014 CA-CHPS) Criteria and listed in the CHPS High Performance Product Database; or
4. Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program).

5.504.4.6.1 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air that provides at least a Minimum Efficiency Reporting Value (MERV) of 13. MERV 13 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exception: Existing mechanical equipment.

5.504.5.3.1 Labeling. Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

5.504.7 Environmental tobacco smoke (ETS) control. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; or as enforced by ordinances, regulations or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions.

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SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Removal of selected portions of site improvements.
2. Salvage of existing items to be reused, recycled, or returned to Owner.

B. Related Requirements:

1. Division 01 Section "Summary of Work" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
3. Division 01 Section "Construction Waste Management" for waste management procedures.
- 4.

1.3 DEFINITIONS

- A. "Reinstall": Carefully detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall as indicated.
- B. "Remove": Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- C. "Remove and Deliver to Owner" or "Salvage and Deliver to Owner": Carefully detach from existing construction, in a manner to prevent damage, and deliver to location designated by Owner.
- D. "Replace": Remove items and provide new items as indicated per specifications.
- E. "Salvage and Stock Pile for Reuse": Detach items from existing construction, prepare for reuse, and stockpile on site. Reinstall where indicated.
- F. "Existing to Remain": Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed or salvaged.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, removal waste becomes property of Contractor.

SELECTIVE DEMOLITION 02 41 19 - 1

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Removal Activities: Indicate the following:
 - 1. Detailed sequence of selective removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner or stock piled on site for reuse prior to start of removal work. Provide report for each item to be salvaged and condition.
- E. Pre-Removal Photographs or Video: Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged, either delivered to Owner or reinstalled.

1.7 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective removal.
- C. Storage or sale of removed items or materials on-site is not permitted.
- D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective removal operations.
 - 1. Maintain fire-protection facilities in service during selective removal operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

SELECTIVE DEMOLITION 02 41 19 - 2

- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective removal required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, or preconstruction videotapes.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective removal or removal of existing site elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective removal and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities".
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and site improvements to remain.
 - 1. Provide protection to ensure safe passage of people around selective removal area and to and from occupied portions of buildings.
 - 2. Provide temporary weather protection, during interval between selective removal of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective removal operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being removed.
 - 1. Strengthen or add new supports when required during progress of selective removal.

3.3 SELECTIVE REMOVAL, GENERAL

- A. General: Remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective removal systematically.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Dispose of removed items and materials promptly.
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not remove site elements beyond what is indicated on Drawings without Architect's approval.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area off-site designated by Owner.
 - 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective removal. When permitted by Architect, items may be removed to a suitable, protected storage location during selective removal and cleaned and reinstalled in their original locations after selective removal operations are complete.

3.4 DISPOSAL OF REMOVED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove materials from Project site and legally dispose of them in accordance with Division 01 Section "Construction Waste Management".
 - 1. Do not allow removed materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

- B. Disposal: Transport removed materials off Owner's property and legally dispose of them.

3.5 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective removal operations. Return adjacent areas to condition existing before selective removal operations began.

3.6 SELECTIVE REMOVAL SCHEDULE

- A. See Drawings for removal work.

END OF SECTION

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SECTION 033700

MEMBRANE FORMING CURING SEALING COMPOUND

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes [Drawing Designation CF-1]: Membrane forming curing compounds for new construction. Multi-function acrylic curing and sealing material, with high solid contents and water-borne formulation for all new concrete slabs, including slab-on-grade, elevated slabs, stair treads and landings.
 - 1. Includes application of first coat for use as curing compound, and second coat as sealer for exposed concrete.
- B. Related Sections:
 - 1. Division 01 Section "CALGreen Requirements" for general CALGreen requirements applicable to work of this section.

1.3 REFERENCES

- A. American Society for Testing Materials (ASTM).
 - 1. ASTM C 309 Standard Specification for Membrane Forming Curing Compounds.
 - 2. ASTM C 1315 Standard Specification for Liquid Membrane-Forming Compounds, having Special Properties for Curing and Sealing Concrete.

1.4 SUBMITTALS

- A. CALGreen Submittals:
 - 1. Product Data for CALGreen Mandatory Requirement 5.504.4.3 for paints and coatings including printed statement of VOC content.
- B. Product Data: For each type of product indicated.
- C. Manufacturers' application instructions.

PART 2 - PRODUCTS

2.1 CALGREEN REQUIREMENTS

- A. Paints and other coatings shall be compliant with VOC and other toxic compound limits as specified in Division 01 Section "CALGreen Requirements" for Environmental Quality, Finish Material Pollutant Control, Mandatory Measure 5.504.4.3.

MEMBRANE FORMING CURING SEALING COMPOUND 033700 - 1

2.2 BASIS-OF-DESIGN PRODUCT

- A. Subject to compliance with requirements, provide L&M Construction Chemicals, Inc., Omaha, NE (800) 362-3331, www.lmcc.com product specified

2.3 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product specified, or approved equal.
 - 1. Manufacturer: L & M Construction Chemicals.
 - 2. Product: Dress & Seal WB 30 (ASTM C 1315) water-based, low odor curing compound.
 - a. Acrylic cure-sealer-dust proofer. Apply 2 coats. First coat as a curing compound; second coat to be used as sealer coat. Shall comply with local VOC requirements and ASTM C1315 Type 1, Class B (minimal yellowing).

PART 3 - EXECUTION

3.1 APPLICATION

- A. Apply first coat of membrane forming curing compound to concrete in accordance with manufacturer's requirements after final finishing operations and concrete surface glaze has disappeared.
- B. Concrete shall be protected from premature or excessive drying temperature extremes and damage immediately following finishing. Minimal moisture loss at relatively constant temperature shall be maintained.
- C. Curing shall be maintained for a minimum of seven days or until seventy percent of the specified concrete strength has been obtained.
- D. During curing period, concrete shall be protected from damage by equipment, temperature change, stored materials, jobsite activities, rain, and running water.
- E. In areas where subsequent topping is scheduled follow manufacturers' recommendations for curing the concrete and removal of curing compound.
- F. Apply second sealer coat of membrane forming curing compound to concrete in accordance with manufacturer's requirements at locations where finished concrete is indicated to be sealed and left exposed.

3.2 FIELD QUALITY CONTROL

- A. Examine the curing compound work to determine that the concrete is suitably protected by the material.

END OF SECTION

SECTION 03 54 13

GYPSUM CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes self-leveling, gypsum cement underlayment for application below interior floor coverings.
- B. Related Requirements:
 - 1. Division 09 finishes and Drawings including Interior Finish Schedule for floor finish materials, locations, and application procedures for floor finish materials installed over cementitious underlayment.
 - 2. Structural Drawings and specifications for subfloor materials, thickness, edge treatment of sheathing and deflection.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions with project conditions and materials clearly identified and detailed for each required product and system.
- B. Shop Drawings: Include plans indicating underlayment system, materials, locations, and depths of underlayment systems.
- C. Acoustical Data: Submit sound tests according to IBC code criteria ASTM E492 (IIC) and ASTM E90 (STC)
 - 1. Submit in writing that all sound tests or data provided has been tested according to UL (Underwriters Laboratory) fire resistance design number.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

GYPSUM CEMENT UNDERLAYMENT 03 54 13 - 1

- B. All materials, unless otherwise indicated, shall be manufactured and installed in accordance with current printed directions of manufacturer.
- C. Product compatibility: Manufacturers of underlayment and finished flooring systems shall certify in writing that products are compatible.
- D. Testing:
 - 1. Underlayment mix shall be tested for a slump using a 2 inches (interior diameter.) by 4-inch cylinder resulting in a patty size of 8 inches to 9-1/2 inches.
 - 2. At least one set of three molded cube samples shall be taken from each day's pour or every 10,000 square feet whichever is less during the underlayment application. Cube shall be tested in accordance with ASTM C472 and shall achieve 3500 psi minimum compressive strength.
 - 3. If requested by the Architect or Owner, field control cube samples may be tested by independent laboratory. Selection of independent laboratory shall be agreeable to the Architect, Owner, manufacturer and installer. Copy of compressive test results shall be made available to manufacturer and installer.

1.7 DELIVERY STORAGE AND HANDLING

- A. All materials shall be delivered in their original unopened packages and stored in an enclosed shelter providing protection from damage and exposure from the elements. Damaged or deteriorated materials shall be removed from the premises.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 - 1. Place gypsum cement underlayment only when ambient temperature and temperature of substrates are between 50- and 80-degrees F.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. IIC-Rated Assemblies: For IIC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 492 and classified according to ASTM E 989 by an independent testing agency.

GYPSUM CEMENT UNDERLAYMENT 03 54 13 - 2

- D. Gypsum cement underlayment, sound mats, primers, sealers and all accessories shall be from same manufacturer.

2.2 SYSTEM DESIGN REQUIREMENTS

- A. System 'A' (Provide at Locations Indicated): Design Requirements for Gypsum Cement Underlayment with Sound Mat:
 - 1. Minimum Gypsum Cement Thickness (Not Including Sound Mat): 1 inch.
 - 2. Sound Mat Thickness: 1/4 inch minimum. Varies. Manufacturer's standard thickness.

2.3 GYPSUM CEMENT UNDERLAYMENT AND ACCESSORIES

- A. Gypsum Cement Underlayment: Self-leveling, gypsum cement product that can be applied in minimum uniform thickness.
 - 1. Manufacturers: Subject to compliance with requirements, provide one of the following products:
 - a. Hacker Industries, Incorporated, 'Firm-Fill High Strength' with 1/4-inch-thick 'Sound Mat II' Sound Control Mat for System 'A'.
 - b. Maxxon Corporation, 'Dura-Cap' with 1/4-inch-thick 'Acousti-Mat II' Sound Control Mat for System 'A'.
 - c. United States Gypsum Company, 'Levelrock Floor Underlayment 3500' with 1/4-inch-thick 'SAM-N25' Sound Control Mat for System 'A'.
 - 2. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C 219.
 - 3. Compressive Strength: Not less than 3200 psi at 28 days when tested according to ASTM C 109.
 - 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
 - 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 degrees F.
- D. When applied over wood, some manufacturers recommend reinforcing their products; consult manufacturers. Retain "Reinforcement" Paragraph below if required for Project.
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
- F. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

GYPSUM CEMENT UNDERLAYMENT 03 54 13 - 3

- G. Isolation Strips: Acoustical Solutions “Iso-Step Perimeter Isolation Strip” or approved equal as recommended by underlayment manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with installer present, for conditions affecting performance of the Work.
- B. Wood substrate shall be structurally sound, properly fastened, and dry. Contractor shall clean subfloor to remove mud, oil, grease, dust and other contaminating factors before arrival of the authorized applicator.
 - 1. Limit design of subfloor and framing to a maximum deflection of L/360 Total Load.
 - 2. Wood shall be APA rated T&G or back blocked at joints.
- C. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.

- 3.3 Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.

- 3.4 Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

- A. Sound Control Mat: Install sound control materials according to manufacturer's written instructions.
 - 1. Do not install mechanical fasteners that penetrate through the sound control materials.
 - 2. Where application requires a sound mat, the installation of a perimeter isolation strip is required prior to pouring floor topping in accordance with manufacturer's product literature and application details.

3.5 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions, proportioned to provide an average compressive strength of 3,200 psi or greater.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum adhesion to substrate and between coats.

3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
 1. If acceptable to manufacturer primer may be omitted where cementitious underlayment is installed over sound mats.
- C. Apply underlayment to produce uniform, level surface and thickness.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Seal top of gypsum cement underlayment prior to application of glue down flooring. Consult with flooring manufacturer and coordinate flooring manufacturer's recommendations with work of this Section.
 1. Apply surface sealer of type and at rate recommended by gypsum cement underlayment manufacturer.
- G. Remove and replace underlayment areas that do not meet performance requirements or evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.6 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

3.7 INSTALLATION OF FINISH FLOOR

- A. General Requirements:
 1. Damaged areas of the underlayment must be repaired prior to applying any sealer or treatment.
 2. Heavily soiled floors need to be cleaned and free from paint, dirt, dust, or foreign matter. The use of oil-based cleaning compounds is strictly prohibited.
 3. Apply only approved sealers or surface enhancer as recommended for application and by the manufacturer.
 4. Fasteners to be installed in underlayment shall be designed for use in concrete or masonry systems.
 5. Follow manufacturer's recommendations regarding moisture levels and vapor retarders before proceeding with installation of finish floor system.
 6. Floor shall be dry prior to installation of finished floor or application of floor coatings. Check dryness by taping an 18 inch by 18-inch section of plastic and checking for condensation or discoloration after 16 to 24 hours. (ASTM D4263) or use a Protimeter® SM Survey Master following floor underlayment recommendations.
- B. Floor Finish Applications:

1. Follow floor covering and adhesive manufacturer's guidelines for:
 - a. Proper application and procedures (ASTM F2419).
 - b. Adequate curing or setting time prior to allowing traffic on finished floor.
 - c. Proper trowel selections regarding porous-non porous substrates.
2. Install floor coverings in accordance with trade association guidelines and printed recommendations referenced in each floor covering section.

END OF SECTION

SECTION 05 50 13

ARCHITECTURAL METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for counters.
2. Steel framing and supports for mechanical and electrical equipment.
3. Rain water leaders.
4. Pipe, tube and bar guardrails, handrails and brackets.
5. Elevator machine beams.
6. Steel shapes for supporting elevator door sills.

B. Related Sections:

1. Division 05 Section "Metal Ladders".
2. Division 09 Section "Exterior Painting".

1.3 SUBMITTALS

A. Product Data.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show weld and fastener type and sizes. Show anchorage and accessory items.

C. Welding certificates.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

C. Welding certificates.

ARCHITECTURAL METAL FABRICATIONS 05 50 13 - 1

- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- C. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

ARCHITECTURAL METAL FABRICATIONS 05 50 13 - 2

1. Provide stainless-steel fasteners for fastening aluminum.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- D. Plain Washers: Round, ASME B18.22.1.
- E. Lock Washers: Helical, spring type, ASME B18.21.1.
- F. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with the scheduled finish system and Division 09 painting Sections.
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

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

2.7 COUNTER SUPPORTS

- A. Fabricate shelf supports from steel angles and HHS of sizes indicated and for attachment to structure. Miter joints as indicated. Provide continuous welding for all joints.
- B. Prime shelf angles located in exterior walls with zinc-rich primer.

2.8 RAIN WATER LEADERS

ARCHITECTURAL METAL FABRICATIONS 05 50 13 - 4

- A. All rain water leaders shall be galvanized schedule 40 steel pipe, with welded joints. Terminate all downspouts at grade with cast-iron downspout shoes with clean out per the Plumbing Drawings connected to storm drain system.

- B. Prime rain water leader welded joints and cast iron downspout boots with zinc-rich primer.

2.9 PIPE, TUBE AND BAR GUARDRAILS, HANDRAILS AND BRACKETS

- A. Pipe, Tube and Bar Guardrails and Handrails: Provide as indicated on Drawings.

- B. Tube Railing Wall Brackets: Provide Wagner, 1959R, 1/4-Inch Formed Wall Mount Bracket, 3-inch Center Line, Satin Stainless Steel with 1 Hole. Provide 6-inches from each rail termination and maximum 4-feet on center evenly spaced along rail.

2.10 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Finish metal fabrications after assembly.

- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.11 STEEL AND IRON FINISHES

- A. Galvanizing: All exterior work shall be hot-dip galvanize to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products. Hot-dip galvanize interior work as indicated.

- 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, coated with intumescent paint, or unless otherwise indicated.

- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

- 1. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."

- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

- 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 2. For steel in rated assemblies, shop prime with product compatible with fire resistive coating.

ARCHITECTURAL METAL FABRICATIONS 05 50 13 - 5

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

- 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

- 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

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SECTION 05 51 33

METAL LADDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Fixed aluminum access ladders.

1.3 RELATED SECTIONS

- A. Division 05 Section "Architectural Metal Fabrications" for fasteners and installation requirements used to attach ladders to structure.

1.4 REFERENCES

- A. AA: Aluminum Association.
- B. ASTM B 209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- C. ASTM B 221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- D. OSHA 1910.27: Fixed Ladders.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product.
- B. Shop Drawings:
 - 1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. Provide reaction loads for each hanger and bracket.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.
 - 1. Record of successful in-service performance.
 - 2. Sufficient production capacity to produce required units.

- B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.
- C. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurement before fabrication.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

1.9 WARRANTY

- A. Manufacturer has responsibility for an extended corrective period for work of this Section for a period of 5 years from date of completion against all the conditions indicated below, and when notified in writing from Owner, manufacturer shall promptly and without inconvenience and cost to Owner correct said deficiencies.
 - 1. Defects in materials and workmanship.
 - 2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third party testing laboratory. Ordinary wear and tear, unusual abuse or neglect accepted.
 - 3. Within the warranty period, the manufacturer shall, at its option, repair, replace, or refund the purchase price of defective ladder.
- B. Manufacturer shall be notified immediately of defective products and be given a reasonable opportunity to inspect the goods prior to return. Manufacturer will not assume responsibility, or compensation, for unauthorized repairs or labor. Manufacturer makes no other warranty, expressed or implied, to the merchantability, fitness for a particular purpose, design, sale, installation, or use, of the ladder; and shall not be liable for incidental or consequential damages, losses or expenses, resulting from the use of ladder products.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.

2.2 ROOF ACCESS LADDERS

- A. Royalite <http://www.royalite-mfg.com/> fixed access ladder with dual safety posts specified:
- B. Roof Access Ladder:

1. Heavy Duty Tubular Rail with Dual Extension Safety Post.

- a. Royalite Model HLAB. Dimensions as indicated.

C. Finishes

1. Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.

D. Materials

1. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.
2. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

E. Fabrication

1. Rungs: Not less than 1-1/4 inches in section and 18-3/8 inches long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.
2. Rungs shall withstand a 1,500-pound load without deformation or failure.
3. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8-inch wall thickness by 3 inches wide. Construction shall be self-locking stainless-steel fasteners, full penetration TIG welds and clean, smooth, and burr-free surfaces.
4. Dual Ladder Safety Posts: Retractable hand hold and tie off.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance.
- B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.
- C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.3 PROTECTION

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

END OF SECTION

METAL LADDERS 05 51 33 - 3

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SECTION 06 16 43

GYPSUM SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Gypsum sheathing.
- B. Related Sections:
 - 1. Division 07 Section "Sheet Metal and Flexible Flashing" for primers for application for flexible flashing adhered to gypsum sheathing substrates.
 - 2. Division 09 Section "Portland Cement Plaster" for weather barrier installed over gypsum sheathing prior to application of Portland cement plaster.
 - 3. Division 09 Section "Gypsum Board" for interior gypsum board products and applications.

1.3 REGULATORY REQUIREMENTS

- A. Comply with DSA IR-25-3.13 for ceilings.

1.4 SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. All gypsum board products and accessories shall be manufactured in United States, no foreign made gypsum products allowed.
- B. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- C. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.6 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written recommendations.
- B. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.
- C. Contractor shall be responsible to protect all stocked and stored drywall materials from exposure to moisture. Drywall materials exposed to water and wetted beyond the manufacturer's recommendations, whether installed or stored, shall be removed from the site and disposed of, and replaced with new materials, at no added cost to the Owner.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Manufacturer: USG Corporation, Customer Service Center (800) 950-3839, USG4YOU Tech Support (800) 874-4968.

2.2 GYPSUM SHEATHING

- A. USG, "Securerock" Brand UltraLight Glass-Mat Sheathing.
 - 1. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.
 - 2. Type and Thickness: Type X, 1/2 inch or 5/8 inch thick as indicated.
 - 3. Size: 48 by 96 inches, 48 by 108 inches, or 48 by 120 inches for vertical installation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

- C. Coordinate wall sheathing installation with flashing and joint-sealant installation, so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- D. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- E. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to wood framing with nails or screws.
 - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 4. Install boards with a 1/4-inch gap where they abut concrete or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches on center and set back a minimum of 3/8 inch from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
 - 3. Seal sheathing joints according to sheathing manufacturer's written instructions.

3.3 PROTECTION

- A. Protect all work in place from weather and water damage. If sheathing gets wet prior to close in, Contractor shall test sheathing to insure that maximum moisture levels are not exceeded and shall replace all damaged sheathing prior to installation of exterior wall weather barriers and finishes.

END OF SECTION

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SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior cabinets and countertops.
 - 2. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
 - 3. Shop finishing of interior architectural woodwork.
- B. Related Sections include the following:
 - 1. Division 01 Section "CALGreen Requirements" for general CALGreen requirements applicable to work of this section.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

- A. CALGreen Submittals:
 - 1. Product Data for CALGreen Mandatory Requirement 5.504.4 for adhesives, sealants and caulks including printed statement of VOC content. Product Data: For each type of product indicated, including cabinet hardware and accessories.
- B. Product Data:
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 2. Show locations and sizes of cutouts and holes for plumbing fixtures, and other items installed in architectural woodwork.
 - 3. Where counters span more than 3 feet between cabinets show shop drawing details for supporting front edge and back of counter.

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D. Samples for Initial Selection:

1. Plastic laminates.
2. PVC edge material.

E. Product Certificates for Manufactured Casework: For each type of product, signed by product manufacturer.

F. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Source Limitations for Manufactured Casework: Provide casework manufactured by single manufacturer.

C. Quality Standard: Unless otherwise indicated, comply with North American Architectural Woodwork Standards (NAAWS) 3.1 for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide Woodwork Institute (WI) certified compliance labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.

D. Mockups:

1. Provide mockup.
2. Provide full size base and wall cabinet with drawers, door, adjustable shelf and countertop at location indicated.
3. Subject to acceptance and compliance with requirements mockup may remain as part of permanent work.

E. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate

measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

1.9 WARRANTY

- A. Provide 10-year warranty. Include coverage against defects in material and workmanship on casework including delaminating, and hardware.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product specified, or approved equal.

2.2 CALGREEN REQUIREMENTS

1. Adhesive, sealants and caulks shall be compliant with VOC and other toxic compound limits as specified in Division 01 Section "CALGreen Requirements" for Environmental Quality, Finish Material and Pollutant Control, Mandatory Measure 5.504.4.1 Adhesives, Sealants and Caulks.
2. CALGreen Section 5.504.4.5, Composite Wood Products: Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control measure for Composite Wood (17 CR 93120 et seq.), by or before the dates specified in those sections, as shown in attached CALGreen Table 5.504.4.5.
 - a. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall be in accordance with CALGreen 5.504.4.5.3.

2.3 MATERIALS

- A. General: Provide materials that comply with requirements of WI's quality standards for each type of woodwork and quality grade specified, unless otherwise indicated.

- B. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Manufacturer:

- a. Wilsonart LLC, or approved equal.

- 1) Wilsonart Sales Contact: Sherri Collinwood, collins@wilsonart.com (916) 718-8300.

2. Product:

- a. Standard Decorative Laminate:

1. Grade: 12, HGP
2. Thickness: 0.035 Inches.
3. Surface burning characteristics in accordance with ASTM E84.
4. Colors and Patterns as selected by Architect from manufacturer's full range.

- b. Solid Color Decorative Laminate:

1. Grade: HCS
2. Thickness: 0.040 Inches.
3. Surface burning characteristics in accordance with ASTM E84.
4. Colors and Patterns as selected by Architect from manufacturer's full range.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets conforming to BHMA 156.9.
- B. Hinges: Grade I, 2-1/2-inch RPC, 5-knuckle institutional wrap-around steel hinges made by Stanley Hardware, or approved equal. Hinges shall be rabbited flush into door edges.
- C. Pulls: Back mounted, solid metal, style and finish as selected by Architect from manufacturer's full range.
- D. Adjustable Shelf Standards and Supports: Knappe & Vogt No. 255 recessed standard with KV 256 shelf support.
- E. Drawer Slides:
1. Heavy Duty Grade 1HD-100: Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
 2. Box Drawer Slides: Accuride Model 3832SC for drawers not more than 6 inches and up to 16" wide; or Accuride Model 7432 for drawers not more than 6 inches high and up to 24 inches wide.
 3. File Drawer Slides: Accuride Model 4034 Full extension for drawers more than 6 inches high or 24 inches wide.

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4. Pencil Drawer Slides: Accuride Model 2006 for drawers not more than 3 inches high and 24 inches wide.
- F. Locks: Provide cabinet and drawer locks at 25 percent of all drawers and cabinet doors keyed same as door hardware locksets in accordance with Division 08 Section "Door Hardware". Verify keying pattern (random, alike, by room etc.), number of keys per lock, and key hierarchy (master, grand master etc.) with District during Submittal process.
 - G. Grommets for Cable Passage through Countertops: 2-inch OD, black molded-plastic grommets and matching plastic caps with slot for wire passage.
 1. Product: Subject to compliance with requirements, provide "OG series" by Doug Mockett & Company, Inc.
 - H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Stainless Steel: BHMA 630.
 - I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- 2.5 MISCELLANEOUS MATERIALS
- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
 - B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
 - C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement .
 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- 2.6 FABRICATION, GENERAL
- A. Interior Woodwork Grade: Unless otherwise indicated, provide "Custom Grade" interior woodwork complying with referenced quality standard.
 - B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
 - C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

INTERIOR ARCHITECTURAL WOODWORK 06 40 23 - 5

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
1. Seal edges of openings in countertops with a coat of varnish.

2.7 PLASTIC-LAMINATE CABINETS

- A. WI Construction Style: Style A, Frameless.
- B. WI Construction Type: Type I, multiple self-supporting units rigidly joined together.
- C. WI Door and Drawer Front Style: Flush overlay.
- D. Reveal Dimension: 1/8 inch.
- E. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 1. Horizontal Surfaces Other Than Tops: Grade HGS.
 2. Tops: Chemical Resistant Laminate.
 3. Post-formed Surfaces: Grade HGP.
 4. Vertical Surfaces: Grade HGS.
 5. Edges: PVC edge banding 0.12-inch thick, in color, pattern, and finish as indicated on Drawings.
- F. Materials for Semi-Exposed Surfaces:
 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
 - a. Edges of Plastic-Laminate Shelves: PVC edge banding 0.12-inch thick, matching laminate in color, pattern, and finish.
 - b. For semi-exposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
 2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
 3. Drawer Bottoms: Thermoset decorative panels.
- G. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

- H. Colors, Patterns, and Finishes: As selected by Architect from manufacturer's full range.

2.8 PLASTIC-LAMINATE COUNTERTOPS

- A. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Colors and Patterns:
 - a. [Drawing Designation PL-1]: Wilsonart "Waxed Maple" 8905.
 - b. [Drawing Designation PL-2]: Wilsonart "Noctune" 5353.
- B. Grain Direction: Parallel to cabinet fronts.
- C. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- D. Core Material: Particleboard or medium-density fiberboard.
- E. Core Material at Sinks: Particleboard or medium-density fiberboard made with exterior glue or exterior-grade plywood.
- F. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.
- G. Paper Backing: Provide paper backing on underside of countertop substrate.
- H. Integral cove backsplash, height as indicated on Drawings.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- C. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

3.2 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.3 INSTALLATION

INTERIOR ARCHITECTURAL WOODWORK 06 40 23 - 7

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish indicated.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches on center with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches on center and to walls with adhesive.
 - 3. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 07 21 00

BUILDING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Thermal insulation.
 - 2. Sound attenuation insulation.
 - 3. Fire safing insulation.
- B. Related Sections:
 - 1. Division 07 Section “SBS Modified Bituminous Membrane Roofing” for rigid thermal insulation below built-up roofing.

1.3 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.

2.2 BATT INSULATION

- A. All insulation materials shall be formaldehyde free.
- B. All batts widths shall be sized for compression fit in metal stud walls and joist spaces.
- C. Subject to compliance with requirements provide Knauf Insulation, "ECOBatts."
- D. Unfaced, Glass-Fiber, Blanket Insulation: Blanket sizes as indicated in Building Insulation Schedule at end of this Section and Drawings. Formaldehyde free. ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.3 FIRE SAFING INSULATION

- A. Subject to compliance with requirements, provide Owens Corning (Thermafiber) product specified.
- B. Flexible Fire Blocking: Provide Thermafiber, Fire Containment Safing Insulation, 4.0 pcf with vapor retarding foil face, and 90% special "Green" fiber, in thickness to fill joint widths indicated, 48 or 60 inch widths.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping. See DIVISION 22 "PLUMBING" Sections for pipe insulation requirements; and DIVISION 23 "HVAC" Sections for duct insulation.
- E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.
- F. Thermal insulation shall be installed to meet the Title-24 "Quality Insulation Installation" standards.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions.
- B. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
- C. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where indicated. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 pounds /cubic foot.

3.5 PROTECTION

- A. Repair or replace all insulation from damage due to harmful weather exposures, physical abuse, and other causes prior to insulation being concealed and protected by permanent construction.

3.6 BUILDING INSULATION SCHEDULE

- A. General: Provide insulation types and sizes indicated below, and as indicated on Drawings.

- B. Insulation Type: Unfaced, Glass-Fiber Blanket Insulation.

- 1. Interior Stud Walls:

- a. 4 inches thick, R13 at 2 x 4 inch stud walls.
 - b. 6 inches thick, R19 at 2 x 6 inch stud walls.

- 2. Exterior Stud Walls:

- a. 6 inches thick, R19 at 2 x 6 inch studs walls.
 - b. 8 inch thick, R25 at 2 x 8 inch studs walls.

- 3. Interior Floor/Ceiling Assemblies:

- a. 6-1/2 inch thick, R19.

- 4. Exterior Roof Assemblies:

- a. Framed Penthouse Roof Assemblies: R30, (R-25 batt insulation below sheathing; plus 2-inch minimum, sloped, R-5 inch average polyisocyanurate insulation in roofing system).

3.7 FIRE SAFING INSULATION:

- A. Insulation Type: Unfaced, Mineral-Wool Blanket Insulation.

- B. Locations Indicated: Provide as indicated and compact to densities required to meet fire safing requirements required by building code.

END OF SECTION

SECTION 07 26 16

BELOW-SLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Vapor barrier and installation accessories for installation under concrete slabs.
- B. Related work includes the following:
 - 1. Division 01 Section "CALGreen Requirements" for mandatory vapor barrier requirements.
 - 2. See Structural Drawings for concrete slab and base sections.
 - 3. See Soils Geotechnical Investigation for geotechnical recommendations.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
 - 2. ASTM E1643 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. Technical Reference - American Concrete Institute (ACI):
 - 1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
 - 2. ACI 302.1R-15: Guide to Concrete Floor and Slab Construction.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- 1. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- 2. Summary of test results per paragraph 9.3 of ASTM E1745.
- 3. Manufacturer's samples and literature.
- 4. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.

5. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.
6. Contact vapor barrier manufacturer to coordinate a review of the vapor barrier installation either by digital review or in person.
7. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

1.6 QUALITY ASSURANCE

- A. Reference Standards: Manufacturer's product specifications and installation requirements.
- B. Geotechnical Investigation report recommendations.

1.7 WARRANTIES

- A. Provide manufacturer's written warranty that its products will perform to their published specifications when installed according to accepted industry standards and manufacturer's installation procedures. Provide installer's written warranty that all products have been installed according to accepted industry standards and manufacturer's installation procedures.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 1. Manufacturer: Stego Industries LLC.
 2. Product: 20-mil, "Stego Wrap Vapor Barrier" and accessories.
- B. Vapor barrier shall have the following qualities:
 1. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 2. Strength: ASTM E1745 Class A.
 3. Thickness: 20 mils minimum
- C. Accessories:
 1. General: All accessories shall be manufactured by vapor barrier manufacturer and installed according to manufacturer's installation procedures.
 2. Seams:
 - a. Stego Tape.
 3. Sealing Penetrations of Vapor barrier:
 - a. Stego Mastic.
 - b. Stego Tape.
 4. Perimeter/terminated edge seal:

BELOW-SLAB VAPOR BARRIER 07 26 16 - 2

- a. Stego Crete Claw.
 - b. Stego Term Bar.
 - c. StegoTack Tape (double-sided sealant tape).
- 1) Use of one-sided seaming tape to seal the perimeter is not a recommended method of sealing at the terminated edge.
- 5. Penetration Prevention:
 - a. Stego Beast Foot.
 - 6. Vapor Barrier-Safe Screed System
 - a. Stego Beast Screed.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure that subsoil is level and base material is compacted.
 - 1. Level and compact base material.

3.2 INSTALLATION

- A. Installation shall be in accordance with manufacturer's instructions, and ASTM E1643 over capillary moisture break consisting of at least 4 inches of clean, free-draining gravel or crushed rock.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
 - 2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At all points of termination (block-outs, interior grade beams, perimeter edge, etc.), mechanically seal vapor barrier to the slab itself using Stego Crete Claw, per manufacturer's instructions.
 - a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions, or
 - b. Seal vapor barrier to the entire perimeter wall or footing/grade beam with double sided StegoTack Tape, or both Stego Term Bar and StegoTack Tape, per manufacturer's instructions. Ensure the concrete is clean and dry prior to adhering tape.
 - 3. Overlap joints 6 inches and seal with manufacturer's seam tape.
 - 4. Apply seam tape/Crete Claw to a clean and dry vapor barrier.
 - 5. Seal all penetrations (including pipes) per manufacturer's instructions.
 - 6. For interior forming applications, avoid the use of non-permanent stakes driven through the vapor barrier. Use female-threaded screed pad posts with nail holes and insert them

BELOW-SLAB VAPOR BARRIER 07 26 16 - 3

into Beast Foot. Ensure Beast Foot's peel-and-stick adhesive base is fully adhered to the vapor barrier.

7. If non-permanent stakes must be driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
8. Use reinforcing bar supports with base sections that eliminate or minimize the potential for puncture of the vapor barrier.
9. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.
10. For a vapor barrier-safe, fixed-elevation screed concrete application, install Beast Screed (vapor barrier-safe screed system) per manufacturer's instructions prior to placing concrete.

3.3 SCHEDULE OF UNDERSLAB VAPOR BARRIER LOCATIONS:

- A. Provide below all slabs on grade below buildings.

END OF SECTION

SECTION 07 54 23

THERMOPLASTIC TRI-POLYMER (TPA) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY OF WORK-

- A. This Section includes the following:
 - 1. Mechanically attach insulation/ Dens Deck with screws and plates.
 - 2. Roof membrane: Fully adhered single ply membrane.
 - 3. Baseflashings at curbs, equipment platform and walls.
 - 4. Penetrations and projections.
 - 5. Drains, overflows scuppers.
 - 6. Miscellaneous details.
 - 7. Blocking for existing pipes, conduit, etc. shall be re-cycled rubber triangle blocks
 - 8. Furnish and install new walkway in designated areas
 - 9. New low profile expansion joint.
- B. Related Sections include the following:
 - 1. Division 07 Section "Sheet Metal and self-Adhered Flashing" for metal edge flashings, gutters, and counter flashings.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," before multiplication by a safety factor.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.
- D. FMG Listing: Provide roofing membrane, base flashings, and component materials that comply with requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
 - 1. Fire/Windstorm Classification: Class 1A 90.
 - 2. U.L. Class A fire rating
- E. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist the factored design uplift pressures calculated according to SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems."
- F. Product Data: For each type of product indicated.
- G. Shop Drawings: For roofing system. Include plans, sections, details, and attachments to other Work.
 - 1. Base flashings and membrane terminations.
 - 2. Cricketed or tapered insulation, as it applies, including slopes.
 - 3. Dens Deck fastening patterns.
- H. Samples for Verification: For the following products:
 - 1. 12-by-12-inch square of roofing membrane, of color specified.
 - 2. 12-by-12-inch square of roof insulation.
 - 3. Six insulation fasteners of each type, length, and finish.
- I. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- J. Qualification Data: For Installer and manufacturer.
- K. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.
- L. Research/Evaluation Reports: For components of membrane roofing system.
- M. Maintenance Data: For roofing system to include in maintenance manuals.
- N. Warranties: Special warranties specified in this Section. Provide unexecuted copy of warranty for review and approval.

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- O. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has UL listing, FMG approval for membrane roofing system identical to that used for this Project.
- C. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer.
- E. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
 - 1. Fire-Resistance Ratings: UL Class A, for fire-resistance-rated roof assemblies of which roofing system is a part.
- F. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 5. Review structural loading limitations of roof deck during and after roofing.
 - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 7. Review governing regulations and requirements for insurance and certificates if applicable.
 - 8. Review temporary protection requirements for roofing system during and after installation.
 - 9. Review roof observation and repair procedures after roofing installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard warranty form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 - 1. Special warranty includes roofing membrane, baseflashings, roofing membrane accessories, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system, whether manufactured by or approved by the manufacturer for 20 [twenty] years from date of Substantial Completion.
- B. Maintenance Service Agreement: Manufacturer's standard form, in which manufacturer agrees to provide the following service for the roof system during the second, fifth, tenth, and year fifteen of the warranty period specified above:
 - 1. Inspection of the roof membrane and associated roofing system components listed above by a manufacturer's technical service representative.
 - 2. Report of inspection documenting roofing conditions.
 - 3. Routine preventive maintenance and repairs to damage to the roof system, excluding such damage to the roof system excluded from the warranty and service agreements as a result of neglect, negligence, vandalism or other excluded cause as described in manufacturer's published terms and conditions at the date of this contract.
 - 4. General rooftop housekeeping and cleanup, subject to limits, but generally including removal of incidental debris.

5. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period: years from date of Substantial Completion.

C. Special project warranty: Submit roofing installers warranty, on warranty form at end of this section, signed by installer, covering work of this section, including all components of the membrane roofing system such as membrane, baseflashing, roof insulation, fasteners, walkway products, for the following warranty period:

- C. 1. Warranty period: Two [2] years from date of substantial completion

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of design: Product requirements in section are based upon Tremco, Inc. products named in Part 2 articles. Subject to compliance with requirements, provide the named product.
- B. Manufacturer: Subject to compliance with requirements, provide the following:
 1. TPA single ply membrane –CRRC approved membrane system
 2. Roof system meeting the following requirements:
 - a. Warranty requirements and coverage. Follow up inspections, housekeeping and preventative maintenance.
 - b. Regulatory requirements

2.2 TPA ROOFING - TPA FLEECE BACKED MEMBRANE

- A. Fabric-Reinforced TPA Sheet: Uniform, flexible sheet formed from a thermoplastic fabric or scrim reinforced, and as follows:
 1. Thickness: 60 mils fleeced back product.
 2. Exposed Face Color: 2 colors. "White" at building mechanical wells. Custom color as selected by Architect at walkway canopies.
 3. Physical Properties:
 - a. Tensile Strength: MD 537 lbf/in and XMD lbf/in ASTM D 751, grab method.
 - b. Elongation at Break: 40 percent; ASTM D 751.
 - c. Tearing Strength: 100 lbf minimum; ASTM D 751, Procedure B.
 - d. Brittleness Point: Minus 22 deg F .

- e. Ozone Resistance: No cracks after sample, wrapped around a 3-inch- diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F and an ozone level of 100 pphm ; ASTM D 1149.
- f. Resistance to Heat Aging: 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 deg F; ASTM D 573.
- g. Water Absorption: Less than 4 percent mass change after 166 hours' immersion at 158 deg F ; ASTM D 471.
- h. Linear Dimension Change: Plus or minus 2 percent; ASTM D 1204.

2.3 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
 - 1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.
- C. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic sheet flashing, **55 mils** thick, minimum, of same color as sheet membrane.
- D. Bonding Adhesive: Manufacturer's standard **water**-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings. Elastomeric adhesive by roof systems manufacturer
- E. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.
- F. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.
- I. Liquid applied coatings: Alpha Guard fluid applied system consisting of: primer, base coat, fiberglass reinforcement and top coat. Primer: Multi use primer – Low volatile, water based quick drying primer, one [1] part used to promote adhesion Base coat –One [1] part, moisture triggered polyurethane base roof coating, fiberglass reinforcement- Medium fine fiber, rapid wetting chopped strand mat. Top coat – one [1] part moisture triggered polyurethane top coat.
- J. Caulking: one [1] and two [2] part polyurethane sealant.

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- K. Exterior paint for flashings/vents: Sherman Williams exterior grade Latex, Super Pint grade or better. Submit sample for approval.

2.4 ROOF RECOVER BOARD –DENS DECK

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
- B. Dens Deck: ASTM C1177, 1/4" in thickness.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- D. Crickets/taper insulation: ASTM C 1289 Polyisocyanurate insulation

2.5 RECOVER BOARD ACCESSORIES

- A. General: Roof recover board accessories recommended by manufacturer for intended use and compatible with membrane roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- C. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation/Dens Deck to substrate Fas-n-free insulation adhesive.

2.6 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections. Using a power broom or acceptable means, remove all loose, non adhered gravel, dirt and debris.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- D. Dead/ unused equipment: Remove from roof and premises all dead or un-used equipment.

3.3 RECOVER BOARD INSTALLATION

- A. Coordinate installing membrane roofing system components so recover board is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof recover board.
- C. Trim surface of recover board where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- D. Install recover board with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit recover board within 1/4 inch of nailers, projections, and penetrations
- E. Mechanically Fastened recover board: Install layer of recover board and secure layer of recover board to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof recover board to deck type.
 - 1. Fasten layer of recover board according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten layer of recover board to resist uplift pressure at corners, perimeter, and field of roof.
- F. Install cover boards over existing system with long joints in continuous straight lines with end joints staggered between rows.
 - 1. Fasten according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.

2. Fasten to resist uplift pressure at corners, perimeter, and field of roof.
- G. Tapered insulation: Furnish and install taper board insulation providing a positive slope to drain of 1/8-inch per foot to direct water out of these specific areas. Install cover board over crickets as specified.

3.4 FULLY ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
 1. Install sheet according to ASTM D 5082.
- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Adhesively fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing. Set fleeced back single ply membrane in manufacturers approved adhesive at the rate of 1 gallon per 100 square feet. Roll in for maximum adhesion as required prior to heat welding laps.
- E. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- F. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.
 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.
- G. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- H. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.
- I. Through-Membrane Attachment: Secure roofing membrane using fastening plates or metal battens and mechanically fasten roofing membrane to roof deck. Cover battens and fasteners with a continuous cover strip.
- J. Install roofing membrane and auxiliary materials to ensure system is made watertight nightly.

3.5 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with sheet flashing.
- D. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
- F. Baseflashing @ building wall [upper roof]: Remove TWO [2] rows of wood siding shingles [e] baseflashing and remove [e] counterflashing. Fully adhere sheet and run to highest point, slipping sheet up under interior coping leg. Furnish and install flat termination bar to secure sheet in place, fastened twelve [12] inches O.C. with washered fasteners. Furnish and install GSM metal counter/Z flashing with a three [3] inch face with a skirt and a hem. Face fasten metal, twelve [12] inches O.C. into substrate.
- G. Misc flashings: Prime metal with Alpha Guard metal primer. Apply Alpha Guard base coat. while base is still wet, apply reinforcing mat and trowel in without wrinkles or voids. Apply top coat of Alpha Guard.
- H. Penetrations/projections: Furnish and install pre manufactured boot. Heat weld flange to field membrane. Clamp and caulk top of flashing.
- I. Curbs: Set flashing sheet in adhesive and run to top of curb. Secure to substrate six [6] inches O.C. with approved fasters. Heat weld baseflashing to field sheet.
- J. Sleepers/ sleepers with caps: Secure sleepers into deck. Set flashing sheet in adhesive and wrap sleepers. Furnish and install corners and heat weld to baseflashing. Heat weld baseflashing to field sheet. Furnish and install new twenty-four [24] gauge GSM sleeper caps secure with washered fasteners. On sleepers with existing caps, neatly split corners, furnish and install baseflashing to sheet to highest point and secure. Pop river corners, two [2] per section. On large mechanical unit, neatly trip off existing counterflashing metal on support base leaving approximately two [2] inches. Furnish and install single ply membrane over the ends of the sleepers, onto support base and up under existing counterflashing. Furnish and install new skirt counter flashing and secure.
- K. Drains/Overflows: Remove strainer and clamping and set aside. Run field sheet into bowl. Center target sheet of 55 mil unreinforced flashing sheet directly drain opening and install set into water block. Re- assemble drain components, set clamping ring in TF tape and secure with new bolts with washers. Re-install drain strainer.
- L. Overflows [thru wall]: Furnish and install [n] twenty four [24] gauge, one [1] piece continuous scupper. Flange of scupper must be fabricated out of TPA coated metal to allow for heat welding flashing membrane to metal. Extend metal to exterior side, caulk around flashing and

install [n] metal flashing to complete detail. Prime and paint metal to match wall. See sheet metal section

- M. Metal coping joints: [upgrade] Secure metal as required with washered flat head screws. Avoid top nailing. Using a wire wheel, remove all existing caulking on metal coping joints. Tape off each side in a straight line two [2] inches from joint. Prime and apply urethane sealant with reinforcement over entire joint. Tool for maximum adhesion. See sheetmetal section for metal coping.
- N. Two [2] piece counterflashing: Remove [e] fasteners and drop skirt. Set aside for re-installation. Furnish and install [n] baseflashing, fully adhered. Terminate top of flashing sheet with flat termination bar and secure twelve [12] inches O.C. Re-install skirt to original position and secure.
- O. Sight screen[s]: Carefully take down sight screen in sections and aside to re-install.
- P. Sight screen brace base [SW side][Steel U bracket] Using a wire wheel, remove all loose non adhered mastics, etc. In a straight line, tape off steel a minimum of eight [8] inches above the finished roof. Prime, and apply Alpha Guard base coat over steel and onto to membrane. While coating is wet, embed reinforcing mat. Trowel in with no lumps or wrinkles. Apply top coat of Alpha Guard.
- Q. Door threshold: Remove existing door thresholds on access and equipment doors. Furnish and install new roof membrane set into adhesive over threshold area. Furnish and install new door threshold, like same in utility. Set flat head fasteners in caulking
- R. Blocking: Furnish and install additional [n] re-cycled rubber blocking, like same in service to provide support to existing conduit and pipes meeting current Uniform Building Code for spacing.
- S. Gravel stop Furnish and install new gravel stop metal secured to 22 gauge cleat. Mechanically fasten flange three [3] inches OC staggered and strip in with single ply membrane. Heat weld directly to metal. See sheetmetal section
- T. Low profile expansion joint: Furnish and install and secure on each side of joint. Furnish and install compressible closed cell backer for 25% compression in joint. Furnish and install new single ply membrane to create a bellow over the backer rod. Extend sheet a minimum of four [4] inches on either side of the joint and heat weld onto field sheet.

3.6 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations to match existing walk pad path/locations. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

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

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

3.8 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.9 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: **<Insert name of Owner.>**
 - 2. Address: **<Insert address.>**
 - 3. Building Name/Type: **<Insert information.>**
 - 4. Address: **<Insert address.>**
 - 5. Area of Work: **<Insert information.>**
 - 6. Acceptance Date: **<Insert date.>**
 - 7. Warranty Period: **<Insert time.>**
 - 8. Expiration Date: **<Insert date.>**
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding **<Insert wind speed>** mph (m/sec);
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this **<Insert day>** day of **<Insert month>**, **<Insert year>**.

1. Authorized Signature: <**Insert signature.**>
2. Name: <**Insert name.**>
3. Title: <**Insert title.**>

END OF SECTION

SECTION 07 62 00

SHEET METAL AND SELF-ADHERED FLASHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SCOPE OF WORK

- A. This Section includes the following sheet metal flashing and trim:
 - 1. Formed flashing for structures and equipment.
 - 2. Self-adhered flashings and sealants.
 - 3. Miscellaneous flashing as required to complete Work.
 - 4. Manufactured reglets with counterflashing.
- B. Related Sections include the following:
 - 1. Division 07 Section “SBS Modified Bituminous Membrane Roofing”.
 - 2. Division 07 Section “Standing Seam Sheet Metal Roofing”.
 - 3. Division 07 Section “Joint Sealants” for sealants.
 - 4. Division 09 Section “Exterior Painting” for painting of sheet metal.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

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1.04 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identify material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 - 4. Details of expansion-joint covers, including showing direction of expansion and contraction.

1.05 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.07 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leak proof, secure, and noncorrosive installation.

PART 2 – PRODUCTS

2.01 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.

2.02 SHEET METALS

- A. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304, dead soft, fully annealed. Finish 2D (dull, cold rolled). Surface smooth, flat. Gauges as indicated on Drawings.
- B. Galvanized Steel: Metallic-Coated Steel Sheet. Provide zinc-coated (galvanized) steel sheet in accordance with ASTM A653, G60, 24 gauge unless otherwise indicated. Where indicated provided one of the following finishes:
 - 1. Factory Finish: Galvanized.
 - 2. Painted: In accordance with Division 09 Section "Exterior Painting".
 - 3. Valspar: In accordance with Division 09 Section "Exterior Painting" using Valspar paint system.
 - 4. Factory PVDF: Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- C. Aluminum: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface. 24 gauge unless otherwise noted. Where indicated provided one of the following finishes:
 - 1. Factory Finish: Galvanized.
 - 2. Factory PVDF: Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- D. Galvalume: 55 percent AL-Zn coated sheet steel as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface. 24 gauge unless otherwise noted. Where indicated provided one of the following finishes:
 - 1. Factory PVDF: Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2.03 UNDERLAYMENT MATERIALS

- A. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, non-perforated.
- B. Slip Sheet: Rosin-sized paper, minimum 3 lb / 100 square feet.

2.04 SELF-ADHERED FLEXIBLE FLASHINGS SYSTEMS

- A. General: Provide one of the following self-adhered flexible flashing systems. Do not mix specified products (flexible flashings, primers, or sealants) between systems unless approved in writing by all system product manufacturers. Contractor proposing to use other systems or products from those listed below shall provide written documentation assuring compatibility between all products within system. Contractor may substitute DAP sealants for sealants specified subject to conditions stated above.
- B. Self-Adhered Flashing Systems: Provide Fortifiber Building Systems Group, “Fortiflash” 25 mil waterproofing flashing membrane, and 3M Super77 Spray Adhesive primer (as required by flexible flashing manufacturer). Provide in manufacturer’s standard sheet widths, or combinations of standard widths, to provide coverage as indicated on Drawings. Provide Fortifiber Building Systems Group, self-adhered flashing compatible “Moistop” polyurethane sealant at all locations where sealant is in contact with self-adhered flashing membrane.
- C. Comparable Self-Adhered Flashing System: Grace Construction Products “Vycor Plus” 25 mil waterproofing flashing membrane with, Grace Construction Products Perm-A-Barrier WB Primer (as required by flexible flashing manufacturer) and one of the following multi-component polyurethane sealants: Sika Chemical “SikaFlex-2c NS”; or Tremco “Vulkem 227”. Grace Building Products “Vycor Pro” may be used in lieu of “Vycor Plus” for primerless applications.
- D. Application Areas: All exterior openings, and other locations indicated.

2.05 DOWNSPOUTS AND BOOTS

- A. All downspouts shall be 4 inch diameter, unless otherwise indicated, galvanized schedule 40 steel pipe, with welded joints. Unless otherwise noted, terminate all downspouts at grade with Neenah, or equal, R-4926 series cast-iron downspout shoes; size, configuration and length to fit downspout and storm drain. Connect all downspouts to storm drain system with boots. Provide 4 inch diameter, galvanized schedule 40 TEE with cleanout plug in downspout immediately above transition from downspout to downspout shoe.

2.06 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape.
- C. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, polysulfide, or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

- D. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.
- E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- F. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- H. All fasteners for exterior work shall be stainless steel of type and length required for application.

2.07 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
- D. Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- E. Sealed Joints: Form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- F. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric, or butyl sealant concealed within joints.
- G. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- H. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- I. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" for application but not less than thickness of metal being secured.

SHEET METAL AND SELF-ADHERED FLASHING 07 62 00 - 5

2.08 ROOF SHEET METAL FABRICATIONS

- A. General: Fabricate in minimum 96 inch long, but not exceeding 10 foot long, sections. Fabricate joint plates of same thickness as flashing. Miter corners, seal, and solder or weld watertight. Provide shapes and styles as indicated on Drawings.
- B. Counterflashing at top edge mechanical equipment support flashings, and miscellaneous flashing required to complete work shall be fabricated from 22 and 24 gage thickness as indicated, galvanized steel sheet metal.

2.09 MANUFACTURED COUNTER FLASHINGS

- A. FRY Reglet, "STX Reglet", 24 Gauge, Standard Zinc Finish, Stucco Walls..

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
 - 1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet.
 - 2. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric or butyl sealant.

- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric or butyl sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
 - 1. Use stainless-steel fasteners.
- H. Seal joints with elastomeric or butyl sealant as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 - 2. Prepare joints and apply sealants to comply with requirements in Section 07900.
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except where pre-tinned surface would show in finished Work.
 - 1. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.03 SELF-ADHERED FLASHING INSTALLATION

- A. General: Install self-adhered flashing and trim to comply with Manufacturer's requirements. Prime all substrates.
- B. Provide flexible flashing at all openings, behind expansion and control joints in concrete, and elsewhere as indicated on Drawings.
- C. Install as indicated in accordance with manufacturer's installation instructions and drawings. Review and resolve any conflicts with Engineer prior to proceeding with installation.
- D. Flexible flashing shall be installed over solid backing.

SHEET METAL AND SELF-ADHERED FLASHING 07 62 00 - 7

- E. Flexible flashing shall be supported “in-plane” with wall.
- F. Release split release paper on flexible flashing shall not be removed until building paper can be lapped under flexible flashing.
- G. Staple flexible flashing at inside surfaces of jambs and heads of openings.
- H. Provide sealants from same manufacturer as flexible flashing and recommended by manufacturer for compatibility with flexible flashing.
- I. Provide in minimum widths in accordance with manufacturer’s installation requirements unless greater widths are detailed on Drawings.
- J. Avoid nailing of sheet metal through flexible flashing. Cover all fasteners with self-adhesive flexible flashing.
- K. All flashing materials and weather-resistant sheathing paper shall be weatherboard lapped 2 inches horizontally, and 6 inches vertically.
- L. Prime all substrates prior to installing self-adhesive flexible flashings.

3.04 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric or butyl sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of built-up asphalt roofing.

3.05 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric or butyl sealant to equipment support member.

3.06 CLEANING AND PROTECTION

- A. Clean and neutralize flux materials. Clean off excess solder and sealants.
- B. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

- C. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 07 65 00

FLASHING PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Flashing panels to weatherproof plumbing and electrical penetrations in exterior walls.

1.3 RELATED SECTIONS

- A. Division 01 Section "CALGreen Requirements" for general CALGreen requirements applicable to work of this section.
- B. Division 09, Section "Portland Cement Plaster" for weather barrier materials and installation.
- C. Mechanical and Plumbing Drawings and Specifications.
- D. Electric Drawings and Specifications.

1.4 REFERENCES

- A. ASTM D 412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension.
- B. ASTM D 638 – Standard Test Method for Tensile Properties of Plastics.
- C. ASTM D 792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- D. ASTM D 1505 – Standard Test Method for Density of Plastics by the Density-Gradient Technique.
- E. ASTM D 2240 – Standard Test Method for Rubber Property—Durometer Hardness.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including installation instructions.
- B. Warranty: Submit manufacturer's standard warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

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- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials during handling and installation to prevent damage.

1.7 WARRANTY

- A. Warranty Period: 10 years.

PART 2 - PRODUCTS

2.1 CALGREEN PERFORMANCE REQUIREMENTS

- A. CALGreen Mandatory Requirement: Annular spaces around pipes, electric cables, conduits and other openings in plates at exterior walls shall be protected against the passage of rodents by closing such openings with cement mortar, concrete masonry or similar method acceptable to the enforcing agency.

2.2 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Manufacturer: Quickflash Weatherproofing Products, Inc. (4129 Wagon Trail Avenue, Las Vegas, Nevada 89118. Phone (702) 614-6100. Fax (702) 614-4090. Website www.quickflashproducts.com. E-mail contact@quickflashproducts.com.) products specified.

2.3 FLASHING PANELS

- A. Flashing Panels: Quickflash Weatherproofing Flashing Panels.
- B. General: Select flashing panels from following list as required for plumbing, mechanical, and electrical penetrations through exterior walls in accordance with manufacturer's recommendations. For penetrations sizes other than those indicated, contact manufacturer for flashing panel models and sizes.
- C. Plumbing Flashing Panels:
 - 1. Materials:
 - a. Panel: Combination of high-density polyethylene (HDPE) and low-density polyethylene (LDPE).
 - 1) HDPE, Specific Gravity, ASTM D 1505: 0.953 g/cm³.
 - 2) HDPE, Tensile Strength at Yield, ASTM D 638: 3,100 psi.
 - 3) LDPE, Specific Gravity, ASTM D 792: 0.917 g/cm³.
 - 4) LDPE, Tensile Strength at Yield, ASTM D 638: 1,300 psi.
 - b. Weatherproof Seal: Thermoplastic elastomer.

FLASHING PANELS 07 65 00 - 2

- 1) Hardness, ASTM D 2240, Shore A, 10 Seconds: 46.
 - 2) Specific Gravity, ASTM D 792: 1.05 g/cm³.
 - 3) Tensile Strength, ASTM D 412: 490 psi.
2. Model: P-50.
 - a. Fits: 1/2-inch to 3/4-inch pipes; copper, rigid, PVC, and ABS.
 - b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
 3. Model: P-100.
 - a. Fits: 1-inch to 1-1/4-inch pipes; copper, rigid, PVC, and ABS.
 - b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
 4. Model: P-150.
 - a. Fits: 1-1/2-inch to 1-3/4-inch pipes; copper, rigid, PVC, and ABS.
 - b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
 5. Model: P-200.
 - a. Fits: 2-inch to 2-1/2-inch pipes; copper, rigid, PVC, and ABS.
 - b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
 6. Model: P-300.
 - a. Fits: 3-inch pipes, ABS.
 - b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
 7. Model: P-400.
 - a. Fits: 4-inch pipes, ABS.
 - b. Size: 12-1/2 inches by 12-1/2 inches by 3/32 inch.
 8. Model: P-600.
 - a. Fits: 6-inch sheet metal duct.
 - b. Size: 12-1/2 inches by 12-1/2 inches by 3/32 inch.
 9. Model: P-2PS.
 - a. Fits: Cut out center to fit 1/2-inch to 2-inch copper pipes with exterior tees sweated on.
 - b. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch. 2-piece panel.

D. Electrical Flashing Panels:

1. Material: Thermoplastic elastomer.
 - a. Hardness, ASTM D 2240, Shore A, 10 Seconds: 93.
 - b. Specific Gravity, ASTM D 792: 1.05 g/cm³.
 - c. Tensile Strength, ASTM D 412: 1,300 psi.

FLASHING PANELS 07 65 00 - 3

2. Model: E-SGB-A 1-3/8 inches, electrical single-gang box flashing panel.
 - a. Use: 1-coat stucco and EIFS.
 - b. Fits: Allied Moulded electrical single-gang boxes, part 9327-N.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
3. Model: E-3/0 B-A 1-3/8 inches, electrical 3/0 box flashing panel.
 - a. Use: 1-coat stucco and EIFS.
 - b. Fits: Allied Moulded electrical 3/0 boxes, parts 9335-HNK and 9335-HNGK.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
4. Model: E-SGB-A 7/8 inches, electrical single-gang box flashing panel.
 - a. Use: 3-coat stucco.
 - b. Fits: Allied Moulded electrical single-gang boxes, part 9327-N.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
5. Model: E-3/0 B-A 7/8 inches, electrical 3/0 box flashing panel.
 - a. Use: 3-coat stucco.
 - b. Fits: Allied Moulded electrical 3/0 boxes, parts 9335-HNK and 9335-HNGK.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
6. Model: E-3/0 B, electrical 3/0 box flashing panel.
 - a. Use: 3-coat stucco and lap siding.
 - b. Fits: Specified electrical 3/0 plastic boxes.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
7. Model: E-4/0 B, electrical 4/0 box flashing panel.
 - a. Use: 3-coat stucco and lap siding.
 - b. Fits: Specified electrical 4/0 plastic boxes.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
8. Model: E-PC 3/0, electrical pancake 3/0 box flashing panel.
 - a. Use: 3-coat stucco and lap siding.
 - b. Fits: Specified electrical pancake 3/0 metal boxes.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
9. Model: E-PC 4/0, electrical pancake 4/0 box flashing panel.
 - a. Use: 3-coat stucco and lap siding.
 - b. Fits: Specified electrical pancake 4/0 metal boxes.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
10. Model: E-SGB, electrical single-gang box flashing panel.
 - a. Use: 3-coat stucco and lap siding.

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- b. Fits: Specified electrical single-gang plastic boxes.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.
- 11. Model: E-SGR, electrical single-gang 1/2-inch raised-plaster-ring cover flashing panel.
 - a. Use: 3-coat stucco and lap siding.
 - b. Fits: Specified electrical single-gang raised-plastic-ring cover.
 - c. Size: 11-1/8 inches by 11-1/8 inches by 3/32 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine exterior vertical wall penetrations, and areas to receive flashing panels.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Do not begin installation until unacceptable conditions are corrected.

3.2 PREPARATION

- A. Copper Pipes:
 - 1. Heat sweat copper pipes before installation of flashing panels.
 - 2. Install copper pipes as specified in related Sections.

3.3 INSTALLATION

- A. Install flashing panels in accordance with manufacturer's instructions.
- B. Plumbing Flashing Panels, 1 Piece:
 - 1. Select flashing panel required for specific pipe sizes.
 - 2. Push flashing panel over pipe with label facing to exterior to form weatherproof seal around pipe.
 - 3. Nail flashing panels to walls with corrosion-resistant nails at top of panels.
 - 4. Install pipe as specified in related Sections.
- C. Plumbing Flashing Panels, 2 Piece:
 - 1. Cut flashing panel scores to size of pipe.
 - 2. Place bottom panel under pipe.
 - 3. Snap top panel to bottom panel over pipe.
 - 4. Caulk pipe to flashing panel with exterior polyurethane joint sealant for weatherproof seal.
 - 5. Install pipe as specified in related Sections.
- D. Electrical Flashing Panels:
 - 1. Select flashing panel required for specific electrical boxes.
 - 2. Push flashing panel over electrical box with label facing to exterior to form weatherproof seal around box.

3. Ensure flashing panel collar edge is flush with electrical box opening edge.
4. If required by flashing panel manufacturer, nail flashing panels to walls with corrosion-resistant nails at top of panels.
5. Install electrical boxes as specified in related Sections.

E. Weather Barriers:

1. Place weather barrier up behind bottom of flashing panel to bottom of pipe or electrical box.
2. Place second layer of weather barrier over top of flashing panel to bottom front edge or further down.
3. Install weather barriers as specified in related Sections.

3.4 PROTECTION

- A. Protect installed flashing panels from damage during construction.

END OF SECTION

SECTION 07 72 33

ROOF HATCHES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Roof hatches.
- B. Related Sections include the following:
 - 1. Division 07 Section "Thermoplastic Tri-Polymet Roofing" for installation of roof accessories specified in this Section.
 - 2. Division 07 Section "Sheet Metal and Self Adhered Flashing" for shop and field-fabricated metal flashing, counterflashing, and miscellaneous sheet metal trim and accessories for roof accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details for roof accessories. Show layouts of roof accessories including plans and elevations. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other work.

1.4 QUALITY ASSURANCE

- A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify required openings for each type of roof accessory by field measurements before fabrication and indicate measurements on Shop Drawings.

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1.7 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

1.8 REFERENCE STANDARDS

- A. Manufacturer's technical product data.
- B. Occupational Safety and Health Administration (OSHA) requirements.
- C. California Building Code (CBC) requirements.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coated and mill phosphatized for field painting.
- B. Stainless-Steel Shapes or Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 or Type 316, No. 2D finish.
- C. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized to comply with ASTM A 123/A 123M, unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS

- A. Glass-Fiber Board Insulation: ASTM C 726, 1 inch thick.
- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- C. Polyethylene Sheet: 6-mil thick, polyethylene sheet complying with ASTM D 4397.
- D. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 1. Slip Sheet: Rosin-sized paper, minimum 3 lb / 100 square feet.
- E. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- G. Elastomeric Sealant: ASTM C 920, polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

- H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, and heavy bodied for hooked-type expansion joints with limited movement.
- I. Roofing Cement: ASTM D 4586, non-asbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

2.3 ROOF HATCHES

- A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
 - 1. Manufacturers:
 - a. Bilco Company (Specified).
 - 2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loads.
 - 3. Type and Size: Bilco "Type E-20T" or comparable roof hatch, single-leaf lid, 36 inches by 36 inches.
 - 4. Curb and Lid Material: Galvanized steel sheet, 0.079 inch thick.
 - 5. Insulation: Glass-fiber board.
 - 6. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
 - 7. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
 - 8. Fabricate units to minimum 15 inch heights, unless otherwise indicated.
 - 9. Sloping Roofs: Fabricate hatch curbs with height tapered to match slope to level tops of units.
 - 10. Hardware: Heavy duty spring latch with turn handles, butt or pintle type hinge system, and padlock hasps inside and outside.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored and is ready to receive roof accessories.
 - 2. Verify dimensions of roof openings for roof accessories.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory

installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement. Attach hatch to roof framing in accordance with requirements noted on Drawings.

- B. Install roof accessories to fit substrates and to result in watertight performance.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer. Attach hatch to roof framing per requirements noted on Drawings.
 - 1. Coat concealed side of roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.
- D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
- E. Roof Hatch Installation:
 - 1. Check roof hatch for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.
 - 2. Set roof curb so top surface of roof curb is level.
- F. Seal joints with elastomeric or butyl sealant as required by manufacturer of roof accessories.

3.3 TOUCH UP

- A. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Division 9 painting Sections.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.4 CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions.

END OF SECTION

SECTION 07 84 00

PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Penetrations in fire-resistance-rated walls.

- B. Related Sections:

- 1. Division 01 Section "CALGreen Requirements" for general CALGreen requirements applicable to work of this section.

1.3 ACTION SUBMITTALS

- A. CALGreen Submittals:

- 1. Product Data showing compliance with VOC and other toxic compound limits of firestopping joint sealants as specified in Division 01 Section "CALGreen Requirements".

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

- C. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1.4 INFORMATIONAL SUBMITTALS

- A. CALGreen Submittals:

- 1. Product Data for CALGreen Mandatory Requirement 5.504.4 for adhesives, sealants and caulks including printed statement of VOC content.

- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

PENETRATION FIRESTOPPING 07 84 00 - 1

- B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 1. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
- C. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 CALGREEN REQUIREMENTS

- 1. Adhesive, sealants and caulks shall be compliant with VOC and other toxic compound limits as specified in Division 01 Section "CALGreen Requirements" for Environmental Quality, Finish Material and Pollutant Control, Mandatory Measure 5.504.4.1 Adhesives, Sealants and Caulks.

2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Manufacturer: STI Firestop.

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B. Fire-Rated Acoustical Sealants:

1. General: Provide at all fire-rated, sound-rated walls.
 - a. STI Firestop “Smoke N Sound Acoustical Sealant”.

2.3 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 1. Fire-resistance-rated walls include fire walls.
 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- D. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 1. Permanent forming / damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.4 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

PENETRATION FIRESTOPPING 07 84 00 - 3

- B. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- C. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- D. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

2.5 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

PENETRATION FIRESTOPPING 07 84 00 - 4

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.6 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Firestopping with No Penetrating Items:
 - 1. UL-Classified Systems: W-L-0001-0999.
 - 2. F-Rating: 1 hour.

3. Type of Fill Materials: As required to achieve rating.
- C. Firestopping for Metallic Pipes, Conduit, or Tubing:
1. UL-Classified Systems: W-L-1001-1999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.
- D. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:
1. UL-Classified Systems: W-L-2001-2999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.
- E. Firestopping for Electrical Cables:
1. UL-Classified Systems: W-L-3001-3999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.
- F. Firestopping for Cable Trays with Electric Cables:
1. UL-Classified Systems: W-L-4001-4999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.
- G. Firestopping for Insulated Pipes:
1. UL-Classified Systems: W-L-5001-5999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.
- H. Firestopping for Miscellaneous Electrical Penetrants:
1. UL-Classified Systems: W-L-6001-6999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.
- I. Firestopping for Miscellaneous Mechanical Penetrants:
1. UL-Classified Systems: W-L-7001-7999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.
- J. Firestopping for Groupings of Penetrants:
1. UL-Classified Systems: W-L-8001-8999.
 2. F-Rating: 1 hour.
 3. Type of Fill Materials: As required to achieve rating.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes joint sealants and movement joint products for the following applications, including those specified by reference to this Section:
 - 1. Exterior joints in the following vertical surfaces and horizontal traffic, and non-traffic surfaces:
 - a. Perimeter exposed joints around exterior openings.
 - b. Interior joints and other joints as indicated.
 - 2. Interior joints in the following vertical surfaces and horizontal non-traffic surfaces:
 - a. Vertical joints on exposed surfaces of walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - c. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - d. Other joints as indicated.
- B. Related Sections include the following:
 - 1. Division 01 Section "CALGreen Requirements" for general CALGreen requirements applicable to work of this section.
 - 2. Division 07 Section "Sheet Metal and Flexible Flashing" for concealed sealants used in contact with flexible flashing materials.
 - 3. Division 08 Section "Glazing" for glazing sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

- A. CALGreen Submittals:
 - 1. Product Data for CALGreen Mandatory Requirement 5.504.4 for adhesives, sealants and caulks including printed statement of VOC content.

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- B. Product Data: For each joint-sealant product indicated, provide product data for verification showing compliance with Regulatory Requirements.
- C. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Mock-Ups: Provide sealant where required as part of mock-up for approval. See Division 01, "Quality Requirements" for mock-ups.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Ten years from date of Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 CALGREEN REQUIREMENTS

1. Adhesive, sealants and caulks shall be compliant with VOC and other toxic compound limits as specified in Division 01 Section "CALGreen Requirements" for Environmental Quality, Finish Material and Pollutant Control, Mandatory Measure 5.504.4.1 Adhesives, Sealants and Caulks.

2.2 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Products specified, or approved equal.

2.3 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience. Contractor shall select and provide all products, including products specified in this, and other Sections (sealants, building paper, underlayment materials, etc.) for universal compatibility.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.4 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.5 EXTERIOR BUILDING SEALANTS (General Purpose Exposed Building Sealants)

- A. See Division 07, Section "Sheet Metal and Flexible Flashing" for concealed sealants used in contact with flexible flashing materials.
- B. Single Component, Non-sag, Polyurethane Elastomeric Sealant: Conforms to Specification TT-S-00230C, Type II, Class A, ASTM C 920, Type S, Grade NS, Class 25, Use T.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sika, Sikaflex 1A.
 - b. Tremco, Vulkem 116.
 - c. BASF, Sonolastic NP1

2.6 INTERIOR SANITARY SEALANTS

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- A. Single-component, mildew-resistant silicon joint sealants formulated with fungicide for sealing interior joints of nonporous substrates around ceramic tile, and plumbing fixtures,
 - 1. Products: Subject to compliance with requirements provide one of following products, or comparable product:
 - a. Pecora Corporation, 898.
 - b. DAP, 786.

2.7 INTERIOR ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; AC-20 FTR.
 - b. USG Corporation; SHEETROCK Acoustical Sealant
 - c. Tremco Acoustical Sealant.

2.8 Fire Barrier Moldable Putty Pads:

- 1. Provide 3M, or equal, UL listed, 'Fire Barrier Moldable Putty Pads' to protect metallic and non-metallic electrical boxes where required by fire code because of box size, spacing between boxes, or aggregate area of boxes. Install in accordance with code requirements and manufacturer's installation instructions.
- 2. In addition to locations indicated above provide at all (rated and non-rated) sound-rated walls.

2.9 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type closed-cell material with a surface skin, open-cell material, bicellular material with a surface skin, or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F . Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or

joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.10 ACCESSORIES

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Glazed surfaces of ceramic tile.

- B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Final Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION

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SECTION 08 11 13

HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes hollow-metal work.
- B. Related Requirements:
 - 1. Division 08 Section "Fiberglass-Reinforced Polyester Doors" for FRP doors.
 - 2. Division 08 Section "Flush Wood Doors" for wood doors.
 - 3. Division 08 Section "Door Hardware" for door hardware for hollow-metal doors.
 - 4. Division 08 Section "Glazing" for glazing of doors and windows.
 - 5. Division 09 Sections "Exterior Painting" and "Interior Painting" for painting of frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, acoustical ratings and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each frame type.
 - 2. Details of frames, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.

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4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal frame assembly, for tests performed by a qualified testing agency.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use non-vented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked frame to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 1. [Door Components, Inc.](http://www.dcihollowmetal.com), 7980 Redwood Avenue, Fontana, California 92336 (866) 989-3667, www.dcihollowmetal.com.
- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR WINDOWS AND FRAMES

- A. Construct interior frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Frames: SDI A250.8, Level 3.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Frames:
 - a. Materials: Uncoated, steel sheet, minimum thickness of (16 gauge) 0.053 inch.
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Full profile welded.
 - d. Exposed Finish: Factory primed.

2.4 EXTERIOR WINDOWS AND FRAMES

- A. Construct exterior frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Maximum-Duty Frames: SDI A250.8, Level 4.
 - 1. Physical Performance: Level A according to SDI A250.4.
 - 2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum A40 coating.
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Full profile welded.
 - d. Exposed Finish: Factory primed.

2.5 BORROWED LITES

- A. Hollow-metal frames of uncoated steel sheet, minimum thickness of (16 gauge) 0.053 inch.
- B. Construction: Full profile welded.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.7 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.
- D. Frame Anchors: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized according to ASTM A 153, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.
- F. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143.
- H. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- I. Glazing: Comply with requirements in Division 08 Section "Glazing."
- J. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.8 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 4. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 5. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches on center and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 6. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
 7. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce frames to receive non-templated, mortised, and surface-mounted door hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow-metal work.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.

3. Provide fixed frame moldings on outside of exterior and on secure side of interior frames.
4. Provide loose stops and moldings on inside of hollow-metal work.
5. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.10 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow-metal manufacturer's written instructions.
 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.

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- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.
- F. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Five-ply flush wood doors for opaque finish.
2. Factory priming and finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Division 08 Section "Hollow Metal Frames" for door frames.
2. Division 09 Section "Interior Painting" for painting of wood doors.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Factory-machining criteria.
5. Factory-priming finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Special warranties.

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1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Manufacturer: Haley Bros., Inc. 6291 Orangethorpe Avenue, Buena Park, California 90620, (800) 854-5951, www.haleybros.com.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WT's "Architectural Woodwork Standards."
 - 1. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with the Contract Documents in addition to those of the referenced quality standard.

2.3 FIVE-PLY FLUSH WOOD DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

1. Performance Grade: WDMA I.S. 1A Extra Heavy Duty.
2. Architectural Woodwork Standards WDMA I.S. 1A Grade: Custom.
3. Faces: MDO.
 - a. Apply MDO to standard-thickness, closed-grain, hardwood face veneers or directly to high-density hardboard crossbands.
4. Exposed Vertical Edges: Any closed-grain hardwood.
5. Core for Non-Fire-Rated Doors: ANSI A208.1, Grade LD-1 particleboard.
 - a. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
6. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

2.5 FACTORY PRIMING

- ### A. Doors for Opaque Finish: Factory prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Division 09 Section " Interior Painting."

2.6 FACTORY FINISHING

A. Factory primed doors, field painted.

B. Opaque Finish:

1. Architectural Woodwork Standards WDMA I.S. 1A Grade: Custom.

2. Color: As selected by Architect from manufacturer's full range.
3. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Install frames level, plumb, true, and straight.
 1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
 2. Anchor frames to anchors or blocking built in or directly attached to substrates.
 - a. Secure with countersunk, concealed fasteners and blind nailing.
 - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1) For factory-finished items, use filler matching finish of items being installed.
- D. Job-Fitted Doors:
 1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
 2. Machine doors for hardware.
 3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 4. Clearances:
 - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
 - b. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
 - c. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 5. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Owner will engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 - 1. Provide inspection of installed Work through WI's Certified Compliance Program, certifying that wood doors and frames, including installation, comply with requirements of AWI/AWMCA/WI's "Architectural Woodwork Standards" for the specified grade.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

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SECTION 08 16 13

FIBERGLASS-REINFORCED POLYESTER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Fiberglass-reinforced polyester (FRP) flush doors.

1.3 RELATED SECTIONS

- A. Division 08 Section "Hollow Metal Frames".
- B. Division 08 Section "Aluminum-Framed Storefront" for aluminum storefront frames.
- C. Division 08 Section "Door Hardware".

1.4 REFERENCES

- A. AAMA 1503-98 - Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- B. ANSI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing.
- C. ASTM B 117 - Operating Salt Spray (Fog) Apparatus.
- D. ASTM B 209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- E. ASTM B 221 - Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- F. ASTM D 256 - Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
- G. ASTM D 543 - Evaluating the Resistance of Plastics to Chemical Reagents.
- H. ASTM D 570 - Water Absorption of Plastics.
- I. ASTM D 638 - Tensile Properties of Plastics.
- J. ASTM D 790 - Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- K. ASTM D 1308 - Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
- L. ASTM D 1621 - Compressive Properties of Rigid Cellular Plastics.

- M. ASTM D 1623 - Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- N. ASTM D 2126 - Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- O. ASTM D 2583 - Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
- P. ASTM D 5420 – Impact Resistance of Flat Rigid Plastic Specimens by Means of a Falling Weight.
- Q. ASTM D 6670-01 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
- R. ASTM E 84 - Surface Burning Characteristics of Building Materials.
- S. ASTM E 90 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- T. ASTM E 283 - Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- U. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- V. ASTM E 331 - Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- W. ASTM F 476 - Security of Swinging Door Assemblies.
- X. ASTM F 1642-04 – Standard Test Method for Glazing Systems Subject to Air Blast Loading.
- Y. NWWDA T.M. 7-90 – Cycle Slam Test Method

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
- B. Air Infiltration: For a single door 3-feet 0-inch by 7-feet 0-inch, test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
- C. Water Resistance: For a single door 3-feet 0-inch by 7-feet 0-inch, test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
- D. Indoor air quality testing per ASTM D 6670-01: GREENGUARD Environmental Institute Certified including GREENGUARD for Children and Schools Certification.
- E. Blast Test, Doors and Frames, ASTM F 1642-04, 6 psi / 41 psi-msec: Minimal Hazard.
- F. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 25,000,000 cycles.

- G. Cycle Slam Test Method, NWWDA T.M. 7-90: Minimum 5,000,000 Cycles.
- H. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
- I. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
- J. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
- K. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
- L. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
 - 1. Flame Spread: Maximum of 200, Class C.
 - 2. Smoke Developed: Maximum of 450, Class C.
- M. Surface Burning Characteristics, Class A Option on Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
 - 1. Flame Spread: Maximum of 25.
 - 2. Smoke Developed: Maximum of 450.
- N. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
- O. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
- P. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
- Q. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
- R. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
- S. Gardner Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 5420: 120 in-lb.
- T. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
- U. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to crayon and crankcase oil.
- V. Chemical Resistance, ASTM D 543. Excellent rating.
 - 1. Acetic acid, Concentrated.
 - 2. Ammonium Hydroxide, Concentrated.
 - 3. Citric Acid, 10%.
 - 4. Formaldehyde.
 - 5. Hydrochloric Acid, 10%
 - 6. Sodium hypochlorite, 4 to 6 percent solution.

- W. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 79.9 psi.
- X. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 370 psi.
- Y. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 45.3 psi.
- Z. Thermal and Humid Aging, Foam Core, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 5.14 percent volume change.

1.6 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
- B. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
- C. Samples:
 - 1. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
 - 2. Color: "Slate Grey" 5572.

1.7 INFORMATIONAL SUBMITTALS

- A. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
- B. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
- C. Warranty: Submit manufacturer's standard warranty.

1.8 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years successful experience.
 - 2. Door components from same manufacturer.
 - 3. Evidence of a compliant documented quality management system.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
- B. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finish from damage during handling and installation.

1.10 WARRANTY

- A. Warrant doors and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
- B. Warranty Period: Ten years starting on date of shipment. In addition, a limited lifetime (while the door is in its specified application in its original installation) warranty covering: failure of corner joinery, core deterioration, delamination or bubbling of door skin.
 - 1. Warranty period for painted fiberglass face sheets shall be five years.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.
 - a. Door Model: SL-17 Flush Doors with SpecLite3 fiberglass reinforced polyester (FRP) face sheets.

2.2 FRP FLUSH DOORS

- A. Door Opening Size: As indicated on the Drawings.
- B. Construction:
 - 1. Door Thickness: 1-3/4 inches.
 - 2. Stiles and Rails: Aluminum extrusions made from prime-equivalent billet that is produced from 100 percent reprocessed 6063-T6 alloy recovered from industrial processes, minimum of 2-5/16-inch depth.
 - 3. Corners: Mitered.
 - 4. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom integral to standard tubular shaped stiles and rails reinforced to accept hardware as specified.
 - 5. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery. Welds, glue, or other methods are not acceptable.
 - 6. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
 - 7. Rail caps or other face sheet capture methods are not acceptable.
 - 8. Extrude top and bottom rail legs for interlocking continuous weather bar.
 - 9. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals.
 - 10. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded, interlocking edge of bottom rail.
 - 11. Glue: Use of glue to bond sheet to core or extrusions is not acceptable.

C. Face Sheet:

1. Material: SpecLite3 FRP, 0.120-inch thickness, finish color throughout.
2. Protective coating: Abuse-resistant engineered surface. Provide FRP with SpecLite3 protective coating, or equal.
3. Texture: "Pebble Grain".
4. Finish and Color: "Slate Grey" 5572..
5. Adhesion: The use of glue to bond face sheet to foam core is prohibited.

D. Core:

1. Material: Poured-in-place polyurethane foam.
2. Density: Minimum of 5 pounds per cubic foot.
3. R-Value: Minimum of 9.

E. Cutouts:

1. Manufacture doors with cutouts for vision lites, sizes as indicated.
2. Factory installed lites.

F. Hardware:

1. Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
2. Factory install hardware.

2.3 MATERIALS

A. Aluminum Members:

1. Aluminum extrusions made from prime-equivalent billet that is produced from 100% reprocessed 6063-T6 alloy recovered from industrial processes: ASTM B 221.
2. Sheet and Plate: ASTM B 209.
3. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.

B. Components: Door components from same manufacturer.

C. Fasteners:

1. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
2. Compatibility: Compatible with items to be fastened.
3. Exposed Fasteners: Screws with finish matching items to be fastened.

2.4 FABRICATION

A. Sizes and Profiles: Required sizes for door units, and profile requirements shall be as indicated on the Drawings.

B. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.

- C. Assembly:
 - 1. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
 - 2. Remove burrs from cut edges.
- D. Welding: Welding of doors is not acceptable.
- E. Fit:
 - 1. Maintain continuity of line and accurate relation of planes and angles.
 - 2. Secure attachments and support at mechanical joints with hairline fit at contacting members.

2.5 HARDWARE

- A. Pre-machine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
- B. Factory install hardware.
- C. Hardware Schedule: As follows and as indicated Division 08 Section “Door Hardware”.
 - 1. Hinges: SL-11HD continuous hinges finish as specified in Division 08 Section “Door Hardware”.
- D. Size: As indicated on the Drawings.

2.6 ALUMINUM FINISHES

- A. Painted: Color as selected by Architect from manufacturer’s full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive doors. Notify Architect of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

- A. Ensure openings to receive doors are plumb, level, square, and in tolerance.

3.3 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions.
- B. Install doors plumb, level, square, true to line, and without warp or rack.
- C. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by Architect.
- D. Set thresholds in bed of mastic and backseal.

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- E. Install exterior doors to be weathertight in closed position.
- F. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by Architect.
- G. Remove and replace damaged components that cannot be successfully repaired as determined by Architect.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for installation of doors.

3.5 ADJUSTING

- A. Adjust doors, hinges, and locksets for smooth operation without binding.

3.6 CLEANING

- A. Clean doors promptly after installation in accordance with manufacturer's instructions.
- B. Do not use harsh cleaning materials or methods that would damage finish.

3.7 PROTECTION

- 1. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of substantial completion.

END OF SECTION

SECTION 08 31 13

ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.
- B. Related Requirements:
 - 1. Divisions 22 through 28 for plumbing, mechanical and electrical access doors and frames.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Product Schedule: For access doors and frames showing proposed locations, sizes, door type and finish, and lock type for each door.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Manufacturers: Nystrom Building Products, Minneapolis, MN (800) 547-2635.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.3 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Concealed Flanges. Provide at concealed locations not exposed to public view:

1. Description: Face of door flush with frame, with exposed flange and concealed hinge.
 2. Locations: Walls and ceilings.
 3. Door Size: Smallest manufactured standard size complying with code requirements and permitting maintenance and access, and removal and replacement of working parts.
 4. Uncoated Steel Sheet for Door:
 - a. Provide at non-corrosive and dry locations
 - b. Nominal 0.060 inch, 16 gauge, factory primed, and field painted.
 5. Metallic-Coated Steel Sheet for Door:
 - a. Provide at corrosive and wet or moist locations.
 - b. Nominal 0.064 inch, 16 gauge, factory primed, and field painted.
 6. Frame Material: Same material, thickness, and finish as door.
 7. Latch and Lock: Cam latch, screwdriver operated with interior release where door allows passage to interior space.
- B. Recessed Access Doors with Concealed Flanges. Provide at locations exposed to public view with infill materials and finishes to match adjacent wall or ceiling:
1. Description: Door face recessed 5/8 inch for gypsum board unless otherwise required for plaster, acoustical tile or other infill material; with concealed flange for gypsum board unless otherwise required for plaster, acoustical tile or other wall or ceiling material; and concealed hinges.
 2. Locations: Walls and ceilings.
 3. Door Size: Smallest manufactured standard size complying with code requirements and permitting maintenance and access, and removal and replacement of working parts.
 4. Uncoated Steel Sheet for Door:
 - a. Provide at non-corrosive and dry locations
 - b. Nominal 0.060 inch, 16 gauge, factory primed, and field painted.
 5. Metallic-Coated Steel Sheet for Door:
 - a. Provide at corrosive and wet or moist locations.
 - b. Nominal 0.064 inch, 16 gauge, factory primed, and field painted.
 6. Stainless-Steel Sheet for Door:
 - a. Provide at tiled locations.
 - b. Nominal 0.062 inch, 16 gauge, No. 4 finish.
 7. Welded Aluminum Access Doors:
 - a. Provide at in lieu of uncoated or metallic-coated steel sheet access doors above.
 - b. Provide Nystrom RGB Series or approved equal access doors.
 8. Frame Material: Same material, thickness, and finish as door.

9. Latch and Lock: Cam latch, screwdriver operated with interior release where door allows passage to interior space.

C. Exterior Flush Access Doors:

1. Description: Weatherproof assembly, with face of door fit flush with frame and with exposed frame. Include extruded door gaskets and minimum 2-inch-thick fiberglass insulation.
2. Locations: Walls and soffits.
3. Door Size: Smallest manufactured standard size complying with code requirements and permitting maintenance and access, and removal and replacement of working parts.
4. Metallic-Coated Steel Sheet for Door:
 - a. Provide at corrosive and wet or moist locations.
 - b. Nominal 0.064 inch, 16 gauge factory primed, and field painted.
5. Frame Material: Same material, thickness, and finish as door.
6. Latch and Lock: Cam latch, key operated with interior release where door allows passage to interior space.

2.4 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with concealed flange for gypsum board or plaster installation, self-closing door, and concealed hinge.
2. Locations: Rated walls and ceilings.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Temperature-Rise Rating: 450 degrees F at the end of 30 minutes.
 - a. Provide only where required by code.
1. Uncoated Steel Sheet for Door:
 - a. Provide at non-corrosive and dry locations.
 - b. Nominal 0.060 inch, 16 gauge, factory primed, and field painted.
2. Metallic-Coated Steel Sheet for Door:
 - a. Provide at corrosive and wet or moist locations.
 - b. Nominal 0.064 inch, 16 gauge factory and primed field painted.
3. Stainless-Steel Sheet for Door:
 - a. Provide at tiled locations.
 - b. Nominal 0.062 inch, 16 gauge, No. 4 finish.
4. Frame Material: Same material and thickness as door.
5. Latch and Lock: Cam latch, key operated with interior release where door allows passage to interior space.

2.5 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- E. Aluminum Extrusions: ASTM B 221, Alloy 6063.
- F. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- G. Frame Anchors: Same material as door face.
- H. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.6 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.
 - 1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.
- E. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2. Keys: Furnish two keys per lock and key all locks alike.

2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- E. Stainless-Steel Finishes:
 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 2. Polished Finish: No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION

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SECTION 083413

VERTICAL STACKING DOORS

PART 1 GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 SECTION INCLUDES

- A. Overhead folding doors.

1.3 RELATED SECTIONS

- A. Division 05 Section "Metal Fabrications" Steel frame and supports.
- B. Division 07 Section "Joint Sealants" Perimeter sealant and backup materials.
- C. Division 08 Section "Door Hardware" Cylinder locks.
- D. Division 26 Sections for electrical work.

1.4 REFERENCES

- A. AS1170.2:2002 - Structural Design Actions - General Principles.
- B. AS4100-1990- SAA Steel Structures Code.
- C. AS 1288 - Glass in Buildings - Selection and Installation.
- D. AA-6063-T6 - Standards for Aluminum Alloy and Temper.
- E. ASTM A513, Type 1 – Steel Tubes.
- F. ASTM A1008 – Sheet Steel for Covers.
- G. ASTM A36 – Steel Bars.
- H. ASTM A36 – Sheet Steel for Tracks/Channels.

1.5 PERFORMANCE REQUIREMENTS

- A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
 - 1. Design pressure as indicated on Structural Drawings.
 - 2. Maximum deflection of 1/300 of opening width.
- B. Single-Source Responsibility: Provide doors, tracks, motors, installation and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to

VERTICAL STACKING DOOR 083413 - 1

manufacturer of primary components.

1.6 SUBMITTALS

- A. 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.
- B. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, accessories and anchors, jamb details, connection details, anchorage spacing, hardware locations, and installation details.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, represent actual product, color, and patterns.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- F. Operation and Maintenance Data.
- G. Submit written agreement in manufacturer's standard form signed by manufacturer and installer agreeing to repair or replace defective doors that are warped, twisted, bowed or damaged as a result of defective product.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.8 DELIVERY STORAGE AND HANDLING

- A. Store products in manufacturer's unopened labeled packaging until ready for installation.
- B. Store materials in a clean, dry, ventilated, weather tight, secure location.
- C. Protect materials from soiling, abuse, loss and moisture damage.

1.9 PROJECT CONDITIONS

- A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- B. Environmental Conditions: Prior to and during installation, environmental conditions shall be in

accordance with door manufacturers latest published recommendations for temperature, rain, wind, humidity, ventilation, and illumination.

1.10 WARRANTY

- A. Manufacturer warrants to the original purchaser within one year from date of installation, if a product sold under this warranty proves to be defective in material or workmanship through normal use and service according to maintenance and operations instructions, as verified by inspection by persons authorized by SGCA Doors, SGCA Doors will replace or repair (at SGCA Doors option) the defective product.
- B. Manufacturer warrants the steel frame against rust, in painted non-damaged condition for a period of two years from original purchase. This warranty does not apply to scratched, dented, damaged or corroded areas of the frame.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: This Section is based on the products of SGCA Doors (a division of Smoke Guard California, Inc.) which is located at 1915 Mark Ct. Suite 100 Concord, CA 94520. Tel: 877-345-1276 Fax: 877-342-8938. Web: www.sgcal.com or approved equal.
- B. Bi-Fold Doors: Vertically gliding door with no floor tracks.
 - 1. Basis-of-Design Product: SGCA Door STACK or approved equal.
- C. Curtain: Constructed from 2-1/2 inch by 1-1/2 inch top and side rails and 1-1/4 inch by 1-1/2 inch mid rails.
- D. Panels: Panels shall be secured by glazing bead, santoprene or PVC wedges.
 - 1. Panel Heights: As indicated on Drawings.
 - 2. Panel Heights: Even division of the open height equaling rows as indicated, not to exceed 24 inches per panel height.
- E. Brackets and Tracks: Mono section configuration.
- F. Side Guides: 5-1/2 inch by 2-3/8 inch extruded aluminum sections with twin 1/8 inch tracks.
- G. Hardware/Hinges: Cast stainless steel constructed hinges with teflon inserts to ensure quiet and low friction operation.
- H. Operation: Door shall be balanced by the use of torsion springs connected to a rotating shaft. The shaft ends are attached to cable drums which lift/lower the curtain via a flexible cable.
 - 1. Electrical.
- I. Size: As indicated.
- J. Locking:

1. Centrally mounted, two-way mortise key lock.
2. Integrated motor-controlled lock assembly (Liftmaster 3800 or 3900 Motors)

2.2 FINISHES

- A. Finish, Ferrous Metals: All surfaces except working machine parts shall receive the following factory applied finish:

1. Powder coating.
2. Abrasive clean to SSP-SP6

- B. Finish, Aluminum: Provide the following factory applied finish:

1. Clear anodized aluminum.
2. Abrasive clean to SSP-SP6
3. Powder coating.

- C. Finish, Color:

1. As designated in Door Schedule
2. As selected from manufacturer's full range of available colors.
3. Custom color.
4. Manufacturer/Color: As selected by Architect from manufacturer's full range.

2.3 MOTORS

- D. Chamberlain Liftmaster 3800 Series Jackshaft Operator.

1. On board logic controllers.
2. Motor: 115V 60 hz. single phase, 8 amp
3. Sealed motor system.
4. No railings or trolleys; ultra-quiet.
5. Battery backup.
6. Mounts beside or above door.
7. Warranty: 5 years.

- E. Doors shall be electronically operated with control systems as specified.

- F. Provide electrical service and wiring connection as specified in Division 26 for future electric operation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until openings have been properly prepared.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- C. Verify electric power is available and of correct characteristics.

- D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Inserts and Anchorages: Furnish inserts and anchoring devices suitable for the installation of the units and consistent with the manufacturer's installation requirements. Coordinate delivery with other work to avoid delay.
- B. Install overhead doors, operating equipment, hardware, seals, stops, anchors, inserts, supports and track in accordance with approved shop drawings and the manufacturer's printed instructions.
- C. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- D. Anchor assembly to wall construction and building framing without distortion or stress.
- E. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- F. Fit and align door assembly including hardware.
- G. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

3.4 CLEANING AND ADJUSTING

- A. Lubricate, test and adjust door assembly to smooth operation free from warp twist or distortion and in full contact with weather stripping.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

3.5 PROTECTION

- A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.
- B. Protect installed products until completion of project.
- C. Touch-up, damaged coatings and finishes and repair minor damage before Substantial Completion.

3.6 MAINTENANCE

- A. Post Installation Maintenance:
 - 1. Contractor and SGCA Doors representative shall provide Owner with complete company name, address phone number, fax number and assigned contact for emergency repairs and scheduled maintenance for the installed door(s).

B. Training/Instruction for Owner for Operation and System Maintenance:

1. SGCA Doors representative shall instruct Owner's representative in regular tenant provided maintenance and operation of installed doors.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Furnish and install aluminum architectural storefront system complete with hardware and related components as shown on drawings and specified in this section.
 - 1. Test reports documenting compliance with requirements of Article “Laboratory Testing and Performance Requirements” of this Section.

- B. Related Sections:

- 1. Division 08 Section “Fiberglass Reinforced Polyester Doors” for FRP entrance doors in set in aluminum storefront.
 - 2. Division 08 Section “Aluminum Windows” for matching of finishes between aluminum storefronts and aluminum windows.
 - 3. Division 08 Section “Glazing” for glass and glazing.

1.3 RELATED WORK

- A. Division 00 Section “Deferred Approvals” for deferred approval of aluminum-framed storefront with spans greater than 10 feet.
- B. Division 07 Section “Insulated-Core Metal Window Panels” for insulated-core metal window panels set in aluminum-framed storefront.
- C. Division 07 Section “Sheet Metal and Flexible Flashing” for sheet metal and flexible flashing.
- D. Division 07 Section “Joint Sealants” for joint sealants.
- E. Division 08 Section “Fiberglass Reinforced Polyester Doors” for FRP doors in set in aluminum-framed storefront.
- F. Division 08 Section “Aluminum Windows” for coordination of single source manufacturer and matching of finishes.
- G. Division 08 Section “Door Hardware” for door hardware.
- H. Division 08 Section “Glazing” and Drawings for glazing types.

ALUMINUM-FRAMED STOREFRONTS 08 41 13 - 1

1.4 LABORATORY TESTING AND PERFORMANCE REQUIREMENTS

A. Test Units

1. Air, water, and structural test unit size shall be a minimum of two stories high and three lites wide.
2. Thermal test unit sizes shall be 80 inches wide by 80 inches high with one intermediate vertical mullion and two lites of glass.

B. Test Procedures and Performance

1. Air Infiltration Test

- a. Test unit in accordance with ASTM E 283 at a static air pressure difference of 6.24 psf.
- b. Air infiltration shall not exceed .06 cfm/SF of unit.

2. Water Resistance Test

- a. Test unit in accordance with ASTM E 331.
- b. There shall be no uncontrolled water leakage at a static test pressure of 12.0 psf.

3. Uniform Load Deflection Test

- a. Test in accordance with ASTM E 330.
- b. Deflection under design load shall not exceed $L/175$ of the clear span.

4. Uniform Load Structural Test

- a. Test in accordance with ASTM E 330 at a pressure 1.5 times the design wind pressure in accordance with requirements of Article "Laboratory Testing and Performance Requirements" of this Section.
- b. At conclusion of the test, there shall be no glass breakage, permanent damage to fasteners, storefront parts, or any other damage that would cause the storefront to be defective.

1.5 FIELD TESTING AND PERFORMANCE REQUIREMENTS

- A. Test in accordance with AAMA 501.2 for spray test.

1.6 QUALITY ASSURANCE

- A. Provide test reports from AAMA accredited laboratories certifying the performance as specified in Article "Laboratory Testing and Performance Requirements" of this Section.
- B. Test reports shall be accompanied by the storefront manufacturer's letter of certification stating that the tested storefront meets or exceeds the referenced criteria for the appropriate storefront type.

1.7 SUBMITTALS

- A. Contractor shall submit shop drawings; finish samples, test reports, and warranties.
- B. An NFRC Component Modeling Approach (CMA) generated label certificate shall be provided by the manufacturer. The label certificate shall be project specific and will contain the thermal performance ratings of the manufacturer's framing combined with the specified glass, and the glass spacer used in the fabrication of the glass, at NFRC standard test size as defined in table 4-3 in NFRC 100-2010.

1.8 WARRANTIES

- A. Total Storefront Installation:
 - 1. The Contractor shall assume full responsibility and warrant for one year the satisfactory performance of the total storefront installation. This includes the glass (including insulated units), glazing, anchorage and setting system, sealing, flashing, etc., as it relates to air, water, and structural adequacy as called for in the specifications and approved shop drawings.
 - 2. Any deficiencies due to such elements not meeting the specifications shall be corrected by the Contractor at their expense during the warranty period.
- B. Storefront Material and Workmanship:
 - 1. Provide written guarantee against defects in material and workmanship for 10 years from the date of substantial completion.
 - 2. Warranty period shall be for 10 years from the date of final substantial completion.

PART 2 - PRODUCTS

2.1 BASIS-OF-DESIGN PRODUCT.

- A. Basis-of-Design Product: Subject to compliance with requirements, provide [EFCO Corporation](#) System 403 Thermal Screw Spline Storefront or comparable product by one of the following:
 - 1. [Kawneer North America; an Alcoa company.](#)
 - 2. [U.S. Aluminum; a brand of C.R. Laurence.](#)

2.2 MATERIALS

- A. Aluminum:
 - 1. Extruded aluminum shall be 6063-T6 alloy and temper.
- B. Glass: In accordance with Division 08 Section "Glazing" and as indicated on Drawings.
- C. Thermal Barrier:
 - 1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined

as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.

2. Barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.

D. Receptors:

1. Manufacturer's standard aluminum receptors as indicated finished to match aluminum windows.

2.3 FABRICATION

A. General:

1. All aluminum frame extrusions shall have a minimum wall thickness of 0.080 inches.
2. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.

B. Frame:

1. Depth of frame shall not be less than 4 1/2 inches.
2. Face dimension shall not be less than 2 inches.
3. Frame components shall be screw spline construction.

C. Glazing:

1. All units shall be "dry glazed" with gaskets on both exterior and interior of the glass. All units shall be glazed from the exterior.

- D. Finish: Finish all exposed areas of aluminum-framed storefront and components with high performance 70 percent PVDF fluoropolymer Ultrapon. Custom color as selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSPECTION

A. Job Conditions:

1. All openings shall be prepared by others to the proper size and shall be plumb, level and in the proper location and alignment as shown on the architect's drawings.
2. Provide for manufacturer representation to conduct pre-installation site meeting.

3.2 INSTALLATION

- A. Use only skilled tradesmen with work done in accordance with approved shop drawings and specifications.
- B. Storefront system shall be erected plumb and true, in proper alignment and relation to established lines and grades.

- C. Entrance doors shall be securely anchored in place to a straight, plumb and level condition, without distortion. Weather stripping contact and hardware movement shall be checked, and final adjustments made for proper operation and performance of units.
- D. Furnish and apply sealing materials to provide a weather tight installation at all joints and intersections and at opening perimeters.
- E. Sealing materials specified shall be used in strict accordance with the manufacturer's printed instructions and shall be applied only by mechanics specially trained or experienced in their use. All surfaces must be clean and free of foreign matter before applying sealing materials. Sealing compounds shall be tooled to fill the joint and provide a smooth finished surface.

3.3 ANCHORAGE

- A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

3.4 PROTECTION AND CLEANING

- A. Adequately anchor to maintain positions permanently when subjected to normal thermal movement, specified building movement, and specified wind loads.

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SECTION 08 51 00

FIRE-RATED STEEL WINDOWS AND OPERATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Fire Rated Fixed Lite and Projected Awning Steel Windows. 45-Minute UL Labeled.
- B. Window Remote Operators.

1.3 RELATED SECTIONS

- A. Division 08 Section "Glazing" for Glazing Materials.
- B. Division 26 ELECTRICAL Sections for electrical work for window remote operators.

1.4 REFERENCES

- A. ASTM A 569-(1991a; R 1993) Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial Quality.
- B. ASTM A 653-(1994) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. ASTM B 633-(1985; R 1994) Electrodeposited Coatings of Zinc on Iron and Steel.
- D. ASTM B 766-(1986; R 1993) Electrodeposited Coatings of Cadmium.
- E. ASTM E 283-(1991) Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors Under Specific Pressure Differences Across the Specimen.
- F. ASTM E 330-(1990) Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- G. ASTM E 547-(1993) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
- H. ASME B18.6.3-(1972; R 1991) Machine Screws and Machine Screw Nuts.
- I. ASME B18.6.4-(1981; R 1991) Thread Forming and Thread Cutting Tapping Screws and Metallic Drive Screws (Inch Series).
- J. NFPA 80-(2007) Fire Doors and Windows.
- K. NFPA 101-(2006) Safety to Life from Fire in Buildings and Structures.

FIRE-RATED STEEL WINDOWS AND OPERATORS 08 51 00 - 1

- L. UL9-Fire Tests of Window Assemblies.
- M. File No. R13157-D.V. Fyre-Tec Classification.

1.5 PERFORMANCE REQUIREMENTS

A. Fixed and Projected Awning Steel Windows:

1. Fixed lite steel windows shall be designed to meet F-C30 voluntary specifications in AAMA/NWWDA 101/I.S.2-97 and be designed to meet the following performance requirements. Fire-rated windows shall bear the Underwriters Laboratories, Inc. label including the manufacturer's file number for the indicated rating.
2. Projected Awning Steel windows shall conform to CW-PG30-AP voluntary specifications in AAMA/WDMA/CSA 101/I.S.2/A440-08 and be designed to meet the following performance requirements. Fire-rated windows shall bear the Underwriters Laboratories, Inc. label including the manufacturer's file number for the indicated rating.
3. Structural Performance: Structural test pressures on window units shall be for positive load (inward) and negative load (outward) in accordance with ASTM E 330 at a static pressure of 45 PSF. After testing, there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms, or actuating mechanisms or any other damage which could cause window to be inoperable. There shall be no permanent deformation of any main frame, sash or ventilator member in excess of the requirements established by AAMA/ WDMA /CSA 101/I.S.2/A440-08 for the window types specified in this section.
4. Air Infiltration: Air infiltration shall not exceed .3 SCFM per square foot of window area at a static air pressure difference of 1.57 PSF as established by AAMA/ WDMA /CSA 101/I.S.2 and NWWDA -97 when tested in accordance with ASTM E 283.
5. Water Resistance: When tested in accordance with ASTM E 547, there shall be no water leakage at a static air pressure difference of 4.50 PSF.

B. Fire Protective: Fire protective rating shall meet requirements as tested and classified by Underwriters Laboratories Inc, in accordance with UL-9. Products shall meet the requirements of Underwriters Laboratories Inc. The Listing Mark of UL on the product will be accepted as evidence of compliance.

C. Life Safety Criteria: Windows shall conform to NFPA 101 Life Safety Code when rescue and/or second means of escape are indicated.

1.6 SUBMITALS

- A. Manufacturer's descriptive data and catalog cut sheets.
- B. Drawings indicating elevations of windows, rough-opening dimensions for each type and size of windows, section details, fastenings, generic method of installation and anchorage, glazing details, method of glazing, muntin divider details, mullion details, weather-stripping details, types and locations of operating hardware, window type and

indicating compliance with fire safety code, where required. Refer to Authority Having Jurisdiction for specific installation, wall detail, and anchorage requirements.

- C. Manufacturer's preprinted installation instructions and cleaning instructions.
- D. Manufacturer's standard color samples of painted finishes.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
- B. Manufacturer's Qualifications: A firm with not less than 10-years' experience in manufacture of similar type steel windows.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery:
 - 1. Manufacturer's original, unopened, undamaged containers, identification labels intact. Inspect for damage upon delivery.
 - 2. Handle and store products according to manufacturer's recommendations.
- B. Storage and Protection:
 - 1. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.
 - 2. Store windows to prevent damage or marring of finish. Store in shipping containers under cover on building site.

1.9 PROJECT CONDITIONS

- A. Verify actual openings by field measurements before fabrication, show recorded measurements on shop drawings.
- B. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.10 WARRANTY

- A. Manufacturer's standard warranty to be 3 years from the date of delivery.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- B. Series 950 Fixed and 975 Projected Awning Windows as manufactured by Fyre-Tec; 701 Centennial Road; Wayne, NE 68787; Tel: 1-800-377-3261; Fax; 1-402-375-4261; Web: www.fyre-tec.com; Email; info@fyre-tec.com or approved equal.
- C. Architect approved equal.

2.2 STEEL WINDOW TYPES

- A. Fixed and Projected Awning steel windows shall be designed for inside field glazing, and for glass types scheduled on drawings or otherwise specified. Units shall be complete with glass and glazing provisions to meet requirements of paragraph WINDOW PERFORMANCE. Glazing material shall be compatible with steel, and shall not require painting.
- B. Fire-rated windows shall conform to UL-9 and shall be labeled with a 3/4 - hour fire-test rating as specified in the window schedule. Units shall be designed and fabricated to meet glass sizes, window sizes, and opening dimensions established by NFPA 80. Hardware shall conform to NFPA 80 requirements. All operable fire-rated windows are to be self-closing and latching by means of a heat activated fusible link operator.

2.3 MATERIALS

- A. Steel Frames and Inserts
 - 1. Steel frames and inserts shall be fabricated from roll-formed galvanized lock-forming quality steel per ASTM A 653.
 - 2. Frame and insert corners shall mitered and welded.
 - 3. Operable sash shall be supported on two heavy-duty stainless steel four-bar hinges.
- B. Installation Kits
 - 1. Provide subframe installation kits for all windows.
- C. Weather Stripping
 - 1. The insert will accommodate double weather-stripping around the entire perimeter of the insert. Weather-stripping for the insert shall be designed to meet water penetration and air infiltration requirements specified under paragraph WINDOW PERFORMANCE, and shall be manufactured of material compatible with steel and resistant to weather. Weather-strips shall be factory applied and easily replaced in the field.
- D. Formed Component Parts
 - 1. Formed component parts shall be hot-rolled sheet steel conforming to ASTM A 569, commercial quality with a minimum of 0.15 percent carbon.
 - 2. Sheet steel shall be zinc coated (galvanized) by the hot-dip process in accordance with ASTM A 653 or ASTM A 924.
- E. Screws and Bolts
 - 1. Screws and bolts shall conform to ASTM B 766, ASME B18.6.3 and ASME B18.6.4.
- F. Fasteners

1. Fastening devices shall be window manufacturer's design made from cadmium-plated steel, zinc-plated steel, nickel/chrome-plated steel or magnetic stainless steel.

G. Window Anchors

1. Anchors for installing windows shall be stainless steel or hot-dip zinc coated steel conforming to ASTM A 123.

H. Glass and Glazing

1. Insulating Glass Units (IGU) 45-minute rated as specified in Division 08 Section "Glazing".

2.4 FABRICATION

- A. Fabricate windows in accordance with approved shop drawings.
- B. Frame sections shall be one piece sections with corners mitered, welded and dressed smooth.
- C. All windows shall be designed for inside glazing.
- D. All windows shall be factory glazed with UL labeled glass meeting or exceeding the hourly rating required for the frame label. Individual lites shall display a UL label permanently affixed and in accordance with the requirements of the International Building Code and NFPA 80.

2.5 FINISHES

- A. Finish Coat:
 1. Steel windows, fins, mullions, cover plates and associated parts shall be cleaned, pre-treated with iron phosphate and factory coated with baked alkyd enamel or powder coat and cured in a dry film thickness of not less than 0.050 mm (2.0 mil).
 2. Custom Color: As selected by Architect from manufacturer's full range.

2.6 WINDOW REMOTE OPERATORS

- A. Powered and manual as indicated, remote window vent operators as manufactured by Automated Fenestration Incorporated, automatedfenestration.com UL Rated, 24 VDC "VEGA" Actuator model #411 (48S "Gray" RAL 9006; 49U "Black" RAL 9005; or 50C "White as selected by Architect); Motorized Actuators with Control Panel or approved equal..
 1. Architectural Representative: Aldo Trinidad (323) 756-9090.
 2. Provide actuator with 24 VDC step down power supply 115 VDC to 24 VDC.
 3. Surface mounted switches, cables, and operators.

FIRE-RATED STEEL WINDOWS AND OPERATORS 08 51 00 - 5

4. Color to match window frames.
 5. Completely integrated sealed system without necessity of maintenance or lubrication.
 6. High tensile strength flexible steel cable operates through entire length of plastic lined steel conduit.
 7. Cable gearing at powered or manual crank and window vent operator.
 8. Provide shop drawings showing locations of powered and manual cranks, cabling routes, and operator locations.
- B. Provide product data for all devices, including electrical requirements.
- C. Individual Control, Group Control & Individual and Group Control:
1. The system shall be able to interact with Building Management System (BMS) Interface.
- D. The system shall be designed such that support for other BMS protocols can be added as the need arises.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Window openings shall conform to details and dimensions shown on the approved shop drawings.
- B. Notify the Architect immediately of conditions that may adversely affect the window installation. Correct conditions prior to installing windows

3.2 INSTALLATION

- A. Steel windows shall be installed in accordance with approved shop drawings and manufacturer's approved recommendations.
- B. Fire-rated windows shall be installed in compliance with NFPA 80 and NFPA 101.
- C. Steel surfaces in close proximity with masonry, concrete, wood, and dissimilar metals other than stainless steel, zinc, cadmium, or small areas of white bronze shall be protected from direct contact.
- D. Verify that weep features at the bottom of the sills are opened at least 1/8-inch by 1-inch. Failure to do so may lead to premature finish failures and void warranty.
- E. The completed window installation shall be watertight.

3.3 ADJUSTING AND CLEANING

- A. Steel window finish and glass shall be cleaned on interior and exterior sides in accordance with window manufacturer's recommendation. Alkaline, abrasive or brick wash agents shall not be used.

- B. Operable sash shall be adjusted per manufacturer's instruction to provide minimal operating force.

3.4 PROTECTION

- A. Protect installed products and finished surfaces from damage during construction.
- B. Touch-up any abraded surface of the window finish with air dry paint furnished by the window manufacturer.

END OF SECTION

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SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes fixed aluminum-framed windows for exterior locations and window remote operators.
- B. Related Sections include the following:
 - 1. Division 08 Section "Aluminum-Framed Storefronts" for coordinating finish among aluminum fenestration units and matching finishes.
 - 2. Division 08 Section "Glazing" for related glass and glazing requirements.

1.3 COORDINATION WITH OTHER WORK

- 1. Manufacturer of products specified in this Section shall be same manufacturer of products specified in Division 08 Section "Aluminum-Framed Storefronts". Match finishes and glazing.

1.4 DEFINITIONS

- A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. AW: Architectural.
 - 2. HC: Heavy Commercial.
 - 3. C: Commercial.
- B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Design pressure number in pounds force per square foot used to determine the structural test pressure and water test pressure.
- C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
- D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

1.5 PERFORMANCE REQUIREMENTS

ALUMINUM WINDOWS 08 51 13 - 1

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size indicated below:
 - 1. Size required by AAMA/WDMA 101/I.S.2/NAFS for gateway performance.
 - 2. Size indicated on Drawings.
- B. Structural Performance: Provide aluminum windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test. See Structural Drawings for structural design loading requirements.
- C. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or 3/4 inch, whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.
- D. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F material surfaces.
- E. Thermal Transmittance:
 - 1. Thermal testing is to be conducted in accordance with the NFRC 100 procedure, and all windows shall be NFRC certified and labeled.
 - 2. Maximum U-Factor shall be 0.290, Center of Glass, Frame Adjusted.
 - 3. Glass for Thermal Transmittance testing shall be in accordance with the requirements for validation of the NFRC glass matrix. Maximum Solar Heat Gain Coefficient (SHGC) shall be 0.380 SHGC Center of Glass, Frame Adjusted.
- F. Sound Ratings:
 - 1. Windows shall not exceed STC of 35 when tested in accordance with ASTM E1332-90.

1.6 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
 - 1. Joinery details.
 - 2. Expansion provisions.
 - 3. Flashing and drainage details.

4. Weather-stripping details.
 5. Thermal-break details.
 6. Glazing details.
 7. For installed products indicated to comply with design loads, include structural analysis data prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of aluminum windows and used to determine the following:
 - a. Structural test pressures and design pressures from wind loads indicated.
 - b. Deflection limitations of glass framing systems.
- C. Samples for Verification: For aluminum windows and components required, prepared on Samples of size indicated below.
1. Main Framing Member: 12-inch- long, full-size sections of extrusions with factory-applied finish.
 2. Window Corner Fabrication: 12-by-12-inch- long, full-size window corner including full-size sections of extrusions with factory-applied finish, weather stripping, and glazing.
 3. Hardware: Full-size units with factory-applied finishes.
 4. Weather Stripping: 12-inch- long sections.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.
- E. Qualification Data: For Installer and Manufacturer.
- F. Product Test Reports and Labeling: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, class, grade, and size of aluminum window. Test results based on use of downsized test units will not be accepted.
1. Cost of product testing and labeling to comply with Performance Requirements indicated above shall be responsibility of Manufacturer and shall not be included in Contractors cost to Owner.
- G. Warranty: Special warranty specified in this Section.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- C. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for aluminum windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum windows and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements." Do not modify size and dimensional requirements.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- F. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - 1. Provide AAMA-certified aluminum windows with an attached label.
- G. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup for type(s) of window(s) indicated, in location(s) shown on Drawings.
- I. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- J. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to aluminum windows including, but not limited to, the following:
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for finish matching.
 - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for structural anchorage, glazing, flashing, weeping, sealants, and protection of finishes.
 - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating aluminum windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
 - e. Failure of insulating glass.
 2. Warranty Period:
 - a. Window: Two years from date of Substantial Completion.
 - b. Glazing: Five years from date of Substantial Completion.
 - c. Metal Finish: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide EFCO Corporation; product specified or a comparable product by one of the following:
1. Kawneer North America; an Alcoa company.
 2. U.S. Aluminum; a brand of C.R. Laurence.

2.2 WINDOWS

- A. Window Types:
1. Fixed and Awning: EFCO Corporation, Series 2700, 2 Inch, Thermal, Heavy Commercial Grade, Fixed and Awning Windows as indicated on Drawings.
- B. AAMA/WDMA Performance Requirements: Provide aluminum windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS unless more stringent performance requirements are indicated.
- C. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.
1. Maximum Rate: 0.1 cfm/sq. ft. of area at an inward test pressure of 6.24 lbf/sq. ft.
- D. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.
1. Test Pressure: 15 percent of positive design pressure, but not less than 2.86 lbf/sq. ft. or more than 15 lbf/sq. ft.

2. Test Pressure: 20 percent of positive design pressure, but not more than 15 lbf/sq. ft.
- E. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.
- F. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA 101/I.S.2/NAFS.
- G. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

2.3 GLAZING

- A. Factory glaze windows in accordance with requirements of Division 08 Section "Glazing". Match aluminum storefront glazing.
- B. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

2.4 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- C. Thermally Improved Construction: Fabricate aluminum windows with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
 1. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
 2. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.
- F. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.
- G. Factory-Glazed Fabrication: Glaze aluminum windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.

- H. Glazing Stops: Provide snap-on glazing stops coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

2.5 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating. color as selected by Architect from manufacturer's full range of colors.

2.7 WINDOW REMOTE OPERATORS

- A. Powered and manual as indicated, remote window vent operators as manufactured by Clearline Incorporated, (215) 699-9292, controls@clearlineinc.com 24 VDC #1992 Motorized Actuators with Control Panel with 2320 Control Panel, or comparable product by Bronze Craft.
 - 1. Provide actuator with 24 VDC step down power supply 115 VDC to 24 VDC.
 - 2. Surface mounted switches, cables, and operators.
 - 3. Match window frames.
 - 4. Completely integrated sealed system without necessity of maintenance or lubrication.
 - 5. High tensile strength flexible steel cable operates through entire length of plastic lined steel conduit.
 - 6. Cable gearing at powered or manual crank and window vent operator.
 - 7. Provide shop drawings showing locations of powered and manual cranks, cabling routes, and operator locations.
- B. Provide product data for all devices, including electrical requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.

1. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Remove and replace non-complying aluminum window and retest as specified above.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, operators, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior

concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain window operating system. Refer to Division 1 Section "Demonstration and Training."

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SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes items known commercially as Door Hardware that are required for swing, sliding, and folding doors, except special types of unique hardware specified in the same sections as the doors and door frames on which they are installed.
- B. Related Sections: The following sections are noted as containing requirements that relate to this Section, but may not be limited to this listing.
 - 1. Division 08: Section - Hollow Metal Doors and Frames.
 - 2. Division 08: Section - Flush Wood Doors.
 - 3. Division 08: Section - Glazing.

1.3 REFERENCES

- A. 2019 California Building Code, CCR Title 24, Part 2
- B. BHMA - Builders' Hardware Manufacturers Association
- C. DHI - Door and Hardware Institute
- D. NFPA - National Fire Protection Association.
 - 1. NFPA 80 - Fire Doors and Other Opening Protectives
 - 2. NFPA 105 - Smoke and Draft Control Door Assemblies
- E. UL - Underwriters Laboratories.
 - 1. UL 10C - Fire Tests of Door Assemblies
 - 2. UL 305 - Panic Hardware
- F. WHI - Warnock Hersey Incorporated
- G. SDI - Steel Door Institute

1.4 SUBMITTALS & SUBSTITUTIONS

- A. General: Submit in accordance with Conditions of the Contract and Division 01 Specification sections.

DOOR HARDWARE 08 71 00 - 1

- B. Submit product data (catalog cuts) including manufacturers' technical product information for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- C. Submit electronic PDF copies of schedule organized vertically into "Hardware Sets" with index of doors and headings, indicating complete designations of every item required for each door or opening. Include following information:
1. Include a Cover Sheet with:
 - a. Job Name, location, telephone number.
 - b. Architects name, location and telephone number.
 - c. Contractors name, location, telephone number and job number.
 - d. Suppliers name, location, telephone number and job number.
 - e. Hardware consultant's name, location and telephone number.
 2. Job Index information included:
 - a. Numerical door number index including; door number, hardware heading number and page number.
 - b. Complete keying information (referred to DHI hand-book "Keying Systems and Nomenclature"). Provision should be made in the schedule to provide keying information when available; if it is not available at the time the preliminary schedule is submitted.
 - c. Manufacturers' names and abbreviations for all materials.
 - d. Explanation of abbreviations, symbols, and codes used in the schedule.
 - e. Mounting locations for hardware.
 - f. Clarification statements or questions.
 - g. Catalog cuts and manufacturer's technical data and instructions.
 3. Vertical schedule format sample:

Heading Number 1 (Hardware group or set number - HW Group #1)				
(a) 1 Single - Door #101 - Corridor 101 to Exterior			(b) 90°	(c) RH
(d) 3'-0" x 7'-0" x 1-3/4" - Wood Door x Hollow Metal Frame - 20 Minute				
(e) 1.	(f) 3 ea	(g) Hinges - (h) 5BB1 4.5 x 4.5 NRP (i) 1/2 TMS	(j) 630	(k) IVE
2.	1 ea	Lockset - ND80P6D x RHO x RH x 10-025 x JTMS	626	SCH
3.	1 ea	Closer - 4040XP x EDA x TBSRT	689	LCN

- (a) Single or pair of doors with opening number and location.
- (b) Degree of opening.
- (c) Hand of door(s).
- (d) Door/frame dimensions and material; Label requirements, if any.
- (e) Hardware item line # (Optional).
- (f) Quantity.
- (g) Product description.
- (h) Product part number.
- (i) Fastenings and other pertinent information.
- (j) Hardware finish codes per ANSI/BHMA A156.18.

DOOR HARDWARE 08 71 00 - 2

(k) Manufacturer abbreviation.

- D. Make substitution requests in accordance with Division 01. Substitution requests must be made prior to bid date. Include product data and indicate benefit to the project. Furnish samples of any proposed substitution.
- E. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.
- F. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- G. Furnish as-built/as-installed schedule with close-out documents, including keying schedule and transcript, wiring/riser diagrams, manufacturers' installation and adjustment and maintenance information.
- H. Fire Door Assembly Testing: Submit a written record of each fire door assembly to the Owner to be made available to the Authority Having Jurisdiction (AHJ) for future building inspections.
- I. LEED Certification Points: Submit information and certifications necessary to achieve maximum points for LEED certification; coordinate and cooperate with Owner and Architect in providing information necessary for required LEED rating.

1.5 QUALITY ASSURANCE

- A. Obtain each type of hardware (latch and lock sets, hinges, closers, exit devices, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this project and that employs an experienced architectural hardware consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation.
 - 1. Responsible for detailing, scheduling and ordering of finish hardware.
 - 2. Meet with Owner to finalize keying requirements and to obtain final instructions in writing.
 - 3. Stock parts for products supplied and are capable of repairing and replacing hardware items found defective within warranty periods.
- C. Hardware Installer: Company specializing in the installation of commercial door hardware with five years documented experience.
- D. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and tested by UL or Warnock Hersey for given type/size opening and degree of label. Provide proper latching hardware, door closers, approved-bearing hinges and seals whether listed in the Hardware Schedule or not.

1. Where emergency exit devices are required on fire-rated doors, (with supplementary marking on doors' UL labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL label on exit devices indicating "Fire Exit Hardware".
- E. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- F. Product packaging to be labelled in compliance with CA Prop 65, Safe Drinking Water and Toxic Enforcement Act of 1986.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery of packaged hardware items to the appropriate locations (shop or field) for installation.
- B. Hardware items shall be individually packaged in manufacturers' original containers, complete with proper fasteners. Clearly mark packages on outside to indicate contents and locations in hardware schedule and in work.
- C. Provide locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, etc.
- D. Contractor to inventory door hardware jointly with representatives of hardware supplier and hardware installer until each all are satisfied that count is correct.

1.7 WARRANTY

- A. Provide warranties of respective manufacturers' regular terms of sale from day of final acceptance as follows:
 1. Locksets: Three (3) years.
 2. Closers: Thirty (30) years.
 3. Exit devices: Three (3) years.
 4. All other hardware: Two (2) years.

1.8 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

1.9 PRE-INSTALLATION CONFERENCE

- A. Convene a pre-installation conference at least one week prior to beginning work of this section.
- B. Attendance: Architect, Construction Manager, Contractor, Security Contractor, Hardware Supplier, Installer, Key Owner's Personnel, and Project Inspector.
- C. Agenda: Review hardware schedule, products, installation procedures and coordination required with related work. Review Owner's keying standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

<u>Item</u>	<u>Manufacturer</u>	<u>Acceptable Substitutes</u>
Hinges	Ives	Hager, Stanley, McKinney
Locks, Latches & Cylinders	Schlage	None – District Standard
Exit Devices	Von Duprin	None – District Standard
Closers	LCN	None – District Standard
Push, Pulls & Protection Plates	Ives	Trimco, BBW, DCI
Flush Bolts	Ives	Trimco, BBW, DCI
Coordinators	Ives	Trimco, BBW, DCI
Door Stops	Ives	Trimco, BBW, DCI
Overhead Stops	Glynn-Johnson	Or Approved Equal
Thresholds	Zero	Pemko, National Guard
Seals & Bottoms	Zero	Pemko, National Guard

2.2 MATERIALS

A. Hinges:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Hinges shall be sized in accordance with the following:
 - a. Height:
 - 1) Doors up to 42" wide: 4-1/2 inches.
 - 2) Doors 43" to 48" wide: 5 inches.
 - b. Width: Sufficient to clear frame and trim when door swings 180 degrees.
 - c. Number of Hinges: Provide 3 hinges per leaf to 7'-5" in height. Add one for each additional 2 feet in height.
3. Exterior out-swinging hinges shall be non-ferrous material and shall have stainless steel hinge pins. All doors to have non-rising pins.
4. Furnish non-removable pins (NRP) at all exterior out-swing doors and interior key lock doors with reverse bevels.

B. Continuous Hinges:

1. Provide aluminum geared continuous hinges fabricated from 6063-T6 aluminum conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
3. Provide continuous hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
4. Provide continuous hinges 1" shorter in length than nominal height of door, unless otherwise noted, with symmetrical hole pattern.
5. On fire-rated doors, provide continuous hinges that are UL listed for use on fire-rated doors.
6. Install continuous hinges with fasteners supplied by manufacturer.

C. Heavy Duty Mortise Locks and Latches: Schlage "L" Series as scheduled with "06" style lever and "A" style rose.

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3 hour fire doors.
2. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
3. Provide lock case that is multi-function and field reversible for handing without opening case.
4. Provide locks with standard 2-3/4" backset with full 3/4" throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1" throw, constructed of stainless steel.
5. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
6. Cylinders: Refer to "KEYING" article, herein.
7. Indicators: Where specified, provide indicator above cylinder or emergency release for visibility while operating the lock that identifies an occupied/unoccupied status of the lock or latch.
8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
9. Provide levers with vandal resistant technology as scheduled for use at abusive applications.

D. Exit devices: Von Duprin as scheduled.

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Provide certificate by independent testing laboratory that device has completed over 1,000,000 cycles and can still meet ANSI/BHMA A156.3 standards.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Provide exit devices cut to door width and height. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
6. Provide flush end caps for exit devices.
7. Exit devices shall comply with CBC Section 11B-404.2.7 and shall be mounted between 34" and 44" above the finished floor surface.
8. Provide exit devices UL certified to meet 5 lbs. maximum unlatching force requirements according to the CBC Section 11B-309.4.
9. Cylinders: Refer to "KEYING" article, herein.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Provide cylinder dogging indicators (CDSI) for visible indication of dogging status as specified.
12. Removable Mullions: Provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide exit devices with dead latching feature for security and for future addition of alarm kits and/or other electrified requirements.
15. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
16. Provide exit devices with manufacturer's approved strikes.

E. Closers: LCN as scheduled.

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Provide certificate by independent testing laboratory that door closers have completed over 10,000,000 cycles and can still meet ANSI/BHMA A156.4 standards.
4. Cylinder Body: 1-1/2" diameter with 3/4" diameter double heat-treated pinion journal.
5. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120° F to -30° F.
6. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
7. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
8. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
9. Pressure Relief Valve (PRV) Technology: Not permitted.
10. Provide door closers powder coated to match balance of door hardware. Powder coating finish shall be certified to exceed 100 hours salt spray testing as described in ANSI/BHMA A156.4 and ASTM B117.
11. Provide special rust inhibitor (SRI) in highly corrosive areas, and where noted in hardware sets.
12. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

F. Flush Bolts & Dust Proof Strikes:

1. Automatic flush bolts shall be of the low operating force design.
2. Provide top bolt only model for interior doors where applicable and as permitted by testing procedures.
3. Provide dust proof strikes at openings using bottom bolts.
4. Manual flush bolts shall only be permitted on storage or mechanical openings, as scheduled.

G. Door Stops:

1. Unless otherwise noted in hardware sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
2. Do not install floor stops more than four (4) inches from the face of the wall or partition (CBC Section 11B-307).
3. Provide backing plate at wall framing behind wall type.
4. Overhead stops shall be made of stainless steel and non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions. Stop-only function shall be provided at fire-rated openings.

H. Protection Plates:

1. Provide kick, mop, and/or armor plates minimum of 0.050" thick, with four beveled edges. Furnish with sheet metal or wood screws, finished to match plates.

2. Kick plates shall be sized 10" high and 2" less door width (LDW) at single doors and 10" high and 1" LDW at pairs or doors.
 3. Provide mop and armor plates with sizes as scheduled in hardware sets.
- I. Thresholds: As scheduled and per details.
1. Thresholds shall not exceed 1/2" in height, with a beveled surface of 1:2 maximum slope. Thresholds shall comply with CBC Section 11B-404.2.5.
 2. Set thresholds in a full bed of butyl-rubber or polyisobutylene mastic sealant complying with requirements in Division 07 "Thermal and Moisture Protection".
 3. Use 1/4" fasteners, red-head flat-head sleeve anchors (SS/FHSL).
- J. Seals: Provide silicone gasket at all rated and exterior doors.
1. Smoke & Draft Control Doors: Provide UL10C Classified complies with NFPA 80 & NFPA 252 for use on "S" labeled Positive Pressure door assemblies.

2.3 KEYING

- A. Furnish all cylinders in the Schlage Full Size Interchangeable Core (FSIC) style. Permanent cores to be supplied by Owner.
- B. Furnish construction keying for doors requiring locking during construction.
1. For FSIC systems provide 23-030-ICX Construction Cores.
 2. For FSIC systems provide ten 48-101-ICX Construction Keys.
 3. For FSIC systems provide two 48-056-ICX Control Keys. (const.)
 4. For FSIC systems provide two control keys for installing the permanent cores (49-056 for "Classic" keyways, 48-052-XP for "Classic Primus") (49-003 for "Everest Conventional", 48-005-XP for "Everest Primus")

2.4 FINISHES

- A. Generally to be satin chrome US26D (626 on bronze and 652 on steel) unless otherwise noted.
- B. Furnish push plates, pull plates and kick or armor plates in satin stainless steel US32D (630) unless otherwise noted.
- C. Door closers shall be powder-coated to match other hardware, unless otherwise noted.
- D. Aluminum items to be finished anodized aluminum except thresholds which can be furnished as standard mill finish.

2.5 FASTENERS

- A. Screws for strikes, face plates and similar items shall be flat head, countersunk type, provide machine screws for metal and standard wood screws for wood.
- B. Screws for butt hinges shall be flathead, countersunk, full-thread type.
- C. Fastening of closer bases or closer shoes to doors shall be by means of sex bolts and spray painted to match closer finish.

- D. Provide expansion anchors for attaching hardware items to concrete or masonry.
- E. All exposed fasteners shall have a phillips head.
- F. Finish of exposed screws to match surface finish of hardware or other adjacent work.
- G. All Exit Devices and Lock Protectors shall be fastened to the door by the means of sex bolts or through bolts.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that doors and frames are square and plumb and ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.
- C. Fire-Rated Door Assembly Inspection: Upon completion of the installation, all fire door assemblies shall be inspected to confirm proper operation of the closing device and latching device and that only the manufacturer's furnished fasteners are used for installation and that it meets all criteria of a fire door assembly per NFPA 80 (Standard for Fire Doors and Other Opening Protectives) 2016 Edition. A written record shall be maintained and transmitted to the Owner to be made available to the Authority Having Jurisdiction (AHJ). The inspection of the swinging fire doors shall be performed by a certified FDAI (Fire Door Assembly Inspector) with knowledge and understanding of the operating components of the type of door being subjected to the inspection. The record shall list each fire door assembly throughout the project and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and requirements of DHI.
- B. Use the templates provided by hardware item manufacturer.
- C. Mounting heights for hardware shall be as recommended by DHI. Operating hardware shall be located between 34" and 44" above finish floor to comply with CBC Section 11B-404.2.7.
- D. Door Closers:
 - 1. Place door closers inside building, stairs, rooms, etc. Closers shall be installed to permit doors to swing 180 degrees or maximum allowable by conditions.
 - 2. Maximum effort to operate closers shall not exceed 5 lbs., such pull or push effort being applied at right angles to hinged doors.
 - 3. When fire doors are required, the maximum effort to operate the closer may be increased but shall not exceed 15 lbs. when specifically approved by fire marshal.
 - 4. All closers shall be adjusted to operate with the minimum amount of opening force and still close and latch the door. These forces do not apply to the force required to retract latch bolts or disengage other devices that hold the door in a closed position.

5. Compensating devices or automatic door operators may be utilized to meet the above standards.
 6. Per CBC Section 11B-404.2.8.1, doors shall take minimum of 5 seconds to move from an open position of 90 degrees to 12 degrees to the latch jamb.
- E. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
 - F. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
 - G. Set thresholds for exterior doors in full bed of butyl-rubber sealant.
 - H. If hand of door is changed during construction, make necessary changes in hardware at no additional cost.

3.3 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.
- B. Clean adjacent surface soiled by hardware installation.
- C. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy, return to that work area and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's Personnel in proper adjustment and maintenance of hardware finishes, during the final adjustment of hardware.
- E. Continued Maintenance Service: Approximately six months after the completion of the project, the Contractor accompanied by the Architectural Hardware Consultant, shall return to the project and re-adjust every item of hardware to restore proper functions of doors and hardware. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures. Replace hardware items which have deteriorated or failed due to faulty design, materials or installation of hardware units. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.4 HARDWARE LOCATIONS

- A. Conform to CCR, Title 24, Part 2; and ADAAG; and the drawings for access-compliant positioning requirements for the disabled.

3.5 FIELD QUALITY CONTROL

- A. Contractor is responsible for providing the services of an Architectural Hardware Consultant (AHC) or a proprietary product technician to inspect installation and certify that hardware and

its installation have been furnished and installed in accordance with manufacturers' instructions and as specified herein.

3.6 HARDWARE SCHEDULE

- A. The items listed in the following schedule shall conform to the requirements of the foregoing specifications.
- B. While the hardware schedule is intended to cover all doors, and other movable parts of the building, and establish type and standard of quality, the contractor is responsible for examining the Plans and Specifications and furnishing proper hardware for all openings whether listed or not. If there are any omissions in hardware groups in regard to regular doors they shall be called to the attention of the Architect prior to bid opening for instruction; otherwise, list will be considered Complete. No extras will be allowed for omissions.
- C. The Door Schedule on the Drawings indicates which hardware set is used with each door.

MANUFACTURERS ABBREVIATIONS

GLY	=	Glynn-Johnson	Overhead Door Stops
IVE	=	Ives	Hinges, Flush Bolts, Door Stops & Kick Plates
LCN	=	LCN	Door Closers
SCH	=	Schlage Lock	Locks, Latches & Cylinders
VON	=	Von Duprin	Exit Devices
ZER	=	Zero International	Thresholds, Gasketing & Weather-stripping

HW GROUP NO. 01 - CTE WORKSHOP

For use on Door #(s):

101

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	PANIC HARDWARE	LD-PA-AX-99-L-2SI-06	626	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	PRIMUS CORE	OWNER SUPPLIED	626	SCH
1	EA	SURFACE CLOSER	4111 EDA TBWMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP/HOLDER	WS45X	626	IVE
1	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

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HW GROUP NO. 02 - CTE WORKSHOP

For use on Door #(s):

101B

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	PANIC HARDWARE	LD-PA-AX-99-L-2SI-06	626	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	PRIMUS CORE	OWNER SUPPLIED	626	SCH
1	EA	OH STOP & HOLDER	100H ADJ	630	GLY
1	EA	SURFACE CLOSER	4111 EDA TBWMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 03 - SCIENCE PREP

For use on Door #(s):

201

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	CLASSROOM SECURITY	L9071T 06A L283-711	626	SCH
2	EA	PRIMUS CORE	OWNER SUPPLIED	626	SCH
1	EA	SURFACE CLOSER	4111 EDA TBWMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 04 - OFFICE

For use on Door #(s):
202

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
1	EA	CONT. HINGE	224XY	628	IVE
1	EA	OFFICE/ENTRY LOCK	L9056T 06A L583-363	626	SCH
1	EA	PRIMUS CORE	OWNER SUPPLIED	626	SCH
1	EA	SURFACE CLOSER	4011T TBWMS	689	LCN
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	DOOR SHOE	153A	A	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 05 - RESTROOM

For use on Door #(s):
203

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PRIVACY W/DB & IND	L9496T 06A L583-363	626	SCH
1	EA	PRIMUS CORE	OWNER SUPPLIED	626	SCH
1	EA	SURFACE CLOSER	4111 EDA TBWMS	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS401/402CCV	626	IVE
1	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 06 - DUST COLLECTOR

For use on Door #(s):

102

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
6	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	OWNER SUPPLIED	626	SCH
2	EA	OH STOP & HOLDER	90F	630	GLY
1	EA	DOOR SWEEP	328AA	AA	ZER
1	EA	GASKETING	488SBK PSA	BK	ZER
1	EA	ASTRAGAL	44STST OR BY HM DOOR MFR	STST	ZER
1	EA	THRESHOLD	PER DETAIL	A	ZER

HW GROUP NO. 07

For use on Door #(s):

201A

<u>QTY</u>		<u>DESCRIPTION</u>	<u>CATALOG NUMBER</u>	<u>FINISH</u>	<u>MFR</u>
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	OWNER SUPPLIED	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH TBWMS	689	LCN
1	EA	GASKETING	488SBK PSA	BK	ZER

HW GROUP NO. 08 - HARDWARE BY VERTICAL STACKING DOOR MANUFACTURER

For use on Door #(s):

101A 101C 101D

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Aluminum entrances and storefronts.
 - 2. Aluminum windows.
- B. Related Sections:
 - 1. Division 08 Section "Aluminum-Framed Storefronts" for field glazed aluminum-framed entrances and storefronts.
 - 2. Division 08 Section "Aluminum Windows" for factory glazed window assemblies.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:
 - 1. Design Wind Pressures: As indicated on Structural Drawings.
 - 2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length, or 3/4", whichever is less.

3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 1. Temperature Change: 120 deg F, ambient; 180 deg F\, material surfaces.
 - D. Sound Ratings: Provide glazing units that meet STC assembly ratings indicated on Drawings.
- 1.5 SUBMITTALS
- A. Product Data: For each glass product and glazing material indicated.
 - B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
 - C. Qualification Data: For installers and manufacturers of insulating-glass units with sputter-coated, low-e coatings.
 - D. Product Certificates: For glass and glazing products, from manufacturer.
 - E. Warranties: Sample of special warranties.
- 1.6 QUALITY ASSURANCE
- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
 - B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
 - C. Source Limitations for Glass: Obtain glass from single source from single manufacturer for each glass type.
 - D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
 - E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 1. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 2. IGM Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
 - F. Safety Glazing Labeling: Permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

- G. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
- H. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- I. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.9 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Final Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product specified, or approved equal.

2.2 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.

1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

- B. Strength: Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS

- A. Heat-Treated Float Glass (Includes "Heat-Strengthened" and "Tempered"): ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.

2.4 INSULATING GLASS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide PPG Industries products specified, or comparable product by one of the following meeting the performance requirements of the products specified:

1. Vitro Architectural Glass or equal product from Guardian Glass.

- B. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.
2. Spacer: Manufacturer's standard spacer material and construction.

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3. Desiccant: Molecular sieve or silica gel, or blend of both.

2.5 GLASS TYPES

- A. Drawing Designation Glass Type "A" (1 Inch Tempered IGU) Non-Rated:
 1. Minimum Performance Requirements:
 - a. Outside Lite: Vitro, Solarban 70XL Solexia, 5/16 Inch Glass, Fully Tempered, Low-E coating on 2nd surface.
 - b. 1/2 Inch Air Space, 5% Air and 95% Argon.
 - c. Inside Lite: Vitro, Clear, 3/16 Inch Glass, Fully Tempered.
 - d. U-Value: Non-adjusted center of glazing = 0.23.
 - e. SHGC Value: Non-adjusted center of glazing = 0.25.
- B. Drawing Designation Glass Type "B": Same as Type "A" but with Anemostat "FireGlass-20", Clear, 1/4-Inch, Fire and Impact Safety Rated, 20 Minutes.
- C. Drawing Designation Glass Types "C": Same as Type "A" but with Anemostat, "FireLite Plus", Clear, 5/16-Inch, Fire and Impact Safety Rated, 45 and 60 Minutes.

2.6 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.

2.7 GLAZING SEALANTS

- A. General:
 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. Tremco Incorporated; Spectrem 1.
- C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.8 GLAZING TAPES

- A. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- C. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Final Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION

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SECTION 09 24 00

PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior Portland Cement Plaster (Stucco) and accessories for the following system:
 - a. Exterior Stucco with Acrylic Finish: Three coat (scratch, brown, and textured acrylic finish color coat) 1-inch thick stucco system with acrylic finish coat applied over metal lath over weather resistant sheathing paper, over sheathing.
- B. Related Sections include the following:
 - 1. Division 06 Section "Gypsum Sheathing" for gypsum sheathing.
 - 2. Division 07 Section "Joint Sealants" for joint sealants.
 - 3. Division 07 Section "Sheet Metal and Flexible Flashing" for sheet metal and flexible flashing materials integral with stucco.
 - 4. Division 08 window and door sections for frames integral with stucco.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. For plaster and finish coat products include surface preparation procedures, mixing instructions, application instructions and curing instructions, manufacturer's sample system warranty.
- B. Mix Design: For final recommended mix design for each coat.
- C. Samples for Verification: Submit 2 samples of each color for each type of finish coat indicated; 24 by 24 inches and prepared on rigid backing.
- D. Manufacturer's instructions and recommendations on painting, repairing, and maintaining all foam trim installed under this section.
- E. Provide samples of all metal lath, foam trim, and trim accessories used on project.

1.4 REFERENCE STANDARDS

- A. ASTM C 926 - Standard Specification for Application of Portland Cement-Based Plaster.
- B. ASTM C 1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

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- C. ASTM C 1032 - Standard Specification for Woven Wire Lath
- D. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.
- E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.
- F. Manufacturer's specifications and recommendations.
- G. Title 24, Part 2, California Building Code (CBC) Chapter 25A.
- H. Portland Cement Plaster Association Plaster / Stucco Manual, Fifth Edition, 2003.
- I. Northwest Wall and Ceiling Bureau Portland Cement Plaster / Stucco Resources Guide 3rd Edition, 1997.

1.5 QUALITY ASSURANCE

- A. Products provided under this section shall exhibit the following characteristics when tested as follows:
 - 1. ASTM C 109: Compressive Strength: 13.9 Mpa (2020 psi)
 - 2. ASTM C 348: Flexural Strength: 3.0 Mpa (570 psi)
 - 3. ASTM C 190: Tensile Strength: 1.2 Mpa(180 psi)
 - 4. ICBO Procedure: Freeze/Thaw cycling: No cracking, checking or delamination
 - 5. ASTM E 514: Water Vapor Permeability:415 ng/ (7.2 Perms)
 - 6. ASTM E 72: Transverse Load Strength: Wood Studs – 468.7 kg. m2 (96 psf) Metal Studs –673.8 kg/ m2 (138 psi)
 - 7. ASTM E 119: Fire-Test-Response Characteristics: For portland cement plaster assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 8. MIL STD 810B: Mildew Fungus Resistance –Passed
 - 9. ASTM B 117: Salt Spray Resistance – 300 hrs, no deleterious effects.
 - 10. ASTM D 968: Abrasion Resistance – 500 L(132 gal), no deleterious effects.
 - 11. ASTM G155: Accelerated Weathering – 3000 hrs, Passed.
- A. Mockups: Before plastering, install mockups of at least 100 square feet. in surface area, and 10 lineal feet in width to demonstrate aesthetic effects and set quality standards for materials and execution. Install mockup at location directed by Architect.
 - 1. Install mockups for each type of system and finish indicated.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Completion.
 - 3. Provide stucco system mock-ups for one window and one door opening as directed by Architect.
- B. Perform Work in accordance with ASTM C 926.
- C. Regulatory requirements: All plaster work shall be performed in accordance with requirements of Chapter 25A, California Building Code; Section 2506A - Exterior Lath and Section 2508A - Exterior Plaster.

- D. Conform to California Building code for fire rated assemblies as indicated on drawings.
- E. Manufacturer Qualifications: Company specializing in manufacturing the products of this section with minimum five years of documented experience.
- F. Installer Qualifications: Installer shall be listed with ~~Acrylic-Modified~~ Portland Cement Plaster Systems Manufacturer as a trained contractor and shall possess a current Manufacturer-trained contractor certificate.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.7 PROJECT CONDITIONS

- A. Do not apply plaster when substrate or ambient air temperature is outside the manufacturer's recommended ranges
- B. Maintain manufacturer's recommended minimum ambient temperature during installation of plaster and until cured.
- C. Application of materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are dry.
- D. Protect the materials from uneven and excessive evaporation in warm windy weather. Always work the shady side of the wall.

1.8 WARRANTY

- A. Provide manufacturer's standard single source (scratch, brown, primer and finish coats shall be from same manufacturer) 10-year system warranty.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.

2.2 METAL LATH

- A. Subject to compliance with requirements provide either Option 1, Expanded Metal Lath; or Option 2, Welded Wire Lath. All lath shall be same type.
- B. Metal Lath Option 1, Expanded-Metal Lath: ASTM C 847 with ASTM A 653, G60, hot-dip galvanized zinc coating.
 - 1. Manufacturers:
 - a. ClarkDietrich Building Systems.

2. Diamond-Mesh Lath for Vertical Surfaces: Self-furring, 2.5 lb/sq. yd.
3. Flat Rib Lath for Horizontal Surfaces and Vertical Surfaces Behind Stone Veneer Masonry: Rib depth of not more than 1/8 inch, 3.4 lb/sq. yd.

C. Metal Lath Option 2, Welded Wire Lath:

1. Manufacturers:
 - a. Structa Wire Corporation.
2. Welded-Wire Lath for Vertical Surfaces: ICC # ESR 2017; Structalath Twin Track, self-furring, galvanized steel welded wire.
3. Welded-Wire Lath for Horizontal Surfaces: ICC # ESR 2017; Structalath VTruss Walls and Ceilings, self-furring, galvanized steel welded wire.
4. Welded-Wire Lath for Vertical Surfaces Behind Stone Veneer Masonry: ICC # ESR 2017; Megalath, self-furring, galvanized steel welded wire.

2.3 WEATHER BARRIER

- A. Fortifiber Corporation "Two-Ply Super Jumbo Tex 60 Minute Weather Resistive Barrier". Asphalt saturated Grade 'D' breather type sheathing paper complying with UBC 14-1, and exceeding Federal Specifications UU-13-790a, Type I, Grade 'D', Style 2. No substitute.

2.4 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required. Provide types as indicated on Drawings.
- B. Galvanized Trim Accessories: Shall be hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.

1. Manufacturers:
 - a. Clark Dietrich Building Systems.
2. Foundation Weep Screed: #7. Install at bottom edge of all stucco.
3. External-Corner Reinforcement: #1A. Install at all outside corners.
4. Internal-Corner Control Joint: #30. Install at all inside corners.
5. Casing Beads: #66X Expanded Flange Casing Bead, or 66N Short Flange Casing Bead where #66X is not required. Install at all stucco terminations at openings and wall edges.
6. Expansion Joints: #15, M-shaped configuration with expanded flanges. Install at locations indicated.
7. Provide other trims as indicated or required for complete system.

- C. Bond Breaker Tape: In accordance with Division 07 Section "Joint Sealing". Install at all weep screeds.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Attaching Metal Lath and Accessories Lath to Wood Substrates: Complying with ASTM C 1063. Increase fastener lengths at walls with gypsum sheathing for minimum penetration of wood framing members as specified below.
 - 1. Screws: No. 8 modified truss head x length as required to penetrate into wood substrate a minimum of 5/8 inch.

2.6 PLASTER MATERIALS

- A. Manufacturers: BMI Products.
- B. Plaster Base Coat: "BMI 690 Standard Base with Fibers": A premium pre-blended cement-lime-sand mixture, with fiber that has been specially formulated for the scratch and brown coat. This pre-blended product assures consistent quality throughout the project. Traditional field mixed Portland cement plaster for scratch and brown coat per ASTM C926 standard not allowed.
- C. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
- D. Primer: BMI Primer 100, 100% Acrylic Color Primer: Water-based, pigmented acrylic primer applied over the cured plaster base coat, minimum 7 days, to improve adhesion and provide more uniform finish appearance.
- E. Finish: BMI Integral color finish coat with integral color with finishes as follows:
 - 1. "Medium Texture": Medium sand float using BMI 400 Medium Finish.

2.7 PLASTER MIXES

- A. Base coat: BMI 690 Base is a pre-blended product and, therefore can be mixed in a continuous mixer as well as a mechanical plaster mixer.
- B. Mix for three minutes, but never more than five minutes. Do not overmix.
- C. Double-back method of application is acceptable.
- D. Protect mixtures from freezing, frost, contamination, and excessive evaporation.
- E. Do not re-temper mixes after initial set has occurred.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Cover all exposed flexible flashing with one layer of weather resistant sheathing paper prior to applying stucco.

3.3 INSTALLATION, GENERAL

- A. Install in accordance with all Reference Standards.
- B. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- C. Extend complete plaster assembly behind surface installed fixtures and trim.

3.4 INSTALLING WEATHER RESISTANT SHEATHING PAPER

- A. All wall surfaces to receive stucco shall be covered with two layers of weather resistant sheathing paper, without holes or tears.
 - 1. Lap horizontal edges 3 inches minimum, shingle fashion to weather. Lap vertical edges 6 inches minimum. Double layer at corners, extending 18 inches around corner from each side.
 - 2. Lap sheet metal flashings. No part of metal lath shall extend under paper or flashing. All laps shall weather to exterior.
 - 3. Where existing plaster is being repaired or patched interleave the layers of new paper with the existing paper, lapping them shingle fashion to weather.

3.5 INSTALLING METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C 1063 and CBC Chapter 25.
 - 1. Gypsum Sheathing over Framed Substrates: Install self-furred metal lath at furring points with screws spaced not more than 12 inches on center vertically, and not more than 24 inches on center horizontally. All screws shall be installed through framing spaced not more than 24 inches on center. Gypsum sheathing or gypsum water-resistant backing board shall not be used for securing metal lath.

3.6 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External Corners:
 - 1. Install lath-type external-corner reinforcement at exterior locations.
- C. Control Joints: Install control joints at locations indicated on Drawings and in specific locations approved by Architect for visual effect as follows:
 - 1. Where materials or control joints occur in surface of construction directly behind plaster.

2. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.
- D. Cement plaster screeds and other accessories shall be lapped and caulked at all joints, corners and intersections to make weathertight.

3.7 PLASTER APPLICATION

- A. Apply BMI 690 premixed plaster in accordance with manufacturer's instructions.
- B. Three-Coat Application Over Metal Lath:
1. Apply first coat to a nominal thickness of 3/8 inch. Apply plaster scratch coat to embed lath completely so that no lath is visible. Scratch or score vertical surfaces horizontally at even intervals for mechanical key.
 2. Apply second coat to a nominal thickness of 3/8 inch once the first coat is sufficiently rigid to accept the application without being disturbed. Apply evenly, using a rod, darby or other straightedge, bring surface to a true, even plane, flush with plaster grounds.
 3. Float surface with a wood or hard rubber float to promote densification and ensure a surface with adequate "tooth" receptive to bonding of the finish coat.
 4. Apply integral color finish coat to a nominal thickness of 1/8 inch. Apply evenly over brown coat and 7 days after application of preceding coat.
- C. Curing: Base requires adequate moisture to allow continuous hydration of the cement.
1. Minimum four (4) days of moist curing shall be provided.
 2. Provide additional moist curing to conform to code requirements, manufacturer recommendations, local practices and climatic conditions and as otherwise required to provide acceptable substrate for finish coat.
 3. Base coat shall be allowed to cure for a minimum of 7 days prior to coating with integral color finish coat.
- D. Primer Application: Colored Primer:
1. Ensure that the surface of the wall is cured, clean, dry and free of efflorescence, oil or other contaminants that would impair adhesion.
 2. Primer color shall closely match that of the selected finish.
 3. Stir to a smooth homogeneous consistency and apply to the wall using a roller, brush or airless spray equipment. Refer to published Colored Primer data sheet for more complete instructions.
 4. Allow to completely dry.
- E. Integral Color Textured Finish Application:
1. Ensure that the surface of the wall is clean, dry and free of any contaminants that may impair the adhesion of surface finish.
 2. Spray, or trowel-apply textured finish to dried primer.
 3. Apply finish to natural breaks to avoid visible cold joints.
 4. Always work the shady side of the wall or provide temporary shading to avoid application in direct sunlight.

5. Apply in accordance with manufacturer directions for the specific finish and texture being used.
6. Provide finish as indicated on the Drawings.
7. Colors: As selected by Architect from manufacturer's full range.

3.8 CUTTING AND PATCHING

- A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.9 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from doorframes, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

SECTION 09 25 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior and mold-resistant gypsum board.
 - 2. High-impact panels.
- B. Related Sections include the following:
 - 1. Division 09 Section "Interior Painting".

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
 - 2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for the following:
 - a. Each texture finish indicated.

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2. Apply or install final decoration indicated, including painting , on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 1. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 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. G-P Gypsum.
 - b. National Gypsum Company.
 - c. USG Corporation.
- B. Type X:
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered .

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- C. Mold-Resistant Gypsum Board: ASTM C 1396. With moisture- and mold-resistant core and paper surfaces.

1. 5/8-inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.3 HIGH-IMPACT PANELS

- A. High-Impact Type: Manufactured with Type X core, plastic film laminated to back side for greater resistance to through-penetration (impact resistance).

1. Core: 5/8 inch thick.
2. Abuse-Resistance Classification: Level 2.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet .
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. (USG) NB Series "Z" shaped reveal trim.

- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

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. Fry Reglet Corp.
 - b. Gordon, Inc.
2. Pittcon Industries: Aluminum alloy and temper with not less than the strength and durability properties of ASTM B 221, Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified .
4. Shapes:
 - a. (Fry) "F" Series reveal molding 5/8" deep with 1/2" and 1" wide reveals, as indicated.
 - b. (Pittcon) PCS Series channel screed 5/8" deep with 1/2" and 1" wide reveals, as indicated.
 - c. "L" trim, "J" trim, and other shapes as indicated .

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
- E. Thermal Insulation: As specified in Division 07 Section "Building Insulation."
- F. Vapor Retarder: As specified in Division 07 Section "Building Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Install interior gypsum board in the following locations:
 - 1. Gypsum Board, Type X: All walls and ceilings unless otherwise noted.
 - a. For multilayer applications at above locations, provide as finish layer.
 - 2. Mold-Resistant Type: Provide at behind all FRP panels and all non-tiled walls and ceilings at Toilet Rooms; Custodial Rooms; at exterior walls with vinyl wall coverings; Storage Rooms and Fire Riser Rooms.
 - 3. Acoustical Panels: Install where indicated.
 - 4. High-Impact Panels: Install where indicated.
- B. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- C. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Type X: Where required for fire-resistance-rated assembly and vertical surfaces, unless otherwise indicated .
 - 2. Type C: Where required for specific fire-resistance-rated assembly indicated.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) , unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 - 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring

member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.

3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws .

3.4 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at showers, and tubs; locations indicated to receive tile; and around new framed openings through exterior walls. Install with 1/4-inch gap where panels abut other construction or penetrations.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints [at locations indicated on Drawings] [according to ASTM C 840 and in specific locations approved by Architect for visual effect].
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 2. LC-Bead: Use at exposed panel edges .
 3. L-Bead: Use where indicated .
 4. U-Bead: Use at exposed panel edges .
- D. Aluminum Trim: Install in locations indicated on Drawings .

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 1. Level 1: Ceiling plenum areas, and concealed areas.
 2. Level 2: Panels that are substrate for FRP panels and similar paneling treatments.

3. Level 3: Surfaces receiving medium or heavy textured finishes to match existing surface texture, and surfaces to receive heavy wall coverings and paneling.
 4. Level 4: Exposed painted surfaces.
 5. Level 5: Not used.
- E. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

3.8 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet, or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.

1.3 DEFINITIONS

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch- square samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- long Samples of each type, finish, and color.

1.5 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class 'A' materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 450 or less.
 - b. Flame Spread: 25 or less.

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- C. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. NRC Range: 0.75 or better.
- E. Formaldehyde: Manufacturer certifications that products have low VOC and formaldehyde emissions per testing Standard established by the California Department of Health Services.
- F. Light Reflectance: 0.85 or better.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 WARRANTY

- A. Ceiling Tile and Suspension System: Manufacturer 30-Year Limited System Warranty for all panels and suspension systems specified.

1.10 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2 percent of quantity installed.
 - 4. Impact Clips: Equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide USG products specified, or comparable products from Certainteed or Armstrong (Sales Representative Laura Kuhar, lkuhar@usg.com (970) 376-3151):

- 1. USG:

- a. Suspended Acoustical Panels, Drawing Designation ACP-1: As indicated on Drawings.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance, unless otherwise indicated.

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Donn Brand, Centricitee DX/DXL, or approved alternate, capped, double-web, steel suspension system: Main and cross runners roll formed from cold-rolled steel sheet, pre-painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation, with prefinished 15/16 inch wide metal caps on flanges. ICC Evaluation Report ICC-ESR-1222.

- 1. Structural Classification: Heavy-duty system.
 - 2. Face Design: Flat, flush.
 - 3. Cap Material: Steel or aluminum cold-rolled sheet.
 - 4. Cap Finish: Painted white.

2.4 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire but provide not less than 0.135-inch-diameter wire.
- D. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.

- E. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, pre-painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished 15/16 inch wide metal caps on flanges.
 - 1. Structural Classification: Heavy-duty system.
 - 2. End Condition of Cross Runners: Match existing.
 - 3. Face Design: Flat, flush.
 - 4. Cap Material: Steel or aluminum cold-rolled sheet.
 - 5. Cap Finish: Painted white.

2.6 METAL EDGE MOLDINGS, TRIM AND SEISMIC CLIPS

- A. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
- B. Perimeter Angle Trim: USG M9 12' x 9/16" x 15/16" Wall Angle Molding prefinished white.
- C. Seismic Clips: Donn ACM7 Seismic Clip, meets ICC Evaluation Service (ICC-ES) AC156 and AC308 requirements.

2.7 ACOUSTICAL SEALANT

- A. Available Products:
 - 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corp; AC-20 FTR Acoustical and Insulation Sealant or approved alternate.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant or approved alternate.
- B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION, GENERAL

- A. General: Install acoustical panel ceilings to comply with UBC Standard 25-2 and seismic requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Ceiling grid shall be installed in accordance with DSA IR 25-5.
- C. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 6. Attach hangers to structural members.
 - 7. Space hangers not more than 48 inches on center. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- D. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.
- E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Screw attach moldings to substrate at intervals not more than 16 inches on center. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet . Miter corners accurately and connect securely.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

- F. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- G. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 - 2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 09 65 00

RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Resilient flooring.

- B. Related Sections:

- 1. Division 01 Section "CALGreen Requirements" for resilient flooring requirements.
 - 2. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated showing compliance with Regulatory Requirements article.

- 1. Provide manufacturer's product data for resilient sheet flooring showing compliance with Performance Requirements before ordering products.

- B. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- 1. Show details of special patterns.

- C. Samples for Verification: In manufacturer's standard size, but not less than 6 inches by 6 inches sections of each different color and pattern of floor covering required.

- 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

- D. Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

- E. Product Schedule: For floor coverings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.

- 1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.

- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

- 1. Critical Radiant Flux Classification: Class 1, not less than 0.45 W/sq. cm.

- C. Smoke Density: As determined by testing identical products according to ASTM E 662 or NFPA 258 by a qualified testing agency.

- 1. Smoke Density: 450 or less.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store rolls upright.

1.8 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F in spaces to receive floor coverings during the following time periods:

- 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F or more than 95 degrees F.

- C. Close spaces to traffic during floor covering installation.

- D. Close spaces to traffic for 48 hours after floor covering installation.

- E. Install floor coverings after other finishing operations, including painting, have been completed.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Covering: Furnish quantity not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

1.10 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For resilient sheet flooring installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM D 2407:
 - 1. Level Surfaces: Minimum 0.6.
 - 2. Sloped Surfaces: Minimum 0.8.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Resilient Rubber Tile Flooring:
 - 1. Drawing Designations RT-1 and RT-2: As indicated on Drawings.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based, or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
- C. Seamless-Installation Accessories for Resilient Sheet Flooring:
 - 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Color: As indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Examine resilient sheet flooring for type, color, pattern, and potential defects.

- C. Concrete Slabs: Verify that finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 200 square feet and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 square feet in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install floor coverings until they are same temperature as space where they are to be installed.
 - 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

3.3 FLOOR COVERING INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor coverings.
- B. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- C. Lay out floor coverings as follows:
 - 1. Maintain uniformity of floor covering direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
 - 3. Match edges of floor coverings for color shading at seams.

4. Avoid cross seams.

- D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:
 - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.
- B. Perform the following operations immediately after completing floor covering installation:
 - 1. Remove adhesive and other blemishes from floor covering surfaces.
 - 2. Sweep and vacuum floor coverings thoroughly.
 - 3. Damp-mop floor coverings to remove marks and soil.
- C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor coverings until Substantial Completion.

END OF SECTION

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SECTION 09 65 13

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resilient Base.
 - 2. Reducer Strips.
- B. Related Sections:
 - 1. Division 09 Section floor covering sections for floor coverings.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Product Schedule: For resilient products.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

- A. Follow manufacturer's written requirements.
- B. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

RESILIENT BASE RUBBER TILE AND ACCESSORIES 09 65 13 - 1

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.

2.2 RESILIENT BASE

- A. Resilient Base Standard [Drawing Designation B-1]: As indicated on Drawings.
- B. Outside Corners: Job formed.
- C. Inside Corners: Job formed.
- D. Lengths: Coils in manufacturer's standard length.
- E. Finish: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
- C. Provide transition strips at all transitions between dissimilar flooring materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

RESILIENT BASE RUBBER TILE AND ACCESSORIES 09 65 13 - 2

3.2 PREPARATION

- A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 200 square feet and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 square feet in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient sheet flooring until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates. Base shall be fully adhered in compliance with all manufacturer recommendations. Loose corners and leading edges will not

be accepted as part of the final installation. Where used in wet locations a bead of sealant shall be applied at the base of drywall, immediately prior to installation of the resilient base.

- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products until Substantial Completion.

END OF SECTION

SECTION 096713

RESINOUS COMPOSITION FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the epoxy mosaic composition flooring and integral base as scheduled on the drawings and specified herein.

1.3 RELATED WORK

- A. Division 22 Plumbing sections for floor drains.
 - 1. Floor drains and clean-outs shall be of the “floor-flange” type (Zurn Z400 ‘Type BL’ Round Strainer with Dex-O-Tex Flange, or equal) as manufactured for use with composition floors by most major drain manufacturers.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer’s technical data, application instructions and general recommendations for the epoxy mosaic composition flooring specified herein.
- B. Samples for initial selection purposes in form of manufacturer’s color charts showing full range of colors and finishes available.
 - 1. Submit 2-1/2 inch by 4 inch samples of color chips from color chart as selected by the Architect.
- C. Material certificates signed by manufacturer certifying that the epoxy mosaic composition flooring complies with requirements specified herein.
- D. Maintenance Instructions: Submit manufacturer’s written instructions for recommended maintenance practices.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer or applicator who has specialized in installing resinous flooring types similar to that required for this Project and who is acceptable to manufacturer of primary materials.
- B. Single-Source Responsibility: Obtain epoxy mosaic composition flooring materials, including primers, resins, hardening agents, colored aggregates and finish or sealing coats, from a single manufacturer.

RESINOUS COMPOSITION FLOORING 096713 - 1

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's directions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Comply with epoxy mosaic composition flooring manufacturer's directions for maintenance of ambient and substrate temperature, moisture, humidity, ventilation, and other conditions required to execute and protect Work.
- B. Lighting: Permanent lighting will be in place and working before installing resinous flooring.

PART 2 - PRODUCTS

2.1 BASIS-OF-DESIGN PRODUCT

- A. Subject to compliance with requirements provide troweled epoxy mosaic composition flooring by Dex-O-Tex Cheminert Terracolor with chemical resistant top finish as manufactured by Crossfield Products Corp. in Rancho Dominguez, California and Roselle Park, New Jersey, or comparable products by following manufacturer's:
 - 1. Key Resins Company.
 - 2. Neogard Construction Coatings.
 - 3. Westcoat Specialty Coating System.

2.2 PROPERTIES

- A. Colors: As selected by Architect from manufacturer's full range.
- B. Physical Properties: Provide flooring system that meet or exceed the listed minimum physical property requirements when tested according to the referenced standard test method in parentheses.

Thickness: 1/4"

Compressive Strength (ASTM C579): 8,576 psi

Tensile Strength (ASTM C307): 1,619 psi

Flexural Strength (ASTM C580): 4,300 psi

Surface Hardness (ASTM D2240): Durameter "D" 81

Abrasion Resistance (ASTM D1044): 0.0 gr. loss

Indentation (MIL-PRF-3134): >1.0%

Impact Resistance (Gardner Impact Tester): No chipping, cracking or
delamination and not more than
0.014" indentation

Adhesion (A.C.I. Comm. No. 503.1): >400 psi (100% failure in concrete)

RESINOUS COMPOSITION FLOORING 096713 - 2

Electrical Conductivity (NFPA 56A): Di-electric

Flammability (ASTM E648/NFPA 253/FTMS 372): Greater than 1.07 watts/cm²

2.3 SUPPLEMENTAL MATERIALS

- A. Waterproofing Membrane: Type recommended or produced by manufacturer of epoxy mosaic composition flooring system for type of service and floor condition indicated.
 - 1. Provide at 2nd floor locations only.
- B. Anti-Microbial Additive: Incorporate antimicrobial chemical additive to prevent growth of most bacteria, fungi, algae and actinomycetes.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where the epoxy mosaic composition flooring is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Architect.
- B. Test for moisture vapor transmission. Notify Architect immediately if moisture vapor transmission exceeds manufacturers recommended levels.

3.2 PREPARATION

- A. Substrate: Perform preparation and cleaning procedures according to flooring manufacturer's instructions for particular substrate conditions involved, and as specified. Provide clean, dry and neutral substrate for flooring application.
- B. Concrete Surfaces: Shot-blast, acid etch or power scarify as required to obtain optimum bond of flooring to concrete. Remove sufficient material to provide a sound surface free of laitance, glaze, efflorescence, and any bond-inhibiting curing compounds or form release agents. Remove grease, oil, and other penetrating contaminants. Repair damaged and deteriorated concrete to acceptable condition. Leave surface free of dust, dirt, laitance, and efflorescence.
- C. Materials: Mix resin hardener and aggregate when required, and prepare materials according to flooring system manufacturer's instructions.

3.3 APPLICATION

- A. General: Apply each component of epoxy mosaic composition flooring system according to manufacturer's directions to product a uniform monolithic flooring surface of thickness indicated.
- B. Bond Coat: Apply bond coat over prepared substrate at manufacturer's recommended spreading rate.
- C. Body Coat: Over primer, trowel apply epoxy mortar mix at nominal 1/4-inch thickness; hand or power trowel. Allow to cure before proceeding.

RESINOUS COMPOSITION FLOORING 096713 - 3

- D. Grout Coats: Apply two coats of grout. Sand and inspect the surface for consistency.
- E. Finish or Sealing Coats: After grout coats have cured sufficiently, apply finish coats of type recommended by flooring manufacturer to product finish matching approved sample and in number of coats and spreading rates recommended by manufacturer.
 - 1. Final finish coat shall be in color and skid retardant profile as approved by the Architect.
 - 2. Finished floor shall be 1/4"-inch thick, uniform in color and free of trowel marks.
- F. Cove Base: Apply cove base mix to wall surfaces at locations shown to form cove base height of 4 inches unless otherwise indicated. Follow manufacturer's instructions and details including taping, mixing, priming, troweling, sanding, and top-coating of cove base.

3.4 CURING, PROTECTION AND CLEANING

- A. Cure epoxy mosaic composition flooring material according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area for a minimum of 24 hours.
- B. Protect finished floor with wax paper. Use Masonite, if rolling load traffic exists.
- C. Clean with manufacturer recommended cleaner.

END OF SECTION

SECTION 09 68 13

CARPET WALK-OFF MATS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. [Drawing Designation CP-2] Section includes adhesively installed carpet walk-off mats.
- B. Related Sections include the following:
 - 1. Division 09 Section "Resilient Base and Accessories" for carpet base.

1.3 ACTION SUBMITTALS

- A. Product Data: Product Data: For each type of product indicated including documentation showing adhesive and recycled material compliance with "Regulatory Requirements" article of this Section.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - 2. Carpet type, color, and dye lot.
 - 3. Locations where dye lot changes occur.
 - 4. Seam locations, types, and methods.
 - 5. Type of subfloor.
 - 6. Type of installation.
 - 7. Pattern type, repeat size, location, direction, and starting point.
 - 8. Pile direction.
 - 9. Type, color, and location of insets and borders.
 - 10. Type, color, and location of edge, transition, and other accessory strips.
 - 11. Transition details to other flooring materials.
- A. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet: 12-inch- square Samples.
- B. Product Schedule: For carpet Use same designations indicated on Drawings.
- C. Qualification Data: For Installer.

CARPET WALK-OFF MATS 09 68 13 - 1

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports: Based on evaluation of comprehensive tests performed by a qualified testing agency
- B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet.
- B. Warranties: Special warranties specified in this Section.

1.6 PERFORMANCE REQUIREMENTS

- A. General: Comply with all the following performance requirements.
 - 1. Carpet and walk-off mats shall be stable, firm and slip resistant. Exposed edges of carpet shall be fastened to floor surfaces and shall have trim on the entire length of the exposed edge.
 - 2. Adhesives used in installing flooring materials must be under the lower of 70 g/l in VOC's or the appropriate VOC standard for the specific product according to the South Coast Air Quality Management District (CAQMD) Rule 1168 (2005 amendments version) standards.
 - 3. Recycled Content Flooring Materials: Minimum of 25 percent recycled content by volume / weight for all flooring except carpet. For carpet, minimum of 10 percent post-consumer recycled content; and minimum of 20 percent post-industrial recycled content. Post-industrial content (pre-consumer) recycled content is counted at half the rate of post-consumer recycled content.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Pre-installation Conference: Conduct conference at project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to carpet installation including, but not limited to, the following:
 - 1. Review delivery, storage, and handling procedures.
 - 2. Review ambient conditions and ventilation procedures.
- D. Labeling: Each carpet and cushion material shall bear identifying label.

1.8 DELIVERY, STORAGE, AND HANDLING

1.9 Comply with CRI 104, Section 5, "Storage and Handling."

1.10 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.

1.11 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, Insert failure characteristic and delamination.
 - 3. Warranty Period: Lifetime Commercial Limited Warranty.

1.12 ADA COMPLIANCE

- A. Ground and Floor Surfaces:
 - 1. General: Ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, shall be stable, firm, slip-resistant, and shall comply with these requirements.
 - 2. Changes in Level:
 - a. Changes in level up to 1/4 inch may be vertical and without edge treatment. Notwithstanding this requirement, provide transitions strips at all level changes.
 - b. Changes in level between 1/4 inch and 1/2 inch shall be beveled with a slope no greater than 1:2.
 - c. Changes in level greater than 1/2 inch shall be accomplished by means of a ramp that complies with above requirements.
 - 3. Carpet: Shall be securely attached.
 - 4. Exposed edges of carpet shall be fastened to floor surfaces and have trim along the entire length of the exposed edge. Carpet trim shall comply with above requirements.

PART 2 - PRODUCTS

2.1 PRODUCTS;

- A. Subject to compliance with requirements provide products specified.

2.2 CARPET WALK-OFF MATS

- A. [Drawing Designations CP-1] (Not Used)
- B. [Drawing CP-2] Walk-Off Mat: As indicated on Drawings.

2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet and cushion manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, non-staining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and carpet cushion and is recommended or provided by carpet and carpet cushion manufacturers.
 - 1. Use adhesives with VOC content that comply with Division 01 Section "CALGreen Requirements".
- C. Transition Strips: See Division 09 Section "Resilient Base and Accessories".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet.
 - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:
 - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
 - 1. Level adjoining border edges.
- C. Do not bridge building expansion joints with carpet.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."

- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet adhesive manufacturer .

END OF SECTION

SECTION 09 77 30

FIBERGLASS REINFORCED PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. [Drawing Designation FRP-1] Fiberglass Reinforced Plastic (FRP) panels for adhesive mounting.
 - 2. Moldings, adhesive, and joint sealants.
- B. Related Sections include the following:
 - 1. Division 01 Section "CALGreen Requirements" for general CALGreen requirements applicable to work of this section.
 - 2. Division 09 Section "Gypsum Board" for gypsum board finish levels below paneling.

1.3 REFERENCES

- A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.
- B. ASTM International:
 - 1. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 - 2. ASTM D5319 Standard Specification for Glass-Fiber Reinforced Plastic Wall and Ceiling Panels.
 - 3. 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).
 - 4. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. Crane Composites (Inspired by Kemlite):
 - 1. Installation Guide For FRP Panels #6876.

1.4 ADMINISTRATIVE REQUIREMENTS

FIBERGLASS REINFORCED PANELS 09 77 30 - 1

- A. Preinstallation Meetings: Conduct preinstallation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 ACTION SUBMITTALS

- A. Product Technical Data: For each product to be used, including:
 1. Shop Drawings: Showing layout, profiles and product components, including anchorage, accessories, finish colors, patterns and textures. Indicate location and dimension of joints and fastener attachment.
 2. Samples: Selection and verification samples for finishes, colors and textures. Submit two samples of each type of panel, trim and fastener.
 3. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
 4. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.
 5. Manufacturer's Instructions: Manufacturer's Installation Guide for FRP #6876.
 6. Qualifications Statements: For manufacturer and installer.

1.6 CLOSEOUT SUBMITTALS

1. Operation and Maintenance Data: For installed products including maintenance methods and precautions against cleaning materials and methods detrimental to finishes and performance.
2. Warranty: Warranty documents required in this section.

1.7 MAINTENANCE MATERIAL

- A. Extra Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels
 1. Quantity: Furnish quantity of panel and trim units equal to 5 percent of amount installed.
 2. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed installation of fiberglass reinforced panels similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Manufacturer Qualifications: A firm experienced in manufacturing fiberglass reinforced panels similar to those required for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain each color, grade, finish, and type of fiberglass reinforced panels from a single source with resources to provide components of consistent quality in appearance and physical properties.

1.9 DELIVERY, STORAGE, AND HANDLING

FIBERGLASS REINFORCED PANELS 09 77 30 - 2

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact. Package sheets on skids or pallets for shipment to project site.
- B. Store wall surface-protection materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Store products indoors and protect from moisture, construction traffic and damage.
 - 2. Store panels flat on clean, dry surface. Do not stand on edge or stack on fresh concrete or other surfaces that emit moisture.
 - 3. Store panels at least 24 hours with temperature and humidity conditions approximating the average environment of the finished room.
- C. Handling: Remove foreign matter from face of panel by use of a soft bristle brush, avoiding abrasive action.

1.10 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Installation shall not begin until building is enclosed and residual moisture from construction work has dissipated.
 - 2. During installation and for not less than 48 hours before, maintain an ambient temperature and relative humidity within limits required by type of adhesive used and recommendation of adhesive manufacturer.
 - 3. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.
- B. Field Measurements: Verify actual measurements and openings by field measurements before fabrication. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace FRP panels that fail within specified warranty period.
 - 1. Failures shall include, but not be limited to substantial defects in material and workmanship, rotting, rusting, corrosion, development of structural surface cracks, or requiring painting or refinishing.
 - 2. Warranty Period: Ten years from date of Substantial Completion.
- B. Special Warranty: Installer's standard form in which installer agrees to repair or replace FRP panels that fail due to poor workmanship or faulty installation within the specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS

FIBERGLASS REINFORCED PANELS 09 77 30 - 3

- A. Basis-of-Design Product [Drawing Designation FRP-1]: Subject to compliance with requirements, provide the following:
 - 1. Crane Composites, FRP wall panels or comparable products from following manufacturers:
 - a. Marlite.
 - b. Nudo Products.

2.2 MATERIALS

- A. Pattern and Color: As selected by Architect from manufacturer's full range.
- B. Panel Size:
 - 1. Wall Panel Width: 48 inches to conform to wainscot height indicated.
 - 2. Wall Panel Length: 96 inches or 120 inches as required to conform to wall width indicated on the drawings with fewest vertical joints. Provide full-length panels from corner to corner unless substrate dimensions exceed available fabricated size.
- C. Thickness:
 - 1. Standard Panels: 0.075-inch thick.
- D. Dimensional Tolerances:
 - 1. Width and Length: 1/8 inch.
 - 2. Thickness: +/- 10%.
 - 3. Squareness: Not more than 1/8 inch out of square.
- E. Surface Burning Classification, ASTM E84: Class A; flame spread 25 or less; and smoke developed 450 or less.
- F. Accessories: "Silhouette" trims and moldings or aluminum moldings as selected by Architect from manufacturer's full range.
- G. Adhesives as recommended by panel manufacturer for required substrate:
 - 1. Porous Surfaces: A high-quality, low-odor, non-flammable latex-based fiberglass reinforced panels adhesive for application over approved porous surfaces such as drywall or plywood. The adhesive shall meet low VOC requirements specified in Division 01 Section "CALGreen Requirements".
 - 2. Non-Porous Surfaces: A strong, flexible, moisture-resistant, all-purpose adhesive formulated for fast, easy application over many non-porous surfaces. Synthetic rubber base remains pliable to compensate for movement of structural surfaces up to 1/8 inch. The adhesive shall meet low VOC requirements. Provide adhesive recommended by manufacturer and compliant with requirements specified in Division 01 Section "CALGreen Requirements".
- H. Sealant: Crane "Color Sil" color-matched sealant. Single-component, mildew-resistant silicone as recommended by panel manufacturer.

FIBERGLASS REINFORCED PANELS 09 77 30 - 4

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. 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.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's Installation Instructions.
- B. Fiberglass Reinforced Plastic Panel Installation:
 - 1. Cut and drill panels with carbide tipped saw blades or drill bits or cut with snips.
 - 2. Install panels with manufacturer's recommended gap for panel field and corner joints.
 - 3. Pre-drill fastener holes in panels with 1/8-inch oversize.
 - 4. For trowel type and application of adhesive, follow adhesive manufacturer's recommendations.
 - 5. Using products acceptable to panel manufacturer, install fiberglass reinforced panels in accordance with panel manufacturer's printed instructions. Comply with panel manufacturer's Installation Guide.
- C. Install in accordance with manufacturer's instructions.
- D. Use the adhesives recommended by the panel manufacturer unless prohibited by local regulations; obtain manufacturer's approval of alternative adhesives.
- E. Install continuous bead of silicone sealant in each joint and trim groove and between trim and adjacent construction, maintaining 1/8-inch expansion space.
- F. Avoid contamination of panel faces with adhesives, solvents, or cleaners; clean as necessary and replace if not possible to repair to original condition.
- G. Protect installed products until completion of project.
- H. Touch-up, repair or replace damaged products after Substantial Completion.

END OF SECTION

FIBERGLASS REINFORCED PANELS 09 77 30 - 6

SECTION 09 91 13

EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems and wood stains on exterior substrates. Provide finish painting of all exposed exterior surfaces, except bright metal, glass, integral colored materials, concrete floors, pavements, and surfaces noted to be unpainted. Touch-up factory paint finishes as required. Areas or items not specifically mentioned and requiring paint shall be painted similar to specified areas or items.
- B. Related Sections include the following:
 - 1. Division 05 Sections for metal substrates and shop priming of miscellaneous metal.
 - 2. Division 08 Sections for factory priming doors and frames.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current Manufacturer's Data Sheet for each product category specified in Part 2, with the proposed products highlighted.

1.4 REFERENCE STANDARDS

- A. Manufacturer's written recommendations and standards; and Master Painters Institute (MPI) Standards.
 - 1. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 1. Quantity: Furnish an additional 5 percent, but not less than 1 gallon of each material and color applied.

1.8 GLOSS LEVEL DEFINITIONS

- A. Gloss Level 1, Drawing Mark FL: A traditional matte finish – flat. Maximum of 5 units gloss at 60 degrees. Maximum of 10 units sheen at 85 degrees.
- B. Gloss Level 2, Drawing Mark SF: A high side sheen flat – a “Low Sheen” finish. Maximum of 10 units gloss at 60 degrees. 10 - 35 units sheen at 85 degrees.
- C. Gloss Level 3, Drawing Mark ES: A traditional “eggshell like” finish. 10 - 25 units gloss at 60 degrees. 10 – 35 units sheen at 85 degrees.
- D. Gloss Level 4, Drawing Mark SA: A “satin like” finish. 25 - 30 units gloss at 60 degrees. Minimum of 35 units sheen at 85 degrees.
- E. Gloss Level 5, Drawing Mark SG: A traditional semigloss. 35 - 70 units gloss at 60 degrees.
- F. Gloss Level 6, Drawing Mark GL: A traditional gloss. 70 - 85 units gloss at 60 degrees.
- G. Gloss Level 7, Drawing Mark HG: A traditional high gloss. More than 85 units gloss at 60 degrees.

PART 2 - PRODUCTS

2.1 BASIS-OF-DESIGN PRODUCT

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kelly Moore products specified or approved equal.
 1. Sales Representative: Gaybrielle Greene GGreene@kellymoore.com (925) 984-5969.

2.2 PAINT, GENERAL

- A. Material Compatibility:

EXTERIOR PAINTING 09 91 13 - 2

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As selected by Architect from manufacturer's full range.

2.3 WOOD PRIMERS

A. Acrylic Wood Primers:

1. Kelly Moore, Acrylic Primer-Sealer, 250

2.4 METAL PRIMERS

A. Acrylic Metal Primers:

1. Kelly Moore, Acrylic Prime, 1725 (Ferrous, Galvanized and Aluminum Substrates).

2.5 PORTLAND CEMENT PLASTER AND CONCRETE PRIMERS

A. Acrylic Masonry Primer:

1. Kelly Moore, Acry-Shield, 247.

2.6 LATEX PAINTS

A. Acrylic Low Sheen: (Gloss Level 2).

1. Kelly Moore, Acrylic Low Sheen, 1210.

B. Acrylic Semigloss: (Gloss Level 5).

1. Kelly Moore, Acrylic Semigloss, 1215.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and re-prime substrate with compatible primers as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- F. Aluminum Substrates: Remove surface oxidation.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 1. Use applicators and techniques suited for paint and substrate indicated.
 - a. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Paint entire exposed surface of window frames and sashes.
 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 APPLICATION AREAS:

- A. Provide finish painting of all exposed exterior surfaces, except bright metal, glass, integral colored materials, concrete floors, pavements, and surfaces noted to be unpainted. Touch-up factory paint finishes as required. Areas or items not specifically mentioned and requiring paint shall be painted similar to specified areas or items.
- B. Paint all Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work including, but not limited to, the following:
 1. Equipment, including panel boards and switch gear.
 2. Uninsulated metal piping.
 3. Uninsulated plastic piping.
 4. Pipe hangers and supports.
 5. Metal conduit.
 6. Plastic conduit.

3.5 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to engage the services of a qualified testing agency to sample paint materials being used at any time, and as often as Owner deems necessary during the period when paints are being applied for compliance of paint materials with product requirements:
 1. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove non-complying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.6 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.7 EXTERIOR PAINTING SCHEDULE

- A. General: Areas or items not specifically mentioned and requiring paint shall be painted similar to specified areas or items.
- B. Metal Substrates (Ferrous Metal, Galvanized Metal Substrates, and Aluminum).
 - 1. Latex System: Semigloss
 - a. Prime Coat: Exterior Acrylic Metal Primer.
 - b. Intermediate Coat: Match Topcoat.
 - c. Exterior Acrylic Semigloss.
- C. Concrete.
 - 1. Latex System: Low Sheen
 - a. Prime Coat: Acrylic Masonry Primer.
 - b. Intermediate Coat: Match Topcoat.
 - c. Topcoat: Acrylic Low Sheen.
- D. Wood Substrates, Painted.
 - 1. Latex System: Low Sheen
 - a. Prime Coat: Acrylic Wood Primer.
 - b. Intermediate Coat: Match Topcoat.
 - c. Topcoat: Exterior Acrylic Low Sheen

END OF SECTION

SECTION 09 91 23

INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- 1. This Section includes surface preparation and the application of paint systems on interior substrates. Provide finish painting of all exposed interior surfaces, except bright metal, glass, integral colored materials, concrete floors, and surfaces noted to be unpainted. Touch-up factory paint finishes as required. Areas or items not specifically mentioned and requiring paint shall be painted similar to specified areas or items.
- B. Related Sections include the following:
 - 1. Division 01 Section "CALGreen Requirements" for general CALGreen requirements applicable to work of this section.
 - 2. Division 05 Sections for shop priming of miscellaneous metal.
 - 3. Division 08 Sections for factory priming doors and frames.
 - 4. Division 09 Section "Exterior Painting" for surface preparation and the application of paint and stain systems on exterior substrates.

1.3 SUBMITTALS

- A. CALGreen Submittals:
 - 1. Product Data for CALGreen Mandatory Requirement 5.504.4.3 for paints and coatings including printed statement of VOC content.
- B. Product Data: For each type of product indicated showing compliance with performance requirements.
- C. Samples for Initial Selection: Color samples of each type of topcoat product indicated.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on drawings and in schedules.
 - 2. Printout of current Manufacturer's Material Safety Data Sheets (MSDS), or Safety Data Sheets (SDS) for each product category specified in Part 2, with the proposed product highlighted.

1.4 REFERENCE STANDARDS

INTERIOR PAINTING 09 91 23 - 1

- A. Manufacturer's written recommendations and standards; and Master Painters Institute (MPI) Standards:

- 1. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

- 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish 5 gallons of each applied color.

1.8 GLOSS LEVEL DEFINITIONS

- A. Gloss Level 1, Drawing Mark FL: A traditional matte finish – flat. Maximum of 5 units gloss at 60 degrees. Maximum of 10 units sheen at 85 degrees.
- B. Gloss Level 2, Drawing Mark SF: A high side sheen flat – a “low sheen” finish. Maximum of 10 units gloss at 60 degrees. 10 - 35 units sheen at 85 degrees.
- C. Gloss Level 3, Drawing Mark ES: A traditional “eggshell like” finish. 10 - 25 units gloss at 60 degrees. 10 – 35 units sheen at 85 degrees.
- D. Gloss Level 4, Drawing Mark SA: A “satin” like finish. 25 - 30 units gloss at 60 degrees. Minimum of 35 units sheen at 85 degrees.
- E. Gloss Level 5, Drawing Mark SG: A traditional semigloss. 35 - 70 units gloss at 60 degrees.
- F. Gloss Level 6, Drawing Mark GL: A traditional gloss. 70 - 85 units gloss at 60 degrees.
- G. Gloss Level 7, Drawing Mark HG: A traditional high gloss. More than 85 units gloss at 60 degrees.

PART 2 - PRODUCTS

INTERIOR PAINTING 09 91 23 - 2

2.1 CALGREEN REQUIREMENTS

- A. Shop primers shall be compliant with VOC and other toxic compound limits as specified in Division 01 Section "CALGreen Requirements" for Environmental Quality, Mandatory Measure 5.504.4.3 Paints and Coatings.

2.2 BASIS-OF-DESIGN PRODUCT

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified or approved equal.

2.3 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As indicated on Drawings.

2.4 GYPSUM BOARD AND WOOD PRIMERS / SEALERS

- A. Vinyl Acrylic Primer/Sealer:
 - 1. Kelly Moore, 973, "Acry-Plex Zero VOC.

2.5 METAL PRIMERS

- A. Acrylic Metal Primer (Ferrous Metal and Galvanized Metal):
 - 1. Kelly Moore, 1725, "Acry-Shield".

2.6 VINYL ACRYLIC PAINTS

- A. Interior Vinyl Acrylic Eggshell: (Gloss Level 3).
 - 1. Kelly Moore, 1510, "Enviro-Coat Zero VOC 100% Acrylic Interior Eggshell Enamel".
- B. Interior Vinyl Acrylic Semigloss: (Gloss Level 5).
 - 1. Kelly Moore, 1520, "Enviro-Coat Zero VOC 100% Acrylic Interior Semigloss Enamel".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent, or as recommended by manufacturer.
 - 2. Gypsum Board: 12 percent, or as recommended by manufacturer.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and re-prime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Wood Substrates:
 - 1. Scrape and clean knots and apply coat of knot sealer before applying primer.
 - 2. Sand cut surfaces, and surfaces that will be exposed to view, and dust off.
 - 3. Prime cut edges, edges, ends, faces, undersides, and backsides of wood.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

- H. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Comply with reference standards.
- B. Testing of Paint Materials: Owner reserves the right to engage the services of a qualified testing agency to sample paint materials being used at any time, and as often as Owner deems necessary during the period when paints are being applied for compliance of paint materials with product requirements:
 1. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove non-complying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Gypsum Board and Wood:

- 1. Vinyl Acrylic System: - Eggshell [Drawing Mark 'ES'] Gloss Level 3:
 - a. Prime Coat: Vinyl Acrylic Primer/Sealer.
 - b. Intermediate Coat: Match Topcoat.
 - c. Topcoat: Interior Vinyl Acrylic Eggshell.
- 2. Vinyl Acrylic System: - Semigloss [Drawing Mark 'SG'] Gloss Level 5:
 - a. Prime Coat: Vinyl Acrylic Primer/Sealer.
 - b. Intermediate Coat: Match Topcoat.
 - c. Topcoat: Interior Vinyl Acrylic Semigloss.

B. Metal Substrates (Ferrous Metal and Galvanized Metal Substrates):

- 1. Vinyl Acrylic System: - Semigloss [Drawing Mark 'SG'] Gloss Level 5:
 - a. Prime Coat: Acrylic Metal Primer.
 - b. Intermediate Coat: Match Topcoat.
 - c. Topcoat: Interior Vinyl Acrylic Semigloss.

END OF SECTION

SECTION 10 10 00

MARKER BOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. [Drawing Designation VD-1] Porcelain enamel steel marker boards and accessories.

1.3 REFERENCE STANDARDS

- A. American Society for Testing Materials:
 - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics for Building Materials.
 - 2. ASTM B221 Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
- B. Porcelain Enamel Institute:
 - 1. PEI-1002 Manual and performance Specifications for Porcelain Enamel Writing Surfaces.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of marker board indicated and as follows:
 - 1. Actual sections of porcelain-enamel face sheet.
 - 2. Samples of accessories involving color selection.
- C. Operation and Maintenance Data: For marker boards to include in maintenance manuals. Include data on regular cleaning, stain removal, and precautions.
- D. Warranties: Special warranties specified in this Section.
- E. Manufacturer's Instructions: Provide manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

MARKER BOARDS 10 10 00-1

- A. Source Limitations: Obtain each type of marker board through one source from a single manufacturer.
- B. Manufacturer shall be a firm engaged in the manufacture of visual display boards in the United States and shall have a minimum of 5 years' experience.
- C. Product Options: Drawings indicate profiles, and dimensional requirements of marker boards and are based on the specific system indicated.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store marker boards vertically with packing materials between each unit.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store materials protected from exposure to harmful weather conditions and at temperatures and humidity conditions recommended by manufacturer.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before fabrication.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating marker boards without field measurements. Coordinate wall construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.
 - 3. Comply with manufacturer's recommendations for acclimating area for interior moisture and temperature to approximate normal occupied conditions.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Manufacturer: Claridge Products and Equipment, Inc. or approved equal.
- B. Materials, General
 - 1. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
 - a. Gloss Finish: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser.

MARKER BOARDS 10 10 00-2

C. White Board Assemblies

1. Sizes as indicated. See Drawings for locations.
2. Porcelain-Enamel Markerboard Assembly: Balanced, high-pressure, factory-laminated white board assembly of 3-ply construction consisting of backing sheet, core material, and 0.021-inch- thick, porcelain-enamel face sheet with high gloss finish manufactured in accordance with Porcelain Enamel Institute's specifications.
 - a. Hardboard Core: 1/4-inch thick; with 0.0129-inch- thick, galvanized steel sheet backing.
 - b. Manufacturer's Standard Core: Minimum 1/4-inch thick, with manufacturer's standard moisture-barrier backing.
 - c. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.

D. White Board Accessories:

1. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- thick, extruded aluminum; of size and shape indicated.
2. Factory-Applied Trim: Manufacturer's standard.
3. Chalk Tray: Manufacturer's standard, continuous.
 - a. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.
 - 1) Provide mechanically attached chalk trays at all horizontal marker boards.
 - 2) Provide magnetically attached chalk trays at all vertical marker boards.

E. Warranty:

1. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Surfaces lose original writing and erasing qualities.
 - 2) Surfaces become slick or shiny.
 - 3) Surfaces exhibit crazing, cracking, or flaking.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance.
- B. Examine walls and partitions for proper backing for marker boards.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

MARKER BOARDS 10 10 00-3

3.2 PREPARATION

- A. Remove dirt, scaling paint, projections, and depressions that will affect smooth, finished surfaces of visual display boards.
- B. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, and substances that will impair bond between visual display boards and surfaces.

3.3 INSTALLATION, GENERAL

- A. General: Install marker boards in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
 - 1. Mounting Height: As indicated on Drawings.
 - 2. Butt joint marker boards where two or more are indicated together.

3.4 CLEANING AND PROTECTION

- A. Clean marker boards according to manufacturer's written instructions. Attach one cleaning label to marker board in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect marker boards after installation and cleaning.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Panel Signs [Drawing Designation SN-1]:
 - a. Room identification signs.
 - b. Directional, instructional and informational signs.
 - c. Emergency signs.

- B. Related Requirements:

- 1. Division 26 ELECTRICAL for electrical illuminated exit signs.

1.3 REFERENCE CODES AND STANDARDS

- A. 2016 California Building Code, Chapter 11B, Division 7.
- B. 2010 ADA Standards for Accessible Design.

1.4 DEFINITIONS

- A. "Braille" shall mean contracted (Grade 2) complying with requirements of Sections 11B-703.3 and 11B-703.4 of the 2016 California Building Code.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Verification: One full size sample of each type of sign showing all components with the required finishes.

- D. Sign Schedule: Use same designations specified or indicated on Drawings.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify locations of signs by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL SIGNS, GENERAL

- A. Panel Signs: Signs with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles.

2.2 PANEL SIGNS, BASIS-OF-DESIGN PRODUCT

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Mohawk Sign Systems, Inc. <http://www.mohawksign.com/> signs or comparable product by one of the following:
 1. APCO Graphics, Inc. www.aposigns.com .
 2. Arrow Sign Company www.arrowsigncompany.com .
 3. Best Sign Systems, www.bestsigns.com .
 4. InPro Corporation <https://www.inprocorp.com/signscape-architectural-signage> .
- B. Mohawk 1000 ADA System:
 1. Material Thickness: 1/4 inch.
 2. Surface Finish: Non-Glare.
 3. Durability: Scratch resistant.

4. Performance Requirements: Rugged, two-color, scratch resistant, non-static, fire retardant, washable melamine surface laminate with a non-glare surface and a tough brown phenolic core which is painted a contrasting color after artwork has been engraved into the surface.
5. Installation Accessories: Provide adhesive mounted panel signs unless otherwise indicated as mechanically fastened.
 - a. Adhesives: Manufacturer's standard adhesive.
 - b. Mechanical Fasteners: Vandal resistant, stainless steel. Use concealed fasteners and anchors unless indicated to be exposed.

2.3 PANEL SIGN FABRICATION

A. General:

1. Provide manufacturer's standard sign assemblies according to requirements indicated.
2. Fabricate signs by reverse engraving process to produce characters and graphics in contrasting color.
3. Signs shall be of one-piece construction. Add-ons are unacceptable.
4. All letters, numbers and symbols shall contrast with their background, either light characters on a dark background or dark characters on a light background.
5. Characters and background shall have matte finish.

B. Sign Types, Text, Typeface, Symbols, Letters, Numbers, Sizes, Placement of Text and Symbols: As indicated on Drawings and in accordance with Reference Codes and Standards. All layouts shall be centered unless otherwise indicated.

C. Colors: As selected by Architect from manufacturer's full range.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized, supported and located to accommodate signs.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Fabricate and install signs in accordance with Drawings, Reference Codes and Standards, approved Shop Drawings and manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Methods for Panel Signs: Manufacturer's standard adhesive or two-face tape mounting method.
 - 1. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
- C. Mounting Method for Plaque Sign: As indicated on Drawings. Mount to concealed studs.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 28 13

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Toilet accessories.
 - 2. Underlavatory guards.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
 - 6. Electrical requirements for electric hand dryers.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.
- D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

TOILET ACCESSORIES 10 28 13 - 1

- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Standard Specification for Silvered Flat Glass Mirror.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.3 TOILET ACCESSORIES

- A. Public-Use Washroom Accessory Finishes: Satin-finish stainless steel, unless otherwise noted.
- B. Toilet Tissue Dispensers:
 - 1. Bobrick, B-3888, "Recessed Multi-Roll Toilet Tissue Dispenser".

TOILET ACCESSORIES 10 28 13 - 2

- C. Toilet Seat Cover Dispenser:
 - 1. Bobrick, B-221, "Surface-Mounted Seat-Cover Dispenser".
- D. Wall Mounted Soap Dispensers:
 - 1. Provided by District installed by Contractor. District to provide Appeal Hand Soap Dispenser, Black, 1,000ML for DEB foaming soap from S
- E. Grab Bars:
 - 1. Bobrick, B-6806 Series "1-1/2" Diameter Stainless Steel Grab Bars", 42 inch long and 48 inch long where indicated. Provide other lengths as indicated.
- F. Mirror Units:
 - 1. Bobrick, B-290 Series, "Tempered Glass Mirror with Stainless Steel Angle Frame". Provide 24-inches wide by 36-inches high unless otherwise as indicated on Drawings.
- G. Paper Towel Dispenser: Provide at all sinks in Prep Room and CTE Workshop.
 - 1. Bobrick, B-5262, "Surface-Mounted Paper Towel Dispenser".
- H. Waste Receptacles:
 - 1. Bobrick, B-2260, 12-1/2 inches by 12-1/2 inches, Floor-Standing Stainless Steel Waste Receptacle, Open Top, No Cover. Provide one at each Toilet Room.
- I. Custodial Mop and Broom Holder:
 - 1. Bobrick, B-239, 34-Inch, Utility Shelf with Mop/Broom Holders and Rag Hooks. Provide on at each Custodial Room.
- J. Underlavatory Guard:
 - 1. Manufacturer: Plumberex Specialty Products, Inc. or Truebro by IPS Corporation.
 - a. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 - b. Material and Finish: Antimicrobial, molded plastic, white.
 - c. Provide at all exposed and undercabinet water supplies and waste lines at lavatories and sinks.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers, cabinets and mounting brackets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.
- B. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.
- C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with CCR Title 19.
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to Authorities Having Jurisdiction. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to CCR Title 19.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Completion.

PART 2 - PRODUCTS

2.1 PRODUCT

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products specified, or approved equal.
 - 1. Manufacturer: Potter Roemer.
- B. Fire Extinguishers:
 - 1. At locations indicated provide Potter Roemer, Fire Extinguisher, Model Number 3005, 5 pounds, 2-A:10-B:C, FM Approved, 15-1/4 inches high by 4-1/4-inch diameter, 12 feet to 18-foot range of stream, discharge hose type.
 - 2. Handles and Levers: Manufacturer's standard.
 - 3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging. Provide at Back of House and Parking Areas unless otherwise indicated.
- C. Fire Extinguisher Cabinets and Mounting Brackets:
 - 1. At locations indicated provide Recessed Type, Fire Rated, UL Classified, 7N43: Potter Roemer, Fire Extinguisher Cabinet Model Number 7007-A-VAR-RR (Cold rolled steel with recoatable white polyester finish, semi-recessed wall mounted, inside box dimension 9-inch wide by 18-inch high by 5-inch deep, full glass, 1/4 inch clear tempered glass, vertical ascending red "Fire Extinguisher" lettering, with rolled radius frame).
 - 2. If latch is required to open cabinet, it shall be ADA accessible and open with less than 5# force.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers in locations indicated and in compliance with requirements of Authorities Having Jurisdiction and ADA requirements.

END OF SECTION

SECTION 12 24 13

ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Manually crank-operated, roll-up fabric interior window shades including mounting and operating hardware.

1.3 RELATED SECTIONS

- A. Division 06 Section "Rough Carpentry" for blocking and support of window shade hardware.
- B. Division 07 Section "Joint Sealants" for sealants for perimeter of shade system.

1.4 REFERENCES

- A. NFPA 701-99 - Fire Tests for Flame-Resistant Textiles and Films.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product specified, including:
 - 1. Preparation instructions and recommendations.
 - 2. Installation and maintenance instructions.
 - 3. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 4. Storage and handling requirements and recommendations.
 - 5. Mounting details and installation methods.
- B. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances and relationship to adjacent work.
- C. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings, field verified window dimensions, quantities, type of shade, controls, fabric, and color, and include opening sizes and key to typical mounting details.
- D. Selection Samples: For each finish product specified, two complete sets of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, two complete sets of shade components, unassembled, demonstrating compliance with specified requirements. Shade fabric sample and aluminum finish sample as selected, representing actual product, color, and patterns. Mark face of material to indicate interior faces.

- F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- G. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years' experience in manufacturing products comparable to those specified in this section.
- B. NFPA Flame-Test: Passes NFPA 701. Materials tested shall be identical to products proposed for use.
- C. Mock-Up: Provide a mock-up of one of each type roller shade assembly specified for evaluation of mounting, appearance and accessories.
 - 1. Locate mock-up in window(s) designated by Architect.
 - 2. Do not proceed with remaining work until mock-up is accepted by Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver window shades until building is enclosed and construction within spaces where shades will be installed is substantially complete.
- B. Deliver products in manufacturer's original, unopened, undamaged containers with labels intact.
- C. Label containers and shades according to Window Shade Schedule.
- D. Store products in manufacturer's unopened packaging until ready for installation.

1.8 SEQUENCING

- A. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 PROJECT CONDITIONS

- A. Install roller shades after finish work and ambient temperature, humidity and ventilation conditions are maintained at levels recommended for project upon completion.

1.10 WARRANTY

- A. Hardware and Shade Fabric: Draper's standard twenty-five-year limited warranty.
- B. Motors and Controls: Draper's standard five-year limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

ROLLER WINDOW SHADES 12 24 13 - 2

- A. Acceptable Manufacturer: Draper, Inc., which is located at: 411 S. Pearl P. O. Box 425; Spiceland, IN 47385-0425. ASD. Draper Contact; Ron Wathen at 415.744.4952 or rwathen@draperinc.com

2.2 MANUALLY OPERATED WINDOW SHADES

- A. Manually Crank-Operated Window Shades with Independent Control: Manually operated, vertical roll-up, fabric window shade with components necessary for complete installation; Crank Operated Manual FlexShade XD as manufactured by Draper, Inc.
1. Operation: Crank-operated with single control operation with precision control to easily raise or lower window shades to exact desired height. Crank handle shall be permanently mounted to window at ADA accessible height.
 2. Rollers: Extruded aluminum roller tube of appropriate diameter to support shade fabric with minimal deflection.
 - a. Minimum Roller Tube Diameter: 1.56 inches.
 - b. Fabric Connection to Roller Tube: Spline fabric/roller attachment system to allow shade fabric to be removed from roller without having to remove roller from brackets.
 - c. Fabric Length: 6 inches greater than window height minimum.
 - d. Bottom Slat: 13/16 inch aluminum dowel, encased in bottom hem with heat sealed ends.
 3. Mounting:
 - a. Endcaps and fascia.
 4. Endcaps: Stamped steel with universal design suitable for mounting to ceiling, wall, and jamb. Provide size compatible with roller size.
 - a. Endcap covers: To match fascia or headbox color.
 5. Provided with aluminum fascia concealing shade roller and hardware. Fascia shall be mounted inside window opening extending from jamb to jamb. Provide fascia in lengths to match window openings and 3-7/8-inches high.

2.3 FABRIC

- A. Light-Filtering Fabrics
1. SheerWeave Series SW2701: Duplex basket weave fabric:
 - a. 1-percent open.
 - b. Color: Pearl/Pearl.
 - c. Fire Rating: NFPA 701.

PART 3 EXECUTION

3.1 EXAMINATION

ROLLER WINDOW SHADES 12 24 13 - 3

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

3.2 PREPARATION

- A. Coordinate requirements for blocking and structural supports to ensure adequate means for installation of window shades.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install roller shades level, plumb, square, and true. Allow proper clearances for window operation hardware.

3.4 TESTING AND DEMONSTRATION

- A. Test motorized window shades to verify that controls, limit switches, interface to other building systems, and other operating components are functional. Correct deficiencies.
- B. Demonstrate operation of shades to Owner's designated representatives.

3.5 PROTECTION

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

3.6 SCHEDULES

- A. Refer to Drawings for shade types and locations.

END OF SECTION

SECTION 13 34 21

PREFABRICATED MODULAR STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following Work:
 - 1. Prefabricated Modular Buildings including, but not limited to:
 - a. Civil Work
 - b. Structural Work.
 - c. Architectural Work.
 - d. Fire Protection Work.
 - e. Plumbing Work.
 - f. Mechanical Work.
 - g. Electrical Work
 - 2. Bidder Responsibilities for Construction Documents:
 - a. This set of Contract Documents is intended for bidding by Building Manufacturers. The successful bidder is responsible for creating construction documents, selecting and designing a foundation system in accordance with the geotechnical report, ensuring the constructability and compliance with all referenced codes, providing all necessary engineering calculations, and obtaining approval from all applicable jurisdictions.

1.3 SCOPE OF WORK

- A. This section describes prefabricated, clear span, Modular Buildings. The Modular Buildings shall be installed on concrete foundation and slab-on-grade. The Modular Buildings shall be erected on assigned site within the State of California, complete and ready to use. All costs for purchase, transportation and installation at the site are to be included in the bid price including all Work described in Contract Documents, Drawings, and Project Manual.
- B. Extent of Modular Building is shown on Drawings and described in the Specifications.
- C. The Modular Building design shall be approved for fabrication and erection, by the State of California, Division of the State Architect.

PREFABRICATED MODULAR STRUCTURES 13 34 21 - 1

1.4 SUBMITTALS

- A. Within 6 weeks of the Notice to Proceed, submit complete Shop Drawings, Product Data, and Samples, including Structural, Mechanical, and Electrical engineering calculations for the Modular Building to the Architect of Record for review prior to submission to DSA for approval. After Architects review, the Contractor shall make all corrections noted, and shall be responsible for submission of these documents to DSA and obtaining DSA and approval. All plans, specifications and calculations shall be signed by the Contractor's Architect, or Engineer, licensed by the State of California. Where required by DSA for approval submit Shop Drawings, Product Data, and Samples to DSA. All submittals shall include the Manufacturer's Name.
- B. After receiving DSA approval, submit the complete Shop Drawings, Product Data, and Samples with DSA approval number, to the Architect of Record (HKIT Architects) for approval in accordance with Division 01, Section "Submittals". Furnish eight sets of plans and specifications for each DSA approval number distributed as follows: Five sets to Owner. Two sets to Architect of Record. One set to Inspector.
- C. Construction Administration: The Contractor's Architect or Engineer shall provide final review of Submittals and RFI's and administer CCD's and be responsible for other construction administration procedures during course of Work.
- D. Coordination of Work: It shall be the Contractor's responsibility to make all necessary arrangements with the School District's authorized representative for access to grounds and removal and replacement of fencing, gates or other hindrances, if necessary.
- E. Materials and Workmanship: All workmen shall be skilled and qualified for the work that they perform. All materials used, unless otherwise specified, shall be new and of the types and grades specified. The Contractor shall, if requested, furnish evidence satisfactory to the School District that such is the case.
- F. General Design Requirements: Modular Buildings shall be designed to maintain a positive alignment of floors, walls, roofs, and adjacent existing structures.
 - 1. The module shall be capable of resisting all vertical and lateral loads during transportation and relocation.
 - 2. The structural system of each Modular Building shall be an independent moment resistant steel frame.
 - 3. Dimensions: The Modular Building shall be as indicated on Drawings and shall be clear span type.
 - 4. Roof beams shall allow for 12-inch maximum penetrations for routing HVAC ducts. Provide structural reinforcements as necessary.
- G. Load Criteria: Modules requiring roof live loads or wall wind loads greater than the minimum required by Title 24 CCR, or by design details specified herein shall meet the live load criteria established by the I.F.B.
- H. Foundations and Slab on Grade:

PREFABRICATED MODULAR STRUCTURES 13 34 21 - 2

1. The building shall be set on concrete slab. Plywood pads, Pressure Treated Douglas Fir, or redwood blocks are not allowed. Provide engineered fill subbase and underslab vapor retarder as part of the foundation and floor slab construction.
 2. Foundations and building slab shall be designed in accordance with Geotechnical Investigation Report and all subsequent Geotechnical Supplements. Foundation and slab on grade shall be cast-in-place concrete. Refer to the geotechnical reports and recommendations for hazardous material abatement, foundation design, pad preparation, and engineered fill requirements. Underslab vapor retarder shall be in accordance with Division 07 Section "Below-Grade Vapor Barrier".
 3. The Modular Buildings shall be securely fastened to the foundation in accordance with code requirements and as approved by DSA.
- I. HKIT Architects shall serve as Architect of Record for Increment 1 and Increment 2. Responsibility for Increment 2 Prefabricated Modular Structures (Modular Building and Canopy) is delegated to Contractor's Architects and Engineers.

1.5 FRAMING

- A. General: Coordinate and provide all blocking, backing and furring required to support furniture, fixtures, and accessories specified in related Sections including, but not limited to architectural casework, toilet accessories, plumbing fixtures, electrical fixtures, and seismic bracing of freestanding Storage Cabinets.
- B. Structural Design of Floors, Walls and Roof: Steel frame building shall meet the design requirements of the drawings or as listed below, whichever are more stringent.
1. For structural steel members, comply with AISC "Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings."
 2. For the light gauge steel members, comply with AISC "Specification for the Design of Cold Formed Structural Members" and Section 2701 (a) of Title 24, CCR.
 3. For welded connections, comply with AWS "Structural Welding Code", Welding Inspection shall comply with requirements of Section T24-27.923.
- C. Design Loads: Basic design loads as follows:
1. Wind Load: In accordance with Section 2311, Title 24.
 2. Roof Load: Live load: 20 PSF
 3. Floor Live Load: 50 PSF
 4. Partition Live Load: 20 PSF
- D. Weather Barrier: All weather-exposed surfaces shall have a weather-resistive barrier to protect the interior wall covering in accordance with CBC 2019. Such barrier shall be in accordance with Division 09, Section "Portland Cement Plaster".
- E. Exterior Finishes:—exterior Portland cement plaster shall be in accordance with Division 09 Section "Portland Cement Plaster".

1.6 ROOFING

- A. General Performance Requirements:

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1. Provide installed roofing and base flashings that remain watertight; do not permit the passage of water; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.
 2. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
 3. Provide a roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE 7.
 4. Provide roofing membrane, base flashings, and component materials that are UL Class A fire rated and meet requirements of Title 24 energy compliance.
 5. Design and installation of roofing and substrates shall result in the roof draining freely. Areas where water ponds for more than 1/2 hour are unacceptable and shall be corrected by the manufacturer.
 6. Warranty: Provide in accordance with Division 07 Section "Thermoplastic Tri-Polymer (TPA) Roofing".
- B. Modular Building Roof: Provide in accordance with Provide in accordance with Division 07 Section "Thermoplastic Tri-Polymer (TPA) Roofing".

1.7 SHEET METAL FLASHING AND TRIM

- A. General: Unless otherwise indicated, provide a minimum 24 gauge, G-90 galvanized sheets, prefinished custom color.
- B. Gutters: Form 24 gauge, G-90 galvanized sheet metal in sections not less than 10 feet in length, complete with end pieces, outlet tubes, and special pieces that may be required. Join sections with riveted and soldered joints. Unless otherwise indicated, provide expansion-type slip joint at center of runs. Furnish gutter supports spaced at 36 inches on center constructed of same metal as gutters. Provide standard bronze, copper, or aluminum wire ball strainers at each outlet. Provide stainless steel fine mesh gutter guards at all gutters.
- C. Downspouts: As indicated on Drawings.

1.8 BUILDING INSULATION

- A. Thermal Insulation: Shall be in accordance with Division 07 Section "Building Insulation". Provide a minimum of R-19 at walls, and R-30 at ceilings, glass fiber or mineral wool blanket. Provide additional insulation where required by energy calculations. Thermal insulation shall be foil faced, with faced side to conditioned space, with U.L. flame spread classification of 25 or less.
- B. Sound Insulation: Provide 5-1/2 sound attenuations batts meeting ASTM C 665, Type I, ASTM 136 at all interior partition walls.

1.9 HOLLOW METAL DOORS AND FRAMES

- A. Shall be in accordance with Division 08, Section "Hollow Metal Doors and Frames".

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- 1.10 ALUMINUM-FRAMED ENTRANCES AND STOREFRONT AND ALUMIUM WINDOWS
 - A. Provide in accordance with Division 08 Section "Aluminum-Framed Entrances and Storefronts".
- 1.11 DOOR HARDWARE
 - A. Provide in accordance with Division 08 Section "Door Hardware".
- 1.12 INTERIOR FINISHES
 - A. Shall be as indicated on drawings, and as specified in Division 09 FINISHES.
- 1.13 ACOUSTICAL PANEL CEILINGS
 - A. Shall be as indicated on drawings, and as specified in Division 09, "Acoustical Panel Ceilings".
- 1.14 FIRE PROTECTION
 - A. Provide in accordance with design requirements indicated on Fire Protection Drawings and Specifications.
- 1.15 PLUMBING AND HEATING VENTILATING AND AIR CONDITIONING
 - A. Provide in accordance with design requirements indicated on plumbing and HVAC Drawings and specifications.
- 1.16 ELECTRICAL
 - A. Provide in accordance with design requirements indicated on Electrical Drawings.

PART 2 - PRODUCTS

- 2.1 GENERAL
 - A. Manufacturers and products listed are intended to establish level of quality, size, type material and finish. Substitutions will be considered only in strict conformance with procedures and provisions of Division 01 Section "Product Options and Substitutions".
 - B. Single Product Responsibility: Provide products of the same manufacturer for each of product incorporated into the work.

PART 3 - EXECUTION

- 3.1 INSTALLATION AT SITE
 - A. Once delivery of modules on site is made, erection shall commence immediately and be pursued in a timely manner until complete. All modules called for at the site shall be scheduled for delivery and erection in one continuous time frame, (Saturdays, Sundays, and Holidays,

PREFABRICATED MODULAR STRUCTURES 13 34 21 - 5

excepted.) Failure to begin and pursue erection shall be considered as a breach or default of the Contract.

- B. The Contractor shall furnish material, articles and equipment in ample quantities and at such times as to assure uninterrupted progress of the work. Failure to provide adequate working force, or material of proper quality, or failure in any other respect to prosecute the work with diligence and force specified herein are grounds for declaring a default on the contract.
- C. Security of the buildings against vandalism is the sole responsibility of the Contractor until installation of the buildings, according to the terms of this contract has been completed and the buildings have been accepted for occupancy by the School District.

3.2 CLEAN UP

- A. Because of the nature of the site (School Grounds) the Contractor shall lock up all materials and equipment at the end of the day's work. All scrap material shall be removed from the site and the end of each day's work.
- B. The building site and the building shall be clean and ready for occupancy prior to acceptance by the School District.

3.3 UTILITY HOOK-UP

- A. All utility connections shall be located as indicated on the site floor plans to accommodate hook-up at the site.
- B. Guarantee: Contractor hereby unconditionally guarantees that work will be done in accordance with requirements of the contract, and further guarantees the work of the contract to be and remain free of defects in workmanship and materials for a period on one year from date of acceptance by the State, unless a longer guarantee period is specifically called for. Contractor hereby agrees to repair or replace all work, together with any other adjacent work which may have been damaged or displaced in so doing, that may prove to be not in accordance with requirements or contract or that may be defective in its workmanship or material within guarantee period specified, without any expense whatsoever to School District, ordinary wear and tear and unusual abuse or neglect expected. Contract bonds are in full force and effect during guarantee period.
 - 1. Contractor further agrees that within 10 calendar days after being notified in writing by School District of any work not in accordance with requirements of contract or any defects in the work, he will commence and prosecute with due diligence all work necessary to fulfill terms of this guarantee, and to complete the work within a reasonable period of time, and in the event he fails to so comply he does hereby authorizes said School District to proceed to have such work done at Contractor's expense and he will pay cost thereof upon demand. School District shall be entitled to all costs including reasonable attorney's fees, necessarily incurred upon Contractor's refusal to pay above costs.

END OF SECTION

PREFABRICATED MODULAR STRUCTURES 13 34 21 - 6

SECTION 21 00 00

FIRE PROTECTION GENERAL REQUIREMENTS

PART 1 – GENERAL

1.1 CONDITIONS AND REQUIREMENTS

- A. Refer to the General Conditions, Supplementary Conditions, and Division 01 General Requirements.

1.2 SCOPE OF WORK

- A. Provide all labor, apparatus, and materials that are required to provide a complete installation as indicated on the drawings and in the specifications, including that reasonably inferred for proper execution of this Division.
- B. Consult all other Sections to determine the extent of this work specified elsewhere.
- C. Coordinate all utility requirements for equipment furnished under this Division. Rough-in required systems and make final connections.

1.3 REGULATIONS AND STANDARDS

- A. Install all work to meet or exceed requirements prescribed by governmental bodies having jurisdiction and in accordance with all federal, state, and local codes and ordinances, and all OSHA requirements. These codes include, but are not limited to the latest applicable edition of the following:
 - 1. California Building Code
 - 2. California Electrical Code
 - 3. California Plumbing Code
 - 4. California Mechanical Code
 - 5. California Energy Code
 - 6. California Green Buildings Standard
 - 7. California Fire Code
 - 8. National Fire Protection Association

1.4 QUALITY ASSURANCE

- A. Comply with current governing codes, ordinance and regulations of the Authority Having Jurisdiction and the regulations and requirements of the Owner's insurance underwriter.
- B. Where requirements differ between drawings, specifications, codes and standards, apply the more stringent.

FIRE PROTECTION GENERAL REQUIREMENTS 21 00 00 - 1

- C. Should any change in drawings or specifications be required to comply with governing regulations, notify the Architect prior to submitting bid.
- D. After contract is awarded, if minor changes or additions are required by the aforementioned authorities, even though such work is not shown on drawings or overtly covered in the specifications, they shall be included at the Contractor's expense.
- E. Execute work in strict accordance with the best practices of the trades in a thorough, substantial, skillful and well-executed manner by competent workers. Provide a competent, experienced full-time Superintendent who is authorized to make decisions on behalf of the Contractor.
- F. The Architect or Architect's Representative may conduct unannounced field reviews of any work completed or in progress. A report will be issued for all items that are found to be inconsistent with the contract documents. All items in the report shall be addressed in writing by the Contractor within two (2) weeks.

1.5 SAFETY

- A. Contractors must conduct a weekly safety meeting with their employees and maintain documentation of attendance and topics of discussion. Contractor shall comply with all OSHA regulations. Contractor is required to obtain and pay for insurance required to cover all activities within Contractor's scope of work.

1.6 PERMITS, FEES, AND UTILITIES

- A. Secure and pay for all permits, licenses, inspections, and fees required.
- B. Coordinate with other Sections and schedule sequence of accomplishing the work in such a manner as not to interrupt existing services and utilities at a time that will inconvenience the Owner. Provide Owner a minimum 48 hour notice when utilities will be interrupted.

1.7 PAINTING

- A. Paint all exposed piping and supports.
- B. See Division 09 for painting.

1.8 COORDINATION

- A. Coordinate with work performed by other Sections in order to ensure adequate space and proper location of all necessary work on this project whether or not work is under this Section. Coordination shall be done prior to order or manufacture of any systems or components.
- B. At a minimum, coordinate location of each piece of equipment, requirements for access panels, space required for supports, power requirements for each piece of equipment, and control requirements for each piece of equipment.

FIRE PROTECTION GENERAL REQUIREMENTS 21 00 00 - 2

- C. Wherever the work is of sufficient complexity, prepare additional detail drawings to scale to coordinate the work with the work of other trades. At completion, include a set of these drawings with the record drawings.
- D. Install the work in cooperation with other trades. Before installation, make proper provisions to avoid interferences.
- E. Pipes which pitch have right-of-way over those which do not pitch. For example, condensate drains and waste normally have right-of-way.
- F. No additional costs will be considered for work which has to be relocated due to conflicts with other trades or for additional equipment/parts that need to be installed due to a lack of coordination prior to, or during, construction.
- G. Coordination drawings: The contractor shall provide coordination drawings for all work in this section. All work shall be coordinated to clear work in other sections.

PART 2 – PRODUCTS

2.1 EQUIPMENT AND MATERIALS

- A. Provide products and materials that are new, clean, free of defects, damage and corrosion. Inspect all materials and remove defective materials from the site.
- B. Provide materials and equipment bearing the label of, or listed by, the Underwriter's Laboratories (UL), unless the material or equipment is of a type for which label or listing service is not provided.
- C. Furnish all materials and equipment of the same type by the same manufacturer.

2.2 ALTERNATE EQUIPMENT AND MATERIALS

- A. No substitute materials or equipment may be installed without the written approval of the Architect.
- B. Contract documents are based on materials specified and equipment manufacturers indicated. Acceptance of alternative equipment manufacturers does not relieve Contractor of the responsibility to provide equipment and materials which meet the quality and performance stated or implied in the contract documents. All submittals for substitution must include comparison to show equal with scheduled equipment.
- C. Submit proposals to supply alternate materials or equipment, in writing, with sufficient lead time for review prior to the date equipment must be ordered to maintain project schedule.
- D. No increase in the contract price will be considered to accommodate the use of alternative equipment, including revisions required by other trades.

2.3 SUBMITTALS

- A. Submit shop drawings, manufacturer's data, samples and test reports as specified.

- B. The review of submittals is for general compliance with the design concept and contract documents. Comments or absence of comments does not relieve the Contractor/Vendor/Manufacturer from compliance with the contract documents. The Contractor remains solely responsible for details and accuracy, for confirming and correlating all quantities and dimensions, for selecting fabrication processes, for techniques of construction, for performing the work in a safe manner, and for coordinating the work with that of other trades.
- C. No part of the work shall be ordered, procured, or installed until that work has been submitted, reviewed, and returned without comment.
- D. A minimum period of ten (10) working days will be required in the Engineer's office each time a submittal is sent for review. Contractor shall prioritize submittal reviews where multiple submittals are sent for review. This time period must be considered by the Contractor in the scheduling of the work.
- E. Submittals will be returned to indicate appropriate action taken as follows:
 - 1. No Exceptions Taken.
 - 2. Make Corrections Noted. No Resubmittal Required.
 - 3. Revise and Resubmit.
 - 4. Rejected.
 - 5. Not Reviewed.
- F. Use electronic form acceptable to Architect for electronic submittals, containing the following information:
 - 1. Project name.
 - 2. Date.
 - 3. Name and address of Architect and Engineer.
 - 4. Name of Owner.
 - 5. Name, address and contact information of Contractor.
 - 6. Names and contact information of sub-contractor, manufacturer, and supplier.
 - 7. Name of entity that prepared submittal.
 - 8. Category and type of submittal.
 - 9. Specification Section number and title.
 - 10. Drawing number and detail references, as appropriate.
 - 11. Transmittal number, numbered consecutively, and revision number clearly identified.
 - 12. Each item submitted labeled or identified the same as on the drawings.
- G. Identify each sheet of submittal pages (using arrows, underlining or circling) to show applicable sizes, types, model numbers, ratings, capacities and options actually being proposed. Cross out non-applicable information.

FIRE PROTECTION GENERAL REQUIREMENTS 21 00 00 - 4

- H. Inadequate or incomplete submittals will not be reviewed and will be returned to the Contractor for resubmittal.
- I. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. No additional costs will be considered for any special handling charges or expedited processing required for materials or equipment not ordered in time.

PART 3 – EXECUTION

3.1 EXAMINATION OF SITE

- A. The Contract Documents do not make representations regarding the character or the extent of the subsoils, water levels, existing structural, mechanical, plumbing, and electrical installations, above or below grade, or other sub-surface conditions which may be encountered during the work.
- B. Evaluate existing conditions that may affect methods or cost of performing the work, based on examination of the site or other information. Failure to examine the Drawings or other information does not relieve the Contractor of responsibility for satisfactory completion of the work.

3.2 DRAWINGS

- A. Drawings show general arrangement and location of piping and equipment. Drawings are diagrammatic and intended to show approximate location and routing. Dimensions on drawings shall take precedence over scaled dimensions on drawings. Allow for supports, expansion, and pitch of piping. Field verify all dimensions.
- B. The exact locations of equipment and piping shall be ascertained from the Architect or the Owner's representative in the field. The Architect reserves the right to make minor changes in the location of piping and equipment up to the time of installation without additional cost.
- C. Furnish and install any incidental work not shown or specified which can reasonably be inferred as part of the work and necessary to provide a complete and workable system.
- D. Execute any work or apparatus shown on the Drawings and not specifically mentioned in the Specifications, or vice versa. Omission from Drawings or Specifications of any minor details of construction, installation, materials, or essential specialties does not relieve Contractor from furnishing complete workable system.

3.3 RECORD DRAWINGS

- A. Contractor shall maintain a complete set of documents on site that are marked up during the construction process indicating all changes that have been made. Record drawings shall be maintained up to date throughout construction. Indicate clearly all work installed differently from that shown.

- B. Upon completion of work, certify all record drawings with a stamp including the date and name of Contractor. Submit one (1) complete, bookmarked, set of electronic record drawings to the Architect for final review.
- C. Record drawings must include the following as a minimum:
 - 1. Actual equipment locations.
 - 2. Revisions or substitutions to equipment schedules.
 - 3. Pipe size and routing.
 - 4. Dimensional changes to drawings.
 - 5. Revisions to details shown on drawings.
 - 6. Changes made by RFIs, Addenda, or Change Orders.
 - 7. Locations of access panels and shut-off valves.
 - 8. Locations and depths of underground utilities.

3.4 PROTECTION OF BUILDING

- A. Protect new and existing building structures and adjacent finished surfaces during construction. Patch, repair, and refinish existing work damaged by work under this Division to match adjacent undisturbed areas.

3.5 DELIVERY, DRAYAGE AND HAULING

- A. Include all drayage, hauling, hoisting, shoring and placement in the building of equipment specified and be responsible for the timely delivery of equipment to the project as required by the construction schedule.
- B. Provide proper protection and storage of all items and tools required.
- C. If equipment is not delivered or installed at the project site in a timely manner as required by the construction schedule, the Contractor shall be responsible for disassembly, re-assembly, manufacturer's supervision, shoring, general construction modification, delays, overtime costs, etc. at no additional cost to the Owner.

3.6 EQUIPMENT AND MATERIAL PROTECTION

- A. Protect the work, equipment, and material of other trades from damage by work or workers of this trade, and correct damage caused without additional cost to the Owner.
- B. The Contractor shall be responsible for all work, materials, and equipment until finally inspected, tested, and accepted. Protect work against theft, injury, or damage. Carefully store material and equipment received on site that is not immediately installed.

- C. Cover open ends of work with temporary covers or plugs during construction to prevent entry of dust, dirt, water or other obstructing material. Cover and protect equipment and materials from damage due to water, humidity, paint, spray-on fireproofing, construction debris, etc. Store equipment subject to moisture damage, such as insulation or electrical components in dry, heated spaces.
- D. Provide adequate means for fully protecting finished parts of the materials and equipment against damage from whatever cause during the process of the work until final acceptance.
- E. Do not install damaged items. Take immediate steps to obtain replacement or repair. Replace all wet or damp insulation or acoustic lining.
- F. Do not operate water systems until piping has been cleaned, disinfected and start-up strainers are in place.

3.7 QUALITY OF WORK

- A. The quality of work shall be of a standard generally accepted in the respective trade. Use only experienced, competent, and properly equipped workers. Replace work falling below this standard as directed by the Architect.
- B. Systems shall be worked into a complete and integrated arrangement with like elements arranged neatly with adequate head room and passageway free from obstructions.

3.8 FURRING AND PIPE SPACES

- A. Spaces provided in the design of the building shall be utilized and the work shall be kept within the furring lines established on the Drawings.
- B. Ensure necessary clearances on trim plates at exposed penetrations of walls and floors. If sufficient room is not available above suspended ceiling or vertical shafts obtain clarification from Architect before work is started.

3.9 CUTTING AND PATCHING

- A. Do not cut, channel or drill unfinished masonry, tile, etc. unless written permission is obtained from the Architect. Perform this work in a manner acceptable to the Architect. Cutting of structural members or footings is prohibited without the prior written consent of the Structural Engineer.
- B. Where cutting, channeling or drilling of floors, walls, partitions, ceilings, or other surfaces is necessary from the proper installation, support or anchorage of piping or equipment, lay out the work carefully in advance. Repair any damage to the building, piping, equipment or finishes using skilled tradesmen for all required work.
- C. Provide slots, chases, openings and recesses through floors, walls, ceilings and roofs as required. Where these openings are not provided, provide cutting and patching to accommodate penetrations.

- D. Provide sleeves for all piping passing through new floors, walls, partitions, and any other building construction, of adequate diameter to allow minimum of 2" clearance all around between sleeve and piping. When piping is insulated, insulation shall pass continuously through sleeve with 2" clearance between insulation and sleeve or hole in existing construction.

3.10 ACCESS

- A. Indicating equipment or specialties requiring reading, adjusting, inspection, repairing, removal, or replacement shall be conveniently and accessibly located with reference to finished building.
- B. No controls, or equipment shall be placed in a location that will be inaccessible after the system is complete. Access panels or doors shall be provided where required whether shown on Drawings or not.
- C. Access panels shall be 24" x 24" unless otherwise directed, style as selected by the Architect. Panels shall have the same acoustic barrier or rating as the construction in which panel is installed.
- D. Doors shall be Milcor, Newman or equal, with concealed hinges, screwdriver locks, prime coated with rust inhibitive paint, finish painted in field to match adjacent surface. Provide key locks where required by Architect/Owner. All access doors shall be keyed the same. Doors in walls of toilet rooms shall be stainless steel.
- E. Continuously check installation manuals for clearance and accessibility of equipment. No allowance of any kind will be made for negligence on part of Contractor to foresee means of installing equipment in proper position.

3.11 SEISMIC RESTRAINTS

- A. All equipment, piping, and materials shall be fastened and securely anchored to building structure as required by the Drawings, Specifications, NFPA13, and the California Building Code.
- B. Piping shall be braced as follows:
 - 1. Brace top of system riser.
 - 2. Brace all feed and cross mains.
 - 3. Brace branch lines that are 2 1/2" nominal diameter and larger.
 - 4. Transverse bracings at 40'-0" on center maximum and shall be spaced as calculated in accordance with NFPA13.
 - 5. Longitudinal bracings at 80'-0" on center maximum and shall be space as calculated in accordance with NFPA13.
 - 6. Transverse bracing for one pipe section may also act as longitudinal bracing for the pipe section connected perpendicular to it, if the bracing is installed within 24" of the elbow or tee and is connected to the largest pipe.
 - 7. Do not use branch lines to brace main lines.

8. Provide flexibility in joints where pipes pass through building seismic or expansion joints or where rigidly supported pipes connect to equipment with vibration isolators.
9. At vertical pipe risers, support the weight of the riser at a point or points above the center of gravity of the riser wherever possible. Provide lateral guides at the top and bottom of the riser and at intermediate points not to exceed 30'-0" on center.
10. No bracing is required if the top of single pipe is suspended 12" or less from the connection point at the supporting structural member.

3.12 MANUFACTURER'S DIRECTIONS

- A. Materials and equipment shall be installed in accordance with manufacturer's application and recommendations, requirements, and instructions, and in accordance with Contract Documents.
- B. Conflicts between manufacturer's instructions and Contract Documents shall be brought to the Architect's attention for resolution prior to installation.
- C. Where requirements indicated in Contract Documents exceed manufacturer's requirements, Contract Documents shall govern.

3.13 ELECTRICAL EQUIPMENT AND ELECTRICAL ROOM PRECAUTIONS

- A. Do not install piping other than piping that serve the room for the following: switchgear, transformer, generator, elevator equipment, telephone, fire command, security, dimmer or electrical equipment rooms.
- B. Do not install piping or equipment above or within the code required service space for switchboards, disconnects, panelboards, dimmers, control panels, VFDs, individual motor controllers, electronics, etc.

3.14 CATHODIC PROTECTION

- A. Install dielectric unions at points in piping where dissimilar metal pipes are connected together.

3.15 PIPING AND EQUIPMENT IDENTIFICATION

- A. Furnish and install engraved nameplates with 1/4" minimum lettering at panel mounted control devices, manual control stations, power disconnects, and pieces of equipment. Nameplates shall be white lettering on black background. For outdoor locations, provide brass engraved nameplates or plastic rated for outdoor use.
- B. Each piping system installed under this work shall be identified and the direction of flow indicated. Markings shall be applied after all painting, priming, and cleaning of the piping and insulation is completed. Labels shall be black lettering on colored backgrounds. Lettering shall be easily readable from the floor and background colors easily discernible. Furnish labels in every room and every 20' of pipe length.

- C. Tag all valves with 2" diameter brass tags noting the valve number and contents in the pipe. At the completion of the project, provide Owner with a valve listing for all valves installed in the project. Valve listing shall note valve tag number, contents in the pipe and the areas (room numbers, etc.) that are impacted by valve.

3.16 GUARANTEE

- A. The Contractor shall guarantee the quality of all work and the quality of the equipment and materials in accordance with the provisions of the General Conditions and Special Conditions. Should any defects occur during this period, the Contractor shall promptly repair or replace defective items as directed by the Architect, without cost to the Owner.
- B. Contractor shall be responsible for damage to any part of premises during guaranteed period caused by leaks or breaks in work furnished and/or installed under this Section.

3.17 TESTING

- A. Test all ductwork, equipment, piping, and systems as called for in the Specifications. Notify Architect and inspection authorities prior to testing so that they may be witnessed. Protect all personnel and equipment during testing.

3.18 OPENINGS

- A. Locating and sizing of all openings for piping through walls, roof, etc. shall be done under this Division. Framing of openings shall be done by the respective trades in whose work the opening is made.

3.19 CLEAN-UP

- A. During the course of work under this Division, all rubbish, debris, surplus materials, tools, etc. resulting from this work shall be removed from work area and shall be disposed of off-site at the end of each working day. The Owner's premises shall be left clean, and in a condition acceptable to the Architect.
- B. Clean all work installed under this Contract to satisfaction of Owner.

3.20 OPERATING INSTRUCTIONS AND OPERATOR TRAINING

- A. Provide the services of factory-trained specialists to supervise the operation of all equipment and train the Owner's operating and maintenance personnel.
- B. Instruct the Owner's operating personnel in the basis of design, the available documentation, the proper starting sequences, operation, shut-down, minor adjustments, troubleshooting, recommended spare parts, and regular maintenance procedures.
- C. Submit training agenda, schedule and list of representatives to the Owner for review ten (10) days prior to training. Confirm attendance at training by sign-in sheet. At a minimum, the training agenda shall cover all items required to be provided in the operating and maintenance manuals.

FIRE PROTECTION GENERAL REQUIREMENTS 21 00 00 - 10

3.21 OPERATING AND MAINTENANCE MANUALS

- A. Provide operating instructions and maintenance manuals for all equipment and material furnished under this Division.
- B. Provide the following equipment and maintenance information where applicable:
 - 1. California version (2013) of NFPA 25.
 - 2. Product Data Sheets.
 - 3. Record Drawings.
- C. Contractor must start compiling above data immediately upon approval of submittals for equipment and materials.
- D. Submit one (1) electronic copy of operating and maintenance manuals, indexed and bookmarked, for review by Architect/Engineer.
- E. Submit three (3) complete sets of bound hard copies of operating and maintenance manuals, and one (1) electronic copy to Owner within thirty (30) days of issuance of final occupancy permit.

END OF SECTION

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SECTION 21 05 00

OVERHEAD FIRE PROTECTION SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Division 01, and Division 21 Sections apply to this Section.

1.2 SCOPE OF WORK

- A. Provide labor, materials, equipment, and services to furnish and install complete overhead fire sprinkler system throughout the 2nd CTE Building (two story extension) in accordance with NFPA 13 which shall include, but not limited to the following:
 - 1. Overhead fire sprinkler shop drawings for review and approval by DSA.
 - 2. Hydraulic calculations for NFPA13 Ordinary Hazard Group 2 with 250 gpm outside hose flow review and approval by DSA.
 - 3. Seismic bracing calculations in accordance with NFPA13 for review and approval by DSA.
 - 4. Material Data submittal to DSA.
 - 5. Respond to comments by DSA and make required corrections to overhead fire sprinkler shop drawings to obtain approval at DSA Backcheck.
 - 6. Connection to CTE Building (DSA Application 01-118637) overhead fire sprinkler system stub out shown on the CTE Building (DSA Application 01-118637) approved drawings.
 - 7. Seismic Joint at building seismic separation.
 - 8. Spare head cabinet and stock of spare heads to be located in the CTE Building Riser Room.

1.3 SUBMITTALS

- A. Submit for review, within fifteen (15) days after signing Contract, the required number of copies of a complete list of materials proposed for use. This list includes:
 - 1. Sprinklers.
 - 2. Piping and fittings.
 - 3. Hangers and supports.
 - 4. Seismic Joint.
 - 5. Sprinkler Head Cabinet.
 - 6. Shop Drawings: plans and details, drawn to scale, on which piping is shown and coordinated with other installations, using input from installers of the items involved.

OVERHEAD FIRE PROTECTION SYSTEM 21 05 00 - 1

7. Site Survey: Plans, drawn to scale, on which fire service piping is shown and coordinated with other services and utilities.
 8. Welding certificates.
- B. No substitute materials or equipment shall be installed without the written approval of the Architect.
 - C. No increase in the contract price will be considered to accommodate the use of alternative equipment, including revisions required by other trades.
 - D. Submit test reports on all systems tested. Tests required by Authorities Having Jurisdiction over the work shall be submitted on appropriate forms to the satisfaction of such authorities.

1.4 QUALITY ASSURANCE

- A. Steel support welding qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code – Steel."
- B. Pipe welding qualifications: Qualification procedures and operators.
- C. Each length of pipe, fitting, or device used in any piping system shall be stamped or indelibly marked with type, weight, quality, and manufacturer's name or mark.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Pipes shall be shipped so as not to bend, dent, or otherwise damage the pipe during transport. Contractor shall take all necessary precautions to prevent damage to pipe and fittings during delivery and unloading. Any pipe found to have been damaged due to improper handling shall be removed from the jobsite at Contractor's expense.
- B. Hazardous liquids: Remove and dispose of liquids from piping according to requirements of authorities having jurisdiction.
- C. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- D. Store and handle pipes and tubes having factory-applies protective coatings to avoid damaging coating, and to protect from direct sunlight.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. See Schedules on Drawings for sprinkler heads. Furnish and install all sprinkler heads in accordance with Drawings, manufacturer's recommendations, and all applicable codes.
- B. All material shall be listed by Underwriters' Laboratories.

OVERHEAD FIRE PROTECTION SYSTEM 21 05 00 - 2

- C. Stainless steel piping shall be installed where underground piping is within 5'-0" of the building and under all footing.
- D. Joints shall not be installed under building or footings.
- E. All above grade sprinkler piping shall be UL listed for fire sprinkler use and meet ASTM A135 standards.
- F. Escutcheons shall be provided where piping passes through walls, floors or ceilings. Escutcheons shall be finished as required by the architect to match the building in accordance with Division 01.
- G. A spare head box shall be provided at each riser location with at least 2 of each type of heads used, total number of spare heads shall be in accordance with NFPA13 for the number of head scheduled for the building. A spare wrench shall be included for each type of head in the building.
- H. Bushings are not allowed.
- I. Head guards shall be provided for all head subject to mechanical damage (ie. low heads in mechanical rooms).
- J. CSFM (California State Fire Marshal) approved, UL listed, 120V flow switches shall be used.
- K. CSFM (California State Fire Marshal) approved, UL listed, 120V tamper switches shall be used.
- L. CSFM (California State Fire Marshal) approved, UL listed, 120V, 10" alarm bell shall be used.
- M. Alarm test station in accordance with NFPA13 shall be provided with control valve and orifice equal to one sprinkler head. Alarm test discharge shall discharge to a sanitary sewer receptacle.

2.2 HANGER AND BRACING

- A. Acceptable manufacturers: Tolco, Bline or approved equal.
- B. Hangers, braces and components shall be UL listed and meet the requirements of NFPA13.
- C. Hanger and brace component capacities shall meet requires for the spacing and pipe sizes shown on the drawings.

2.3 PIPE AND FITTINGS

- A. Above Grade Interior Piping: ASTM A135 UL listed fire sprinkler pipe (Schedule 40 with threaded fittings or schedule 10 with welded or roll grooved fittings) carbon steel pipe.

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- B. Above Grade Exterior Piping: ASTM A135 UL listed fire sprinkler pipe(Schedule 40 with threaded fittings or schedule 10 with welded or roll grooved fittings) carbon steel pipe, with factory hot dipped galvanized coating, finish painted to match building in accordance with Division 01.
- C. Above Grade Fittings: Black ductile iron threaded fittings meeting requirements of ASTM A536 for 1 1/2" pipe and smaller, butt welded joints or roll grooved joint for pipes 2" and larger. Hot dipped galvanized coating for exterior fittings. SPF, Anvil, Victaulic or approved equal.
- D. Seismic Joint: Metraflex Fireloop or approved equal.

2.4 VALVES

- A. All valves shall be UL listed rated for 175 psi.
- B. Main Drain: Nibco T-301 or approved equal.
- C. Riser Check Valve: Tyco CV-1 or approved equal.
- D. Control Valve: Tyco BFV-N butterfly valve with tamper switches.
- E. Inspector's Test: AGF Model 1011A Test and Drain with Model 7000 pressure relief valve set at 175 psi.

2.5 SPRINKLER HEADS

- A. Heads shall be provided by a single manufacturer, Tyco, Viking or approved equal.
- B. Heads shall be automatic glass bulb type. All heads shall be ordinary or intermediate rating unless otherwise shown on the drawings. All heads shall be quick response type unless otherwise shown on the drawings. Tyco FRB or approved equal.

2.6 ALARM COMPONENTS

- A. Flow Switch: Potter VSR with adjustable retard or approved equal. CSFM approved and UL listed.
- B. Alarm Bell: Potter PBA12010, 10" 120V or approved equal. CSFM approved and UL listed.

2.7 ACCESSORIES

- A. Spare Head Cabinet: Tyco Spare Head Cabinet.
- B. Pressure Gauge: 4" FFPI-PG 300 psi air/water gauge with 3way valve gauge kit or approved equal.
- C. Semi Recessed Escutcheon: Tyco Style 10, 15., semi recessed escutcheon, finish as required by Architect or approved equal.

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PART 3 – EXECUTION

3.1 PIPING GENERAL INSTALLATION

- A. All piping shall be installed in a manner that is acceptable to DSA, the engineer, and the architect.
- B. All piping shall be pressure tested and flushed in accordance with NFPA13.
- C. Piping shall not run over switchboards, or electrical panels.
- D. Pipe runs in masonry and concrete floors shall be sleeved for protection.
- E. Sleeve all lines rising in footings.
- F. Caulk space between pipes and sleeves in exterior walls with flexible material in accordance with NFPA13. Fire caulk rated wall penetrations.
- G. Place escutcheons, stamped with #16 gauge steel and chromium plated, on pipes passing through sleeves in walls, floors or ceiling where exposed to view within a finished area.
- H. Support piping in accordance with NFPA13
- I. Anchor vertical risers in accordance with NFPA13.
- J. All changes of direction of piping shall be made with fittings. Do not bend pipe.
- K. Flash roof vent piping through roof with 24 gauge or heavier galvanized flashing. Make watertight with black fibrous mastic. Extend flashing into roofing felt 12” from pipes.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure. Comply with NFPA13, details on DSA approved drawings, the manufacture’s listings and the California Building Code.
- B. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- C. Install longitudinal and lateral bracing as shown on the drawings in accordance with NFPA13.
- D. Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

3.3 PAINTING

- A. Paint exposed, exterior metal piping with factory-applied paint or protective coating. Do not paint sprinkler heads.
 - 1. Alkyd System: MPI EXT 5.1D.

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- a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel (flat).
 - d. Color: As selected by Architect.
- B. Paint exposed, interior metal piping with factory-applied paint or protective coating. Do not paint sprinkler heads.
 - 2. Latex Over Alkyd Primer System: MPI INT 5.1Q.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Interior latex matching topcoat.
 - c. Topcoat: Interior latex (flat).
 - d. Color: As selected by Architect.
- C. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.
- D. Refer to Division 09 for additional painting requirements.

3.4 SYSTEM ACCEPTANCE

- A. Provide testing of all fire sprinkler piping at 200 psi for 2 hours in accordance with NFPA13. Such tests shall be done in the presence of the Owner's representative, and all Authorities Having Jurisdiction. The inspection authority having jurisdiction and the Engineer shall be notified a minimum of 48 hours prior to performance of all tests so that they may be witnessed. Existing fire sprinkler systems shall be tested at system pressure. Additions with 20 or more heads to existing fire sprinkler systems shall be isolated from the existing system and tested at 200 psi.
- B. Provide the IOR and the Architect with the completed contractors test certificate in accordance with NFPA13.
- C. The contractor shall provide a hydraulic design information sign attached to the riser in accordance with NFPA13 and template provided on the contract drawings. The sign shall be permanently marked weatherproof metal or rigid plastic.
- D. The contractor shall provide a general information sign attached to the riser in accordance with NFPA13 and template provided on the contract drawings. The sign shall be permanently marked weatherproof metal or rigid plastic.
- E. Contractor shall provide all apparatus, temporary work, or any other requirements necessary for such tests. Take all due precautions to prevent damage to the building or its contents that may be incurred by such tests as the Contractor will be required to repair and make good, at own expense, any damage caused.
- F. Any defects or deficiencies discovered as result of tests shall be immediately repaired and tests shall be repeated until all test requirements are fully met. No caulking of pipe joints to remedy leaks shall be permitted.

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3.5 TRAINING AND O&MS

- A. Refer to Section 21 00 00 Fire Protection General Requirements and Division 01 for Training requirements, Operating and Maintenance Manuals, and other Closeout procedures.

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SECTION 22 00 00

PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.

1.2 ANCILLARY GENERAL CONDITIONS

- A. The following shall be ancillary to the General and Supplementary Conditions and Division 1 Specification Sections:
 - 1. Prior to bidding the project, thoroughly examine all construction documents and specifications, survey the existing site conditions, and include all necessary allowances in bid proposal.
 - 2. In case of a discrepancy in the specifications, between the specifications and the drawings, within the drawings, or between work under this section and other sections, the Contractor shall figure the most stringent and most expensive alternate and, after award of contract, secure direction from the Owner's Representative.

1.3 DESCRIPTION OF WORK

- A. The Contractor shall furnish all labor, materials, testing, tools, equipment, services, and transportation necessary for the completion of all plumbing work as indicated on the drawings and specifications herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner. Work includes, but not limited to the following:
 - 1. Plumbing Fixtures.
 - 2. Soil, waste, and vent piping system including connections to equipment furnished in another section of work, stub-outs and connections to exterior stub-outs.
 - 3. Storm drainage piping system including roof drains, overflow drains, area drains, insulation of horizontal lines and connections to stub-outs.
 - 4. Indirect waste piping including insulation and connections to equipment furnished in another section of work.
 - 5. Condensate drain piping system including insulation and connections to equipment furnished in another sections of work.
 - 6. Domestic hot and cold water piping systems including water heaters, mixing valves, circulating pumps, pipe insulation, connections to equipment furnished in another section of work, and connections to exterior stub-outs.
 - 7. Hangers, anchors, sleeves, metal supports, and channels as required for work under this section including sound isolators where indicated.
 - 8. Piping and valve identification.
 - 9. Furnishing and installation of plumbing fixtures and trim.
 - 10. Final piping connections to all fixtures, equipment, including equipment furnished under other sections.

11. Miscellaneous steel work including floor sleeves, slots, inserts, plates, supports, hangers, etc.
12. Testing, adjusting of completed work, inspections, and instructions.
13. Repair of damage done to premises as a result of this installation and removal of all debris left by those engaged in this installation.
14. Shop drawing, submittals, as-built drawings and operation and maintenance manuals.
15. Permits and connection fees.
16. Flashing and counter flashing.
17. All rigging hoisting, transportation, and associated work necessary for placement of all equipment in the final location shown.
18. Concrete coring, cutting and patching as it relates to this work.
19. Trenching, and compacting for work under this section.
20. Painting of exposed piping and supports in accordance with Section 09 91 00, Painting.

1.4 RELATED WORK ELSEWHERE

- A. Section 07 84 13, Fire Stopping.
- B. Section 07 92 00, Sealants.
- C. Section 08 31 13, Access Panels.
- D. Section 09 91 00, Painting.
- E. Section 21 00 00, Fire Protection.
- F. Division 26, Electrical.

1.5 REFERENCE AND STANDARDS

- A. Regulatory compliance: All work performed under this Division shall comply with the latest currently adopted editions of all codes and regulations and all requirements of all Authorities Having Jurisdiction. The following references and standards are hereby made a part of this Section and work shall conform to applicable requirements herein except as otherwise specified herein or shown on the Drawings.
- B. Codes and Standards: Conform to all applicable codes and standards as stated herein and as described in Division 1 of the Specifications, including the following:
 1. American Gas Association (AGA)
 2. American National Standards Institute (ANSI)
 3. Adhesive and Sealant Council (ASC)
 4. American Society of Mechanical Engineers (ASME)
 5. American Society for Testing and Materials (ASTM)
 6. American Society of Civil Engineers (ASCE)
 7. California Building Code (CBC)
 8. California Plumbing Code (CPC)
 9. California Fire Code (CFC)
 10. California Energy Conservation Code, Title 24
 11. State of California Administrative Code (CAC) Titles 8, 17, and 24
 12. California Electric Code (CEC)

13. National Electrical Manufacturers Association (NEMA)
14. National Fire Protection Agency (NFPA)
15. Underwriters' Laboratories (UL)
16. Comply with all ADA and California Title 24 requirements for disabled access.
17. Division of State Architect, State of California (DSA)
18. City Fire Marshal requirements
19. Comply with the latest edition of all applicable standards, including AWWA, PDI, and OSHA

- C. Minimum requirements: The requirements of these are the minimum that will be allowed unless such requirements are exceeded by applicable codes or regulations, in which the regulatory codes or regulation requirements shall govern.
- D. Nothing in the specifications or drawings shall be construed to permit deviation from the requirements of governing codes unless approval for said deviation has been obtained from the legally constituted Authorities Having Jurisdiction and from the Owner's Representative.

1.6 WORK RESPONSIBILITIES

A. Site Conditions:

1. Examine all of the drawings and the specifications and survey the existing site conditions.
2. Resolve all conflicts with code requirements, site conditions, the work of other trades, or other mechanical contractors.
3. Verify the location of all existing utilities prior to construction and protect from damage.
4. Pay all costs incurred due to damage of existing utilities or other facilities.

B. Drawings:

1. Because of the small-scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of their work, furnishing the necessary piping, fittings, valves, traps, and other devices which may be required to complete the installation.
2. The general intent of the design indicated on the drawings shall be followed as closely as possible. Coordinate with architectural, structural, mechanical and electrical drawings and the work of other trades prior to of piping and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Owner's Representative for approval. Only when Owner Representative's approval is given, in writing, shall Contractor proceed with installation of the work.
3. Should the Contractor make changes in the installation differing from what is indicated on the contract drawings and not necessitated due to field conditions as indicated hereinabove, the Contractor shall be required to re-install the work to comply with what has been indicated on the contract drawings. Should it be impossible to re-install the work and the installation is in accordance with all governing authorities, the Owner's Representative may permit the installation to remain. However, all costs incurred to revise the contract drawings by the Engineer for resubmittal to the building department indicating the as-installed condition shall become the responsibility of the Contractor.
4. Bring discrepancies between different drawings, between drawings and actual field conditions or between drawings and specifications, promptly to the attention of the Owner's Representative for decision.

5. Install pipe with all necessary offsets and to conform to the structure. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, maintain required accessibility, keep openings and passages clear, and satisfy the requirements of the governing codes and standards of good practice. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
6. Clearances and Openings: Contractor shall cooperate and coordinate their work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to their requirements for equipment and installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.
7. Contractor shall and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, telecom/data rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.
8. The architectural drawings and specifications take precedence over the plumbing drawings for location of casework, equipment, lights, diffuser, plumbing fixtures, etc. Contractor shall refer to the drawings, specifications, and review shop drawings for all work, in order to coordinate their work with the other work of the project.
9. All scaled and figured dimensions are approximate and are given for estimate purposes only. Before proceeding with any work, carefully check and verify all dimensions, sizes, etc.
10. Drawings are diagrammatic and size and locations of equipment are generally shown to scale. Make use of data in all Contract Documents, and informational documents, and verify this information against field conditions.
11. As far as possible, the work has been indicated on the drawings in such positions as to suit and accommodate the work of the other trades, but the work as indicated is largely diagrammatic and is shown primarily for clarity. Contractor is responsible for the correct placing of their work and the proper location and connection of their work in relation to the work of other trades.
12. Where apparatus and equipment have been indicated on the drawings, dimensions have been from typical equipment of the class indicated. Carefully check the drawings to see that the equipment will fit into the spaces provided.
13. Where equipment is furnished by another Division or others, verify dimensions and the correct locations of this equipment before proceeding with the rough-in of connections.

C. Responsibility:

1. Be responsible for any cooperative work must be altered due to lack of proper supervision or failure to make proper provision in time. Such changes shall be directly supervised by the Owner's Representative and shall be made to their satisfaction.
2. Provide complete functioning systems and include all labor, materials and associated tools and transportation required for the system to operate safely and satisfactorily.
3. Provide all work indicated on the drawings whether or not mentioned in the specifications.
4. Coordinate the installation of plumbing items with the schedules for work of other trades and other contractors to prevent delays in total work. Assume responsibility for any

cooperative work which must be altered due to lack of proper supervision or failure to make proper provisions in time.

5. Notify the Authority Having Jurisdiction when work is ready for inspection.

D. Coordination of Installation:

1. Bring to the Owner Representative's attention prior to installation any conflicts with other trades which will result in unavoidable contact to the equipment, piping, etc., described herein due to inadequate space, etc.
2. Bring to the Owner Representative's attention any discrepancies between the specifications and field conditions, changes required due to specific equipment selection, etc., prior to installation.
3. Provide written notification to Owner's Representative a minimum of fourteen (14) days prior to a utility shut down.
4. Obtain inspection and approval from the Owner's Representative of any installation to be covered or enclosed prior to such closure.
5. Restoration of Damage: Repair or replace, as directed by Owner's Representative, materials and parts of premises which become damaged as result of installation of work of this Division. Remove replaced parts from premises.
6. Where new pipes are to be connected to an existing pipe or a stub provided under another section, verify location, size, elevation and all other information necessary for connection. This verification shall be done at the start of construction. Should there be a problem, contact the IOR and/or Architect immediately to resolve the problem.

1.7 PERMITS, LICENSES, AND INSPECTIONS

- A. Obtain and pay for all permits, fees and inspections required by work under this Section.
- B. Inspections: All work shall be regularly inspected by the Authority Having Jurisdiction. Certificates of approval shall be delivered to the Owner's Representative.

1.8 SERVICE CONNECTIONS

- A. Arrange and pay all costs for utilities required to complete work of this section. Connection to all on-site services, payment of service charges, and provision for the installation of temporary utilities are included.
- B. Certain site utilities are to be connected to and/or extended. Before laying of any pipe or digging of any trenches, Contractor shall determine by actual excavation and measurement exact location and depth of lines to which is to be connected. In event depth of lines is not sufficient to permit connection in manner indicated; Contractor shall obtain direction from the Owner's Representative before proceeding with this work.
- C. Verify that utility company's size their services and meters to suit ultimate demand indicated on the drawings.
- D. Sanitary Sewer: The Contractor shall be responsible for the soil and waste piping outside of the building to civil site stub and within the building itself.
- E. Domestic Water: The Contractor shall be responsible for the domestic water service outside of the building to civil site stub and within the building itself.

- F. Storm Drain: The Contractor shall be responsible for the storm drain service outside of the building to civil site stub and within the building itself.

1.9 NOISE AND VIBRATION

- A. Cooperate in reducing objectionable noise or vibration. If noise or vibration, because of improper installation, occurs in the building, correct these conditions at no cost to the Owner.

1.10 QUALITY ASSURANCE

- A. Qualifications:

1. For the actual installation and testing of work under this section use only thoroughly trained and experienced work personnel completely familiar with the items required and the manufacturer's current methods of installation.
2. In acceptance or rejection of the finished installation, no allowance will be made for lack of skill.
3. The execution of the work shall be in strict accordance with the best practice of the trades, the intent of this specification, and all codes and ordinances.

- B. Contractor's Qualifications: A firm with at least five (5) years of successful installation experience on projects with plumbing systems work similar and of comparable size and scope to that required for this project. The installer shall have performed at least five (5) similar projects in the San Francisco Bay Area. Contractor shall be prepared to submit written evidence of the installer's experience.

- C. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

- D. All materials and equipment installed as part of this work shall be new and the manufacturer's current model.

- E. Soldering: Soldering of copper tubing shall be done in accordance with the Copper Development Association Copper Tube Handbook Instruction on Joining and Forming Copper Tube, Soldered Joints. Permits for on-site soldering shall be obtained from DSA/Fire Marshal.

- F. Brazing: Brazing of copper tubing shall be done in accordance with the standards of the American Welding Society or the Copper Development Association. Copper Tube Handbook Instruction On Brazing. Permits for on-site brazing shall be obtained from DSA/Fire Marshal.

- G. Welded Joints: Weld in accordance with procedures established and qualified per ANSI B31.2. Each welder and welding operator shall be qualified for the ANSI procedures as evidenced by a copy of a certified ANSI B31.2 qualification test. Contractor shall conduct the ANSI qualification test. Permits for on-site welding shall be obtained from DSA/Fire Marshal.

1.11 PRODUCTS

- A. Products shall be obtained from local suppliers or suppliers with local representation. Items of the same type shall all be purchased from the same supplier.

- B. Protection: Use all means necessary to protect the materials of this section before, during and after installation and to protect the installed work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Owner's Representative.
- D. Protection of Materials:
 - 1. Protect materials, equipment and apparatus provided under this Division from damage, water, dust, or similar impairment, both in storage and installation until Notice of Completion has been filed. Materials, equipment or apparatus damaged because of improper storage or protection will be rejected and must be removed from site.
 - 2. Cap openings in pipes with manufactured caps or fittings. Do not use taped caps.
 - 3. Protect premises and work of other Divisions from damage arising out of installation of work of this Division.
- E. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and soldered ends.
 - 3. Set ball valves open to minimize exposure of functional surfaces.
- F. Use the following precautions during storage:
 - 1. Maintain valve end protection.
 - 2. Store valves indoors and maintain at higher-than-ambient-dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
- G. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use operating handles or stems as lifting or rigging points.

1.12 REVIEW OF CONSTRUCTION

- A. The Owner's Representative may review work at any time.
- B. Advise Owner's Representative fourteen (14) calendar days in advance that work is ready for review at following times:
 - 1. Prior to backfilling buried work.
 - 2. Prior to concealment of completed Contract items.
 - 3. When requirements of Contract have been completed.
 - 4. Prior to installation of suspended dry wall ceiling.
- C. Do not or conceal work without Owner Representative's consent.
- D. Maintain on job a set of specifications and drawings for use by the Owner's Representative.
- E. Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

1.13 SYSTEM ACCEPTANCE

- A. Final Review: Request a final review prior to system acceptance after:
 - 1. Completion of the installation of all systems required under the Contract Documents.
 - 2. Submission and acceptance of operating and maintenance data.
 - 3. Completion of pipe, valve and equipment identification.
 - 4. Completion of cleaning.
 - 5. Satisfactory operation of all systems for a period of one (1) week.
- B. Acceptance shall be contingent upon:
 - 1. Completion of final review and correction of all deficiencies.
 - 2. Satisfactory completion of the acceptance tests which shall demonstrate compliance with all performance and technical requirements of the Contract Documents.
 - 3. Submission of as-built drawings.

1.14 DAMAGE BY LEAKS

- A. Contractor shall be responsible for damage to any part of the premises caused by leaks in the pipe or equipment installed under applicable sections for a period of twenty-four (24) months from the date of acceptance of the work by the Owner.

1.15 SUBMITTALS

- A. Submit shop drawings and product data in accordance with Section 01 60 00 Product Requirements and as follows:
- B. Submittal Requirements:
 - 1. Submit manufacturer's product brochures for all products. Written descriptions of products are not acceptable. Furnish, all at one time, prior to any installation, submittal data on all fixtures, material, equipment and devices. Each submitted item shall be indexed and referenced to these specifications and to identification numbers on fixtures and equipment schedules. Product submittals shall be bound in a three-ring binder, with table of contents and tab set for each system.
 - 2. Manufacturers' submittal literature and shop drawings are required on all items to ensure the latest and most complete manufacturer's data is available for review. Requirements of the submittals and Engineer's submittal notes are a part of the work of this Division except that Engineer's notes may not be used as a means of increasing the scope of work of this Division.
 - 3. Submittals will be checked for general conformance with the design concept of the project, but the review does not guarantee quantities shown and does not supersede requirements of this Division to properly install work.
 - 4. To be valid, all submittals must:
 - a. Identify project name and location, Contractor's, Subcontractor's, supplier's and manufacturer's name, address, and telephone number.
 - b. Include table of contents.
 - c. Identify manufacturer's name and model numbers.
 - d. Clearly indicate and label as such any items proposed as substitution for that specified or shown on plans.

- e. Include all pertinent construction, installation, performance and technical data.
- f. Have all product data sheets labeled to indicate the individual items being submitted. In addition, all required options and accessories shall be clearly marked.
- g. Product data sheets corresponding to items indicated on plans shall be clearly labeled with the corresponding fixture or equipment tag number.
- h. Product data sheets corresponding to items indicated in specifications shall be clearly labeled with the specification section, and item numbers.

C. Product Data:

- 1. General: Manufacturer's specifications, data sheets, certified drawings, and installation instructions. Include physical and performance data, such as weights, sizes, capacities, required clearances, performance curves, acoustical characteristics, finishes, color selection, and accessories. Include certified drawings on major equipment such as water heaters, pumps and tanks.

D. Submit product data and brochures for, but not limited to the following:

- 1. Pipe Material, Fittings and All Piping Specialties.
- 2. Pipe corrosion protection materials.
- 3. Unions, Flanges and Dielectric Isolators.
- 4. Pipe Supports and Seismic Bracing.
- 5. Escutcheons, Flashing and Sleeves.
- 6. Fire stopping, including UL listing system numbers and details.
- 7. Pipe Isolation.
- 8. Insulation.
- 9. Valves (all types).
- 10. Trap Primer Valves.
- 11. Water Hammer Arrestors (Shock Absorbers).
- 12. Thermometers and Pressure Gauges.
- 13. Drains, Cleanouts and Vent Caps.
- 14. Access Doors.
- 15. Pipe and equipment markers, and valve tags.
- 16. Flexible Connectors and Seismic Joints.
- 17. Hose Bibbs.
- 18. Plumbing Fixtures and Trim.
- 19. Pumps (all types).
- 20. Expansion Tanks.
- 21. Water Heaters.

E. Shop Drawings:

- 1. General: Prepare and submit plans, sections, details and diagrams to required scales for specified areas. Drawings shall be prepared using AutoCAD 2000 software. Drawings shall be coordinated, dimensioned and indicate equipment, pipe, duct, fire protection, and electrical in relation to architectural and structural features. Include minor piping, drains, etc. Indicate exact locations and elevations of valves, piping specialties, access doors, etc. Complete and detailed shop drawings of a scale equal to or larger than the design documents shall be maintained throughout the coordination and construction phase indicating all equipment trades' work clearly. All equipment including piping, etc. shall clearly indicate both top and bottom elevations as well as distances from equipment to

- established building lines. Coordinate with other trades and field conditions and show dimensions and details including building construction and access for servicing.
2. Use of contract documents for shop drawings is not acceptable.
 3. Required Drawings: Prepare and submit drawings for all areas and all plumbing work. Scale shall be minimum 1/4"=1'-0" in mechanical rooms, toilet areas, and a minimum 1/8"=1'-0" elsewhere.

1.16 SUBSTITUTIONS

- A. Base manufacturer is indicated in the equipment schedules and specifications. In specification, additional acceptable manufacturers may be indicated. Other manufacturers, materials, or methods shall not be used unless approved in writing by the Owner's Representative. The burden of proof as to the equality of any proposed substitute manufacturer, material, or method shall be upon the contractor. Substitutions, shall be submitted as follows:

1. Requests for substitution review and acceptance shall be accomplished by table of comparison listing pertinent features of both specified and proposed materials, such as material of construction, replacement or maintenance access, motor type, horsepower, voltage, phase, service factor. For each item proposed as substitution for that specified or shown on plans, copies of product data sheets for specified item shall be placed side by side with product data sheets for the corresponding proposed substitution item within the submittal. In addition to the Submittal Requirements for labeling listed above, product data sheets for the specified item shall be clearly labeled "ITEM, NOT SUBMITTED". Product data sheets for the corresponding proposed substitution item shall be clearly labeled "PROPOSED SUBSTITUTION". Review of proposed substitutions will not be made until receipt of satisfactory comparison tabulation.
2. Provide calculations and other detailed data justifying how items proposed as substitution were selected for proposal. Data must be complete enough to permit detailed comparison of every significant characteristic for which the specified item was analyzed during design.
3. It shall be the responsibility of the Contractor to provide adequate information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be reviewed, and re-submittal of same will not be allowed.
4. The Contractor shall provide or perform tests required by Engineer for purpose of judging acceptability of proposed substitutions.
5. The Contractor assumes full responsibility that alternate items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures to ensure that the Contractor has considered all of the proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications, or which indicate proposed alternates that were selected without proper regard to the requirements of the job will not be approved. No more than one proposed alternate will be considered for each item.
6. Alternate items installed without Engineer's approval will be replaced with specified items at Contractor's expense.
7. The Owner or their authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures, or materials. Decisions of the Owner or that of their representative shall be final and conclusive.
8. Submittal of substitutions shall be limited to one proposal for each type or kind of item, unless otherwise permitted by the Owner's Representative. If first proposed product submittal is rejected, Contractor shall submit the first-named or scheduled product.

9. Contractor shall be responsible for all costs and coordination due to the substitution, such as impacts on electrical requirements, weights, openings in slabs and roofs, structural framing, housekeeping pad size, etc.
10. All costs incurred to revise the contract drawings by the Engineer for re-submittal to the building department or Authority Having Jurisdiction, indicating the as-installed condition, shall become the responsibility of the Contractor.

1.17 RECORD DRAWINGS

- A. Record of Job Progress: Keep an accurate dimensional record of the "As-built" locations of all work as required. This record shall be kept up to date on prints as the job progresses and shall be available for inspection at all times. In addition, record drawings are to be used by the Owner's Representative for job review and field inspections.
 1. Where enlarged plans are provided in the construction set, contractor markups shall be kept on the enlarged plans.
- B. "As-Built" documentation shall be transmitted to the Owner within ten (10) days after Owner Representative's acceptance of the completed installation. As-built documentation shall include the following (Unless noted elsewhere, furnish number of copies indicated):
 1. PDF of as-built documents. One (1) copy of final AutoCAD drawing files shall also be provided on CD disk.
 2. Four (4) sets of manufacturer's literature and data updated to include submittal review comments and any equipment substitutions.
 3. Four (4) sets of operation and maintenance data updated to include submittal review comments and any equipment substitutions.
 4. Manufacturer's literature, reports and operation and maintenance data shall be in a labeled three (3) ring binder.
- C. Submit in accordance with Section 01 72 00 Project Record Drawings and Section 01 72 50 Electronic Documentation of Project.

1.18 OPERATION AND MAINTENANCE DATA

- A. The installing contractor shall provide:
 1. All literature and instructions provided by the manufacturer describing proper operation and maintenance of any equipment and devices installed.
- B. Data shall include but is not limited to the following: list of all equipment with manufacturer's name, model number, local representative, service facilities and normal channel of supply for each item. O&M manuals shall be bound in a three (3) ring binder, with table of contents and tab set for each system. "Operation and Maintenance to match "Product Submittals".
 1. System Description: Description of start-up and operating procedures.
 2. Controls: Diagrams and description of operating sequence of each system.
 3. Equipment: Manufacturer's brochures, ratings, certified shop drawings, lubrication charts and data, parts list with parts numbers. Mark each sheet with identification number and actual installed condition.

4. Materials and Accessories: Manufacturer's brochures parts lists with part numbers and lubrication data where applicable. Mark each sheet with equipment identification number or system and location of installation; and to specifically identify which options are provided (in case where data sheet shows multiple options).
5. Certificate of factory tests and code compliance as specified.
6. Recommend preventive maintenance schedule and procedures.

PART 2 - PRODUCTS

2.1 PLUMBING FIXTURES AND TRIM

- A. Refer to plumbing fixture schedule in construction documents for fixture specifications.
 1. Fixtures and equipment shall be certified by the State Authorities and comply with the efficiency standards and water usage requirements of State and Local Authorities.
- B. General: Provide factory fabricated fixtures of type, style and material indicated.
 1. Plumbing Fittings, trim and accessories:
 - a. Water Outlets: At locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valves or dispensing devices of type and size indicated. Include manual shutoff valves and connecting stem pipes to permit outlet servicing without shutdown of water supply piping systems. Stop valves shall be provided at each fixture.
 - b. Vacuum Breakers: provide with flush valves and water outlets equipped for hose attachment.
 2. Provide materials which have been selected for their surface flatness and smoothness. Exposed surfaces which exhibit pitting seam marks, roller marks, foundry sand holes, stains, discoloration, or other imperfections on finished units are not acceptable.
 3. Where piping, fittings, trim and accessories are exposed or semi-exposed provide bright chrome plated or polished stainless-steel units. Provide copper or brass where not exposed.
 4. Escutcheons: Where fixture supplies and drains penetrate walls, provide chrome plated brass escutcheons. Provide box style escutcheons for p-trap penetrations.
 5. Stainless steel fixtures conforming to ANSI A112.19.3M. Type 302/304, hardest workable temper. Finish shall be No., 4, bright, directional polish on exposed surfaces, or as indicated.
 6. Vitreous China: White vitreous china unless otherwise noted. Fixtures conforming to ANSI A1 High quality, from fire cracks, spots, blisters, pinholes and specks; glaze exposed surfaces, and test for crazing resistance in accordance with ASTM C-554.
 7. Traps: Lavatory and sink p-traps shall be commercial grade, chrome plated cast brass body with cleanout, with 17-gauge brass adjustable wall bend, cast brass nipple, 17-gauge tube, and cast brass slip nuts. No reducing washers allowed. Trap shall be provided with forged brass with brass box style escutcheon. Traps to have a 2" water seal and rough-in complete. Trap adapter extensions are not allowed. Trap shall be by CSA or other recognized testing authority and bear manufacturers name. Brasscraft Commercial, McGuire, or Zurn Commercial.
 8. Lavatory and sink water supply shall be heavy duty commercial grade and include chrome plated all-brass stops with all-brass stem (no plastic stems allowed) and loose-key handle. Kits shall have chrome plated flexible copper risers and deep forged brass with setscrew flange and have EPDM washers. Inlet shall be IPS with chrome plated nipple. Supply riser

lengths to conform to fixture manufacturers recommended rough-in dimensions. Outlets shall be compression. Stops shall be certified to 200psi line pressure. Supply kit shall be certified by CSA or other recognized testing authority, bare manufacturers name and comply with the SDWA (Safe Water Act) "No Lead" restrictions AB1953. Supply kits shall be Brasscraft Commercial, McGuire, or Zurn Commercial.

9. Lavatory grid drains to have chrome plated cast brass strainer (with overflow for lavatories with overflow drains) with brass lock nut. Drain tailpiece shall be seamless brass tube and a 6" long. Provide offset type for ADA accessible fixtures. Grid drain shall be certified by CSA or other recognized testing authority. Drain body shall bear manufacturers name so as to be visible after installation.
10. Product submittals for p-traps and lavatory grid drains shall include documentation that product is CSA listed or other recognized testing authority.
11. Water Connections: Shall have rigid metal to metal connections. Slip joints utilizing non-metallic washers are not permitted. All fixtures shall have stops or valves. All stops shall be lock-shield type, unless otherwise noted.
12. Provide Schedule 40 red brass nipples at copper lines serving fixtures. Galvanized nipples are not allowed.
13. Fixture Supports:
 - a. Carriers: Fixture supports for all off-floor plumbing fixtures conforming to ANSI A1 Provide floor mounted commercial grade cast-iron supports for fixtures of either graphitic gray iron, ductile iron, malleable iron, or steel as indicated. Carriers for water closets shall be rated to support loads of up to 500 lbs. Submittals indicate that water closet carriers can meet this requirement. Provide cast iron nipples and couplings for water closets and urinals. ABS is not acceptable. Carriers shall be manufactured by J.R. Smith or Zurn.
 - b. Backing: For fixtures other than those specified or required to be furnished with carriers, 1-1/4" x 6" wide steel flat plate welded to steel studs or secured to brick or concrete, drilled and tapped to match hanger. Also install backing where bottom of fixture meets wall. Bolt fixtures to backing through holes in fixture casting.
14. Fixture Bolt Caps: Provide manufacturer's standard exposed fixture bolt caps finished to match fixture finish.
15. Flush Valve Supports: All flush valves shall be installed to prevent movement. Supply pipe serving flush valves shall be installed with Holdrite #102-26 flush valve support (#114-C for wall mounted water closets). Supply pipe to be soldered to the support.
16. Accessible Fixtures
 - a. All exposed lavatory and sink trim under the fixture on wheelchair accessible fixtures shall be covered with a white anti-microbial vinyl insulating outer shell. Material shall be flame retardant and fungal and bacterial resistant. Insulating kits shall include covers for drain tailpiece, drain offsets, all p-trap components and hot and cold-water supplies including supply risers. Insulation kits shall be Truebro Lav Guard 2, or equal.
 - b. Shall meet the requirements of the Americans with Disabilities Act (ADA).

2.2 STORM, SOIL, WASTE & VENT PIPING SYSTEMS

- A. Above and Below Ground: No-hub cast iron soil pipe and fittings manufactured from gray cast iron with a tensile strength of not less than 21,000 psi, bituminous coated interior and exterior, conforming to the requirements of ASTM A888 and CISPI Standard 301. Each length of pipe shall be hydrostatically (water) tested by the manufacturer to verify compliance. All pipe and

fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute and listed by NSF international. All pipe and fittings shall be of the same manufacturer.

- B. Above and Below Ground: Schedule 40 ABS plastic DWV (or Schedule 40 solid wall PVC only is requested in writing from the Owner) with solvent cement fittings.

1. Underground plastic DWV piping systems shall be installed per ASTM D2321.

- C. No Hub Couplings:

1. Above Ground: No-hub couplings shall comply with CISPI 310 and bear the NSF trademark. No-Hub couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a 3/8-inch socketed torque wrench. The clamps shall be tightened to a minimum of 80-inch pounds. (Single corrugated shield, 4 band 80-inch pound torque or 2 band 80-inch pound torque minimum). The gasket material shall be neoprene rubber meeting the requirements of ASTM C-564. Submittal to include copy of compliance to the requirements of FM 1680 Class I by certified independent third-party testing laboratory. No-Hub couplings shall be Husky SD2000 or Clamp-All High Torq 80. No coupling reducing fittings allowed.
2. Below Ground: No-hub couplings shall comply with CISPI 310 and all requirements of Factory Mutual 1680 Class I, 15 PSI rated pressure. No-Hub couplings shall be constructed of Type 304 stainless steel with 305 stainless steel worm drive screws. The worm drive clamps shall have a hexagon head to accept a 3/8-inch socketed torque wrench. The clamps shall be tightened to a minimum of 80-inch pounds. (Single corrugated shield, 4 band 80-inch pound torque or 2 band 125-inch pound torque minimum). The gasket material shall be neoprene rubber meeting the requirements of ASTM C-564. Submittal to include copy of compliance to the requirements of FM 1680 Class I by certified independent third-party testing laboratory. No-Hub couplings shall be Husky SD4000 or Clamp-All High Torq 125. No coupling reducing fittings allowed.

2.3 DOMESTIC HOT AND COLD-WATER PIPING SYSTEMS

- A. Above Ground:

1. Copper Tube: Type 'L', hard-drawn temper, ASTM copper tubing with ANSI B16.22 wrought copper sweat type fittings or copper pressure seal fittings. Pipe shall be NSF 61 Certified and bear the NSF Certification mark. Submittal to include that pipe is NSF 61 certified.
2. Solder for Copper Piping: Lead-free, antimony-free, cadmium-free, non-toxic solder, 95.5% tin, 4% copper and 0.5% silver. Engelhard 100, or equal.
3. Mechanically formed tee fittings are not acceptable.
4. Fittings: Wrought copper or cast brass solder sweat type. Elkhart EPC or equal
5. Copper Pressure-Seal-Joint Fittings:
Basis-of-Design Product: Subject to compliance with requirements, provide products by Elkhart Products Corporation, Apollo Xpress, Apollo Press, made in USA, no equal
For Types K, L, and M hard copper tubing NPS 1/2 to NPS 4 and soft copper tubing in NPS 1/2 to NPS 1-1/4.
Housing: Copper or bronze.
Sealing Element: EPDM.

Multiple leak path detection system.

IAPMO PS-117.

Tools: Manufacturer's special tools.

Maximum 200 psig (1379 kPa) working pressure.

Maximum temperature rating at 250 deg F (121 deg C).

Maximum test pressures at 600 psig (4136 kPa).

Fittings for NPS 2 (DN 50) and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Cast-bronze or wrought-copper with stainless-steel grip ring and EPDM-rubber, O-ring seal in each end.

B. Below Ground:

1. Tube Size 3" and Smaller: Copper tube; Type "K", hard-drawn temper; wrought-copper fittings, brazed-joints, long radius elbows. Pipe shall be NSF 61 Certified and bear the NSF Certification mark. Submittal to include documentation that pipe is NSF 61 certified.
2. Piping below building floor shall be Type "K" soft annealed copper tubing with no fittings below the slab.
3. Solder for Copper Piping: Lead-free, antimony-free, cadmium-free, non-toxic solder, 95.5% tin, 4% copper and 0.5% silver. Engelhard 100, or equal.
4. Trap primer: use plastic-coated tube, Streamline 'PlumbShield' or equal plastic-coated Type K tubing. Comply with manufacturer's installation instructions.
5. Provide concrete thrust blocks at all changes in direction, changes in size, stops and dead ends, and at valves where thrusts may be expected.

2.4 CONDENSATE PIPING SYSTEMS

- A. Copper Tube: Type 'M', hard-drawn temper, ASTM copper tubing with ANSI B16.22 wrought copper sweat type fittings. Pipe shall be NSF 61 Certified and bear the NSF Certification mark. Submittal to include that pipe is NSF 61 certified.
- B. Solder for Copper Piping: Lead-free, antimony-free, cadmium-free, non-toxic solder, 95.5% tin, 4% copper and 0.5% silver. Engelhard 100, or equal.
- C. Schedule 80 CPVC DWV piping, and fittings installed per ASTM F439.
- D. For all high efficiency condensing equipment: Schedule 40 PVC upstream of Heat Transfer Products model N110 inline condensate neutralizer and type "M" copper downstream. Neutralizer to be located at equipment condensate drain outlet.
- E. For connections to equipment on vibration isolators provide flexible connector after trap.

2.5 INDIRECT WASTE PIPING SYSTEMS

- A. Pipe size 1" and smaller: ASTM B88 DWV copper pipe and fittings.
- B. Pipe size 1-1/4" and larger: ASTM B306 DWV copper pipe and fittings.
- C. Solder for Copper Piping: Lead-free, antimony-free, cadmium-free, non-toxic solder, 95.5% tin, 4% copper and 0.5% silver Engelhard Silvacore 100, or equal.

2.6 DRAINS

- A. Conforming to ANSI A1.
- B. Coated cast iron body, except as noted, with integral double drainage flange, weep holes and inside caulked bottom or no-hub outlet.
- C. Provide cast iron P-trap at all floor drains, floor sinks and trench drains. All floor drains to have trap primers.
- D. Coordinate drain, area drain, trench drains, and floor sink rim elevations to be flush with finish floor and at low point of floor.

2.7 TRAP PRIMER VALVES

- A. Corrosion resistant brass containing no springs or diaphragms, activated by a 5 to 10 psi pressure drop, provide with distribution unit where serving 2 to 4 drains, ASSE 1018 certified and Listed with Precision Plumbing Products Model P-1 & P-2 with DU Series distribution unit, or equal.
- B. Provide trap primers for all floor drains including piping floor drain to trap primer valve. Provide shut-off valve upstream of trap primer valve.
- C. When concealed, provide access panel for maintenance or replacement. Use size appropriate for access.

2.8 CLEANOUTS

- A. Conforming to ANSI A112.36.2. Cleanouts shall be manufactured by J.R. Smith or Zurn.
- B. Cast bronze, full size up to four inch.
- C. Floor Cleanouts: J.R. Smith Fig. 4026-U-F-C, coated cast iron adjustable floor cleanout with inside caulk connection, flange with flashing clamp, internal bronze plug, scoriated round nickel bronze cover secure to rim with vandal-resistant screws.
- D. Wall Cleanouts: J.R. Smith fig. 4422C-U and fig. 4532S-U, cast bronze taper thread plugs with stainless steel cover and vandal-resistant screws. Screw length as required meeting installation requirements. Wall cleanouts shall be located a minimum of 18" above finished floor.

2.9 VALVES

- A. General:
 - 1. All valves used for domestic water shall meet the criteria of California AB1953 low lead provisions.
 - 2. Provide all valves of first quality of approved manufacturer, have proper clearances, and be tight at the specified test pressure. Mark on each valve the maker's name or brand, the figure or list number, and the guaranteed working pressure cast on the body and cast or stamped on the bonnet or provided with other means of easy identification.
 - 3. All valves must be of the product of one manufacturer, except for special application. Figure numbers of manufacturers are listed to indicate the types selected for design, performance and standard of quality and appearance.

4. Valve Design: Rising stem or outside screw and yoke stems. Non-rising stem valves may be used where space conditions prevent full extension of rising stems. Provide Class 150 valves meeting the valve specifications where Class 125 valves are specified but are specified but are not available.
 5. Sizes: Same size as upstream pipe, unless otherwise indicated.
 6. Operators:
 - a. Hand wheels fastened to valve stem for all valves other than quarter turn.
 - b. Lever handles on quarter-turn valves, 6 inch and 8 inch and larger gear operated, except for plug valves. Provide plug valves with square heads and operating wrench. Provide gear operator for valves 8 inch or larger.
 7. Extended stems: Where insulation is indicated, or specified, provide extended stems arranged to receive insulation. Therma-Seal thermal insulating tee-handle to be used on 2 ½" and smaller ball valves.
 8. End Connection: Valves 2" and under shall be sweat, press, or threaded, 2-1/2" and larger shall be flanged or full lug style.
 9. Figure numbers of manufacturers are listed to indicate the types selected for design, performance and standard of quality and appearance.
- B. Ball Valves: MSS SP-110; rated for 150 psi saturated steam pressure, 600 psi WOG pressure; full port, two or three-piece bronze body construction, bronze alloy shall be bismuth, chrome plated solid bronze ball with slot venting for steam service, blowout proof stem, reinforced "Teflon" seat and seals, separate adjustable packing gland and nut, and vinyl covered steel handle. Provide locking type handle where required. Where valve actuation is required valve ball and stem shall be stainless steel.
1. Valves 2" and Smaller: Apollo 77CLF-100A/77CLF-200A, Nibco T/S-685-80-LF, Watts Series LFB6080/LFB6081 or equal.
 2. Valves 2-1/2" and Larger: Use butterfly valve.
- C. Butterfly Valves: MSS SP-67; rated at 200 psi, body conforming to ASTM A 126, Class B. Provide full lug style valves with field replaceable EPDM phenolic backed sleeve, aluminum bronze disc, stainless steel stem, and EPDM O-ring stem seals. Provide lever operators with locks.
1. Apollo LD-141, Nibco LD-2000, Watts Model BF03-121-45/BF03-121-4G or equal.
- D. Check Valves:
1. Swing Check Valves: 2" and Smaller: MSS SP-80; Class 125, 200 psi WOG, cast-bronze body and cap conforming to ASTM B 62; with horizontal swing, Y-pattern, and bronze disc. Provide valves capable of being refitted while the valve remains in the line.
 - a. Apollo 163LF T/S, Nibco T/S-413-Y-LF or equal.
 2. Swing Check Valves: 2-1/2" and Larger: MSS SP-71; Class 125, 200 psi WOG, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal wing, and bronze disc or cast-iron disc with bronze disc ring, flanged ends. Provide valves capable of being refitted while the valve remains in the line.
 - a. Apollo 910FLF-A, Nibco F-918-N or equal.
 3. Lift Check Valves: 2-Inch and Smaller: Class 125; cast-bronze body and cap conforming to ASTM B 62; horizontal or angle pattern, lift-type valve, with stainless steel spring,

bronze disc holder with renewable "Teflon" disc. Provide valves capable of being refitted and ground while the valve remains in the line.

a. Nibco or equal.

4. Non-Slam Check Valves: Provide non-slam check valves on the discharge of pumps. Check valves to be silent closing, class 125, iron body, bronze mounted spring loaded center guide.

a. Valves 2" and Smaller: Apollo 61LF, Nibco T/S-480-Y-LF or equal.

b. Valves 2-1/2" and Larger: Nibco F-910-B or equal.

E. Water Pressure Relief Valves: Provide ASME labeled, bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, Wilkins No. P174A, Apollo 10-600, or equal.

F. Combination Pressure and Temperature Relief Valves: Provide ASME labeled, adjustable bronze spring and diaphragm combination pressure and temperature type with test lever and automatically reseating type thermostatic element, Relief valve shall be type as recommended by the water heater equipment manufacturer.

G. Balancing Valves: Fully assembled, forged brass body, 304 stainless steel parts, EPDM O-rings, 20 mesh stainless steel strainer, nickel-plated brass ball valve, 400 psi/250°F rated, accessible flow control cartridge, ports for testing, Griswold Isolator "R" Series, or equal.

H. Valve Box: Christy B03 reinforced concrete utility box with reinforced concrete lid. Provide steel, checker plate, traffic lids on all paved areas and walkways 5'-0" wide or greater.

2.10 WATER HAMMER ARRESTORS (SHOCK ABSORBERS)

A. Every effort shall be made by the contractor to alleviate hydraulic shock (water hammer). Should water hammer be present in the final installation and water hammer arrestors have not been installed as noted by this specification and all the authorities named within, it shall be the responsibility of the contractor to provide water hammer arrestors per this specification at no additional cost to the Owner.

B. Locate and size per Plumbing and Drainage Institute Manual WH-201.

C. Provide water hammer arrestors in water lines to equipment or fixtures having quick closing valves, flush valves, sensor operated metering faucets, mechanical metering faucets, foot pedal valves, knee operated valves, and any equipment that might produce water hammer.

D. Water hammer arrestors shall be certified by the Plumbing and Drainage Institute (PDI). Water arrestors shall have threaded stainless steel casing, partially filled with liquid and charged with gas as required for line pressure, stainless steel or neoprene bellows, J.R. Smith "Hydrotrol" or Zurn "Shocktrol".

E. When concealed, provide access panel for maintenance or replacement. Use size appropriate for access.

F. Provide 6" brass nipple at connections to copper lines.

2.11 CORROSION PROTECTION

- A. All buried copper and steel piping and fittings shall be cleaned, primed then protected by wrapping.
 - 1. Piping 3" and smaller: Prime pipe and machine wrap pipe using 50% overlap wrap, with polyvinyl chloride tape. Hand wrap fittings using 100% overlap wrap extending 6" beyond fitting onto wrapped pipe. Comply with tape manufacturer's installation instructions. Wrap pipe with 3M "Scotchrap 51" corrosion protection tape (20 mils thick) and pipe primer, or equal.
 - 2. Piping 4" and larger: Encase in 8 mil polyethylene tube encasements in accordance with ANSI/AWWA A21.5/C105 and manufacturer's instructions.
 - 3. All below ground metallic fittings, valves, flanges, bolts, shall be protected against corrosion as follows:
 - a. All metallic components as described above shall receive a heavy coating of "Henry's" oil base roof mastic, or equal.
 - b. After mastic coating is completed and inspected, wrap entire metallic component with a minimum of 10 mils. polyethylene wrap as manufactured by Visqueen or equal, overlapped 50% of the circumference and extended beyond ends of component as required for polyethylene to be secured to piping. The overlap seam shall be located to avoid material from entering the encapsulate area. The ends and seam of the of the polyethylene material shall be secured to the piping and sealed with 3M "Scotchrap 51" corrosion protection tape (20 mils thick) and pipe primer, and 2" wide pipe wrap sealing tape.
 - c. The mastic coating shall be inspected and approved prior to the finish application of the polyethylene material, which shall also be inspected.

2.12 PIPE SUPPORTS, ANCHORS, AND HANGERS

- A. Unless detailed on the drawings, all piping shall be supported with, B-Line, Grinnell, Super Strut, Tolco, or equal, pipe hangers and supports. All hangers and supports furnished for this installation shall be of one manufacturer. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide felt lined hangers for copper piping systems.
- B. Special pipe supports for piping in equipment and other locations where shown on drawings shall be constructed as detailed on drawings. Unless otherwise shown on drawings, support channels, frames, brackets, and legs of special supports shall be made of B-Line, Grinnell, Super Strut, Tolco, Unistrut, or equal channels, attaching clips, pipe clamps, and other required accessories. Piping installed within partitions and connected to plumbing fixture trim shall be securely attached to adjustable stud brackets, not more than 2-feet away from and on the inside of wall penetration.
- C. Hanger Rods: Hanger rod size shall be no less than the standard rod sizes listed on the MSSSP-69. Rods shall be steel rods, threaded at ends only with a minimum safety factor of 5 over the imposed load, Tolco Fig. 103, or equal. All thread rods are not acceptable. Provide rod stiffeners as required.
- D. Where beam clamps are used, provide beam clamp retaining strap.
- E. Powder-driven and explosive type fasteners are not allowed.

- F. Equipment Support Members: Install AISC steel beams to accommodate support for pipe and equipment from above when it is not practical to install concrete anchors.
- G. No metallic pipes shall have metal-to-metal contact with hangers, clamps, brackets, or any other pipe support, or be otherwise in direct contact with any part of the building structure.
- H. Finish of all pipe supports attachments, rods, hangers, etc., shall be galvanized or cadmium plated.
- I. Steel for Equipment Support: Support steel shall be of new material conforming to ASTM A36, latest edition. Brackets, supports, etc., fabricated from ferrous metal shall be hot dipped galvanized after fabrication. Steel hangers shall have a safety factor of 4.0 or greater.
- J. Miscellaneous Steel, Bolts, Nuts, Washers, Etc.: Miscellaneous steel angles, channels, brackets, rods, clamps, etc., shall be of new materials conforming to ASTM A36. All steel parts exposed to weather or where noted shall be hot dipped galvanized after fabrication.
- K. All bolts and nuts, except as otherwise specified, shall to ASTM "Standard Specifications for Low Carbon Steel Externally and Internally Threaded Standard Fasteners", Designation A307. Bolts shall have heavy hexagon heads, and nuts shall be of the hexagon heavy series. All bolts, washers, nuts, anchor bolts, screws, and other hardware, unless otherwise specified, shall be galvanized, and all galvanized nuts shall have a free running fit. Bolts shall be of ample size and strength for the purpose intended.
- L. Concrete Anchors:
 - 1. For New Concrete Slabs with Metal Decking: B-Line, Hilti, Red Head, or equal, steel deck inserts or wedge type expansion anchors.
 - 2. For New Concrete Floor or Base: B-Line, Hilti, Red Head, or equal, hook bolts, wedge type expansion anchors, or Deco adjustable concrete anchors.
 - 3. For Existing Concrete Slabs: B-Line, Hilti, Red Head, or equal, self-drilling concrete anchors. Locate anchors to clear rebar.
 - 4. Maximum loading on inserts and rods shall not exceed 75 percent of ratings.
 - 5. Powder actuated fastening systems will not be allowed.
- M. Insulated pipes shall be supported with Pipe-Shield, Inc., Model "CS-CW" unless otherwise noted, or equal, pipe hanger shield with waterproofed calcium silicate insulation encased in a galvanized-sheet metal shield completely around the pipe. Shield shall be 26 gauge for pipes up to 1", 22 gauge for 1-1/4" and 1-1/2", 20 gauge for 2" to 8" in size, and 16 gauge for 10" and larger. Insulation shall be same thickness as pipe insulation.

2.13 SEISMIC RESTRAINTS

- A. General Requirements: Seismic restraints shall be provided for all vibration isolated equipment, both supported and suspended, and all vibration isolated piping.
- B. Where anchorage details are not shown on the drawings, the field installation shall be subject to the approval of the mechanical engineer and the project inspector.
- C. All mechanical equipment shall be braced or anchorage to resist horizontal force acting in any direction using the following criteria:

1. The total design lateral seismic force shall be determined from ASCE 7 Section 13.3.1, California Building Code (CBC) 2019. Forces shall be applied in their horizontal directions, which result in the most critical loadings for design. The value of a_p (component amplification factor) and R_p (component of modification factor) of Section 13.3.1 shall be selected from Table 13.6-1, ASCE 7. The value of I_p (seismic importance factor) and S_{DS} (special acceleration) shall be selected from Section 13.1.3 and Section 11.4.4, ASCE 7, respectively.

D. For Supported Equipment:

1. Pre-approved isolator restraint system by the State of California OSHPD and bear approval number.
2. Submittal shall include load versus deflection curves up to 1/2" in the x, y, and z planes. Tests shall be conducted in an independent laboratory or under the signed supervision of an independent registered engineer. The snubber assemblies shall be bolted to the test machine as the snubber is normally installed. Test reports shall certify that neither the bridge bearing neoprene elements, nor the snubber body has sustained any obvious deformation after release from the load.
3. Submit calculations for each seismic restraint and vibration isolation signed by structural Registered Engineer.

E. Seismic Restraint Systems for Piping:

1. Piping, ductwork, and electrical distribution systems shall be braced to comply with the forces and displacements prescribed in ASCE 7-10 Section 13.3 as defined in ASCE 7-10 Section 13.6.8, 13.6.7, 13.6.5.6, and 2019 CBC Section 1616A.1.23, 16A.1.24, 1616A.1.25 and 1616A.1.26.
2. The bracing and attachments to the structure shall be detailed on the approved drawings or they shall comply with one of the OSHPD pre-approval of manufacturer's certifications (OPM) as modified to satisfy anchorage requirements of ACI 318-14 Chapter 17.
3. Copies of the OPM manual(s) shall be on the jobsite prior to the start of hanging and bracing of the ductwork and pipe distribution systems.

2.14 PIPE ISOLATION

- A. All piping which is not isolated from contact with the building by its insulation shall be installed with a manufactured type isolator. Isolators shall be B-Line "Vibra Clamp" and "Vibra Cushion", Super Strut, "Trisolator", or equal. Piping shall be installed and supported in a manner to provide for expansion without strains. Guides shall be properly installed to ensure this requirement.
- B. Provide pipe and sound isolation for all piping through walls, Acoustoplumb by LSP Products, Holdrite Silencer by Hubbard Enterprises, or equal.

2.15 PIPE INSULATION

- A. General: Conform to NFPA Section 90A, with special regard to the fire hazard requirements of ASTM E84 and NFPA No. 255, latest revision, including vapor barriers and adhesive. All insulation shall be UL listed and shall meet all code requirements, minimum California State Energy Code Title 24. Insulation shall be Owens Corning, Johns-Manville, or equal.

- B. Fire Hazard Rating: Insulation, jackets, facings, adhesives, coatings, and accessories shall be acceptable to the Fire Marshal, and shall not exceed the following fire hazard classifications: Flame-spread: Maximum 25, Fuel Contributed: Maximum 50, Smoke Developed: Maximum 50. Rating to be in accordance with UL Test Method for Fire Hazard Classification of Building Materials, No. 763.
- C. Domestic Cold, Hot Water, Hot Water Return: Fiberglass, Heavy Duty 25ASJ/SSL, heavy density, UL listed non-combustible fiberglass segmented pipe insulation with an integral vapor barrier jacket. The jacket shall have a pressure sealing lap adhesive. Insulation density shall be between 4 and 7 PCF. Insulate cold water piping in concealed areas and warm (heated) areas with minimum insulation. Insulate exterior cold water piping with 1" insulation. Insulation for hot water shall comply with California Title 24 requirements. Required thickness shall be a function of the pipe size as indicated below.
- D. Indoor Piping -Fluid Temperature Range (105°F and Above):

Pipe Diameter	Insulation Thickness
1" and smaller	1"
Up to and including 2"	1.5"
2-1/2" and larger	1.5"

- E. Outdoor Piping -Fluid Temperature Range (105°F and Above):

Pipe Diameter	Insulation Thickness
1" and smaller	1"
Up to and including 1"	1.5"
1-1/4" and larger	2"

- F. Condensate Drain, Storm Drain and Overflow Drain: Fiberglass, Heavy Duty 25ASJ/SSL, heavy density, UL listed non-combustible fiberglass segmented pipe insulation with an integral vapor barrier jacket. The jacket shall have a pressure sealing lap adhesive. Insulation density shall be between 4 and 7 PCF. Insulate horizontal storm drain and overflow drain lines, elbows up to roof drain body, and roof drain bowls with a 1" thick insulation. Insulate all condensate drains with a minimum of 1/2" thick insulation.
- G. Insulate fittings, valves, joints, expansion joints, and couplings with insulation of same material and thickness as adjoining pipe. Use pre-molded fiberglass covers or radical mitered segments of pipe insulation. For valves, expansion joints, fittings and accessories requiring servicing or inspection, insulation shall be removable and replaceable without damage. Enclose within two-piece no. 15 gauge aluminum covers fastened with cadmium-plated bolts and nuts. Concealed items shall be labeled. Unions and flanges, strainers, air chambers and water arrestors, need not be insulated.

- H. All insulation shall be continuous through walls, sleeves, pipe supports and hangers, and other pipe penetrations.
- I. Finish insulation at supports, protrusions and interruptions. No hangers or supports shall be embedded in insulation.
- J. For exterior applications and piping exposed to weather, provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover piping and all fittings with 0.016" aluminum or stainless-steel jacket (meeting ASTM B209) with moisture barrier, and with two 318" wide 0.015" thick aluminum or 0.010" thick stainless steel bands per 3 feet section (18" on center), completely watertight. Lap all joints 2" minimum and seal per manufacturer's recommendations. Locate seams on the bottom side of horizontal piping.
- K. All insulated piping drops exposed in finished areas shall be jacketed in stainless steel jacket, secured and sealed around pipe to prevent entrance of water during cleaning process.
- L. Insulated pipes shall be supported with Pipe-Shield, Inc., Series A-9000, or equal, pipe hanger shield with waterproofed calcium silicate insulation encased in a galvanized sheet metal shield completely around the pipe. Shield shall be 26 gauge for pipes up to 1-1/2", 22 gauge for 2", 20 gauge for 2-1/2" to 8" in size, and 16 gauge for 10" and larger. Insulation shall be same thickness as pipe insulation. Provide calcium silicate insulation with insulation protection saddles and shields at pipe hangers. Insert sections shall be installed on all insulated piping located centrally under each hanger where the insulation rests on hanger. Vapor barriers and jacketing continuous over insert.

2.16 ESCUTCHEONS, FLASHINGS AND SLEEVES

- A. Provide sleeves for each pipe passing through footings, foundations, walls, partitions, floors, roofs and other locations where needed, whether shown or not.
- B. Piping penetrating below grade exterior walls and floors, and floors in all food service areas including pantries, shall be sleeved and made watertight using Thunderline "Link Seal" sealer, or equal.
- C. Sheet metal pipe sleeves: Fabricate from galvanized sheet metal; round tube closed with snap lock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gauges: 3" and smaller, 20 gauge; 4" to 6", 16 gauge; over 6", 14 gauge. Adjustcrete, Sleevecrete, or equal.
- D. Set all pipe sleeves and inserts in place before concrete is poured. Coordinate the placing of these items to avoid delaying concrete placing operations.
- E. Sleeves for insulated piping shall be of adequate size to accommodate the full thickness of pipe covering with clearance for packing and caulking. Provide galvanized steel pipe sleeve, minimum 18 gauge, sized for maximum 1-inch space between insulation and sleeve. Omit specified insulation and apply same thickness of UL approved insulation through thickness of wall and extending 1" either side. Provide UL rated ceramic fiber packing. Pack space between sleeve and insulation with packing and seal ends with approved seal. Seal shall be positively fastened using metal plates, or escutcheons. Commercial pipe sleeve assemblies which are UL rated and which have been approved by the fire marshal for this purpose shall be used. Pipe Shields Inc. F1000

series or equal. Use only assemblies which have been designed for the service on which they are to be used.

- F. Caulk space between sleeve and pipe or pipe covering through rated walls, partitions, and floors with fire rated, incombustible, UL listed, permanently plastic, waterproof non-staining compound leaving a finished, smooth appearance. Fire stopping shall be in accordance with specification Section 07 84 13, Fire Stopping and Smoke Seals. Provide supporting backing to secure material in place.
- G. Provide sleeves as follows:

SLEEVE LOCATION	SLEEVE MATERIAL
Interior Wall, Partitions	Galvanized sheet metal
Membrane Waterproof Floor and Roof Construction	Standard weight black steel pipe with flashing clamp device welded or threaded to pipe sleeve. Flashing clamp device J.R. Smith 1720 or equal by Zurn
Non-membrane Floor Construction	Standard weight black steel pipe
Footings and Foundations	Schedule 40 galvanized steel pipe
Exterior Walls	Standard weight galvanized steel pipe with a continuously welded water stop of ¼" steel plate extending from outside of sleeve a minimum of 2" all around

- H. Escutcheons, Finish and Plates:
1. Smooth up rough edges around sleeve with plaster.
 2. Provide escutcheon plates where exposed pipes pass through walls, ceilings, or floors, in all finished rooms and conspicuous locations. Provide chrome or nickel plated plates sized to fit pipe and pipe covering and give a finished appearance. Escutcheons held in place by set screws allowing enough clearance to care for expansion and shall be sufficient size to cover the opening around the pipe. Provide plates on pipes extending through sleeves.

2.17 THERMOMETERS

- A. Type: Weksler Fill", or equal, industrial, green reading mercury glass tube, 9" cast of extruded case, double strength glass window, adjustable angle, stainless steel bulb chamber, brass extended separable socket. Provide stainless steel protected shield for outside application. Install for easy reading from floor with clear sight line.
1. Domestic Cold Water: Range of 0-120°F.
 2. Domestic Hot Water: Range of 30 -240°F.

- B. Separable Sockets: Brass 150 psi at with 2%" extension necks. Install vertically in runs of pipe.
- C. Thermometer Wells: Install in piping for all thermometers. Construct to withstand pressure, temperature, and fluid in which installed with extension necks. Install vertically in horizontal runs of pipe.
- D. For thermometers and wells through insulation, provide extensions to compensate for insulation thickness.

2.18 PRESSURE GAUGES

- A. Weksler, or equal, drawn steel or brass case, glass lens, 4½" dial, 1% accuracy, ANSI B40.1 Grade 2A, phosphor bronze, bourdon tube, brass bottom connection.
 - 1. Scale: White coated aluminum with permanently etched markings, black graduations and numerals, 270° arc scale.
 - 2. Range: Dial range approximately twice the working pressure.
- B. Provide pressure gauge cocks between pressure gauges and gauge tees on piping system.

2.19 VENT THROUGH ROOF

- A. Provide Stoneman No. 1100-5, one (1) piece, four (4) pound, series with reinforcing steel boot counter-flashed with cast iron flashing sleeve and equipped with vandal-proof hood for all vent piping. Seal joint between flashing and pipe with waterproofing compound.
- B. All vents through roof shall be provided with vent caps that have cast iron sleeve and dome secured with recessed Allen key set screws. Vent caps shall be manufactured by J.R. Smith or Zurn.

2.20 ACCESS DOORS AND PANELS

- A. Furnish under this Division where shown and required by Regulatory Agencies for access to all concealed valves, water arrestors, unions, etc. Doors shall be in accordance with requirements of Section 08 31 13. Doors in this Division, Section 08 31 13, and Division 26 shall be from same manufacturer for identical appearance and keying. Sizes: 24" x 24" inches' minimum for ceilings and 12" x 12" minimum for walls. Doors shall be furnished with cylinder locks. Furnish fire rated doors when located in rated construction. Deliver doors for installation under Section 08 31 13. Mark each door to accurately establish its location.

2.21 IDENTIFICATION OF PIPING AND EQUIPMENT

- A. Above ground piping:
 - 1. All piping is to be identified as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, pressure sensitive pipe markers consisting of pipe content wording and arrow indicating directions of flow on ANSI color background. Arrow and wording are two separate markers which shall be placed immediately adjacent to each other. Provide at each end of each marker, two and one-fourth inch wide self-sticking clear tape around periphery of pipe or insulation to further secure marker. All markers shall be applied to clean surfaces free of dust, grease, oil or any other material which will prevent adhesion. Install after

cleaning, painting and insulation is complete. Pipe identification shall comply with ANSI A13.1 for the "Scheme Identification of Piping Systems".

2. Location and visibility for pipe identification:
 - a. On all horizontal runs spaced twenty feet (20') maximum but not less than once in each room at entrance and exit of each concealed space.
 - b. At each branch and riser takeoff.
 - c. Within one foot (1') of each valve and control device.
 - d. At every change in directional flow.
 - e. At every pipe passage through wall, floor and ceiling construction.
 - f. Where capped piping is provided for future connections, provide legible and durable metal tags indicating symbol identification.
 - g. At all wall and ceiling access
 - h. Near major equipment items and other points of origination and termination.
 - i. Attention shall be given to visibility with reference to pipe markings. pipe lines are located above or below the normal line of vision; the lettering be placed below or above the horizontal centerline of the pipe.

3. ANSI Color Coding of Piping:

SERVICE	COLOR OF FIELD	COLOR OF TEXT
Domestic Cold Water	Green	White
Domestic Hot Water	Yellow	Black
Domestic Hot Water Return	Yellow	Black
Sanitary Sewer	Green	White
Sanitary Vent	Green	White
Condensate Drain	Yellow	Black
Storm Drain	Green	White
Storm Drain Overflow	Green	White

4. Size of Legend Letters:

OUTSIDE DIAMETER OF PIPE COVERING	MINIMUM LENGTH OF COLOR FIELD	MINIMUM SIZE OF TEXT
3/4" to 1-1/4"	8"	1/2"
1 1/2" to 2"	8"	3/4"
2 1/2" to 6"	12"	1 1/4"
8" to 10"	24"	2 1/2"
Over 10"	32"	3 1/2"

5. All exposed water piping and valves downstream of devices shall be properly identified and labeled as "Non-Potable" water.

B. Buried Utility Warning and Identification Tape:

1. All underground piping shall be identified with underground warning pipe markers as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, non-adhesive four (4) mil polyethylene plastic tape manufactured specifically for warning and identification of buried utility lines. Tape shall be of the type provided in rolls, six inches (6") minimum width, color coded for the utility involved, with warning identification imprinted in bold black letters continuously and repeatedly over entire tape length. Warning and identification for lines shall be "CAUTION (TYPE OF SERVICE) LINE BURIED BELOW". Code and letter coloring shall be permanent, unaffected by moisture and other substances contained in trench backfill material.
2. Run detector tape continuously along pipe and terminate in adjacent valve boxes or other suitable facilities. No splices will be allowed. Locate over buried pipe at twelve inches (12") below finish grade. Protect tape from damage during installation and Tape that is broken, cut or crumpled shall be completely replaced. Install twelve (12") above the top of the respective pipe and twelve (12") below the surface during backfill. Provide detectable type for buried non-metallic pipes.
3. ANSI Color Code of underground tape shall be as follows:

SERVICE	COLOR OF FILED	COLOR OF TEXT
Natural Gas	Yellow	Black
Water	Blue	Black
Sanitary Sewer	Green	Black
Storm Sewer	Green	Black
Electric	Red	Black

C. Valve Identification:

1. All valves shall have brass identification tag as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, brass valve identification tag secured with brass chain and "S" hook. Tags shall bear the service identification and numerical identification of the valve.
2. Engrave identification tags with "normally open" (green) or "normally closed" (red).
3. Tags:
 - a. Minimum two inches (2") square pattern for plumbing and two inches (2") triangle for fire protection.
 - b. No. 18 BS gauge brass with stamped numbers and letters filled in with black enamel paint. Engraving, ink, dye and vinyl fill are not acceptable.
 - c. Identifying number and system letter. Top line shall be 1/4" characters and should abbreviate the service. Example: Hot Water – HW. The second line shall be characters and should list the valve number. Example: 1st floor shall begin 101, second floor begin 201.
 - d. Attach 6"-12" of brass jack chain around bonnet or stem of the valve in a way that it cannot accidentally come off. Attach appropriate size brass "S" hook to the chain in the most conspicuous location. Hang valve tag from the "S" hook. Valve tag should not be attached to the wheel causing interference with valve operation.
 - e. Provide on: All valves and controls.
4. Where shut-off valves are installed on-branch line leading to emergency safety equipment (emergency showers and eyewashes), the valves shall be locked in the open position labeled for identification.

D. Equipment Identification:

1. Provide engraved plastic nameplates on all plumbing equipment, including but not limited to the following: Pumps (all types), water heaters, heat exchangers, and tanks. Provide nameplates on each piece of equipment and at the disconnect, and the breaker. Nameplates shall conform to the following, provided the equipment accommodate the sizes outlined:
 - a. Black background with white lettering.
 - b. Sizes: Equipment 2" x 4", disconnect 1" x 2½", breaker 1" x 3".
 - c. Lettering shall be ¾" (¼" minimum) or sized for the maximum per nameplate.
 - d. Nameplate shall be provided with both adhesive backing and screw holes to insure permanent application.
 - e. Material shall be 2 ply 1/16" thick with beveled edges.
2. Properly identify each piece of equipment and controls pertaining thereto by nameplates mounted on equipment and controls using round head brass machine screws, pop rivets or contact cement. Cardholders in any form not acceptable. Install with corrosion resistant mechanical fasteners and adhesive and seal with clear lacquer.
3. Place warning signs on machines driven by electric motors which are controlled by fully automatic starters, in accordance with Article 3281, General Industry Safety Orders.
4. Small devices, such as pumps, may be identified with tags.
5. Identify control panels and major control components outside panels with nameplates.
6. Identify equipment out of view behind access doors, in unfinished rooms on the face of the access door.
7. All gas pressure regulators shall be identified with proper signs. The upstream pressure shall be identified with a metal tag permanently attached to the regulator and state (with appropriate wording to state actual gas pressure conditions): 5psig natural gas pressure. DO NOT REMOVE, or similar.
8. Emergency Safety Equipment: Emergency units shall be with highly visible signs in accordance with ANSI 2358.1 and shall comply with the provisions of ANSI 2535.1 through ANSI 2535.5. Signs shall utilize a white background with green lettering. Graphics and lettering shall be of the correct size and format. Signs shall be furnished by manufacturer of the safety equipment and shall be in accordance with manufacturer's instructions and ANSI standards.
9. At plumbing fixtures where water exceeding 120 degrees is accessible to users, warning signs with letters at least 2 inches high shall be posted above the fixture. Sign shall have "Danger Hot Water/Tap Symbol" in warning triangle and the words "Danger Hot Water, Use with Caution, Can Cause Severe Burns". Sign shall be approximately 12"high by 8" wide Semi-Rigid PVC and color shall be on White.

E. Valve and Equipment Identification Charts:

- F. Provide five typewritten schedules giving numbers, service and locations, and notations of open or closed, of all tagged valves. Enclose each schedule in separate transparent plastic binder. List piping systems with symbol and color coding on pipe identification chart. List valve model numbers and symbol for service corresponding to piping symbol on valve identification chart. Provide small "key plan" identifying valves as related to column lines. Schematic flow diagrams of each piping system indicating:

1. Location and function of each tagged valve.
2. Type, size and essential features of each system.

- G. Submit drafts of valve schedule for review before preparing final sets.
- H. Frame five copies of reviewed schedule under glass, mount where directed.
- I. Provide typewritten list of equipment in triplicate, indicating location, service for each piece of equipment, suitably framed, with glass front.

2.22 STRAINERS

- A. Wye type, with Monel or stainless-steel strainer cylinder and gasketed machined strainer cap, bronze body, threaded, 250 pound, Apollo 59 Series, or equal.

2.23 FLEXIBLE CONNECTORS

- A. All equipment, either rigidly mounted or mounted on vibration isolators, shall be attached to the piping system using flexible connectors designed for seismic movement. Flexible connectors shall be capable of movement in the $\pm X$, $\pm Y$ and $\pm Z$ planes and must completely isolate the equipment from the piping.
- B. Materials of construction and end fitting type shall be consistent with pipe material and equipment/ pipe connection fittings. For potable water service, connectors shall be classified in accordance with 61-1977 standards.
- C. Flexible connectors attached to fuel gas lines, shall be specifically manufactured for gas applications and certified by the American Gas Association.
- D. Flexible connectors shall be flexible corrugated hose and braid, stainless steel, rated, 125psig minimum, 150 lb flange for pipe sizes 2-1/2" and larger and threaded ends for 2" and smaller, as manufactured by Dormont Manufacturing Co., or equal. Provide flexible metal hose assembly as shown on the drawings.

PART 3 - EXECUTION

3.1 DRAWINGS AND SITE

- A. Drawings:
 1. All scaled and figured dimensions are approximate and are given for estimate purposes only. Before proceeding with any work, carefully check and verify all dimensions, sizes, lengths, etc.
 2. So far as possible the work has been on the drawings in such positions as to suit and accommodate the work of the other trades, but the work as indicated is largely diagrammatic and is shown primarily for clarity. Contractor is responsible for the correct placing of their work and the proper location and connection of work in relation to the work of other trades.
 3. Where apparatus and equipment have been indicated on the drawings, dimensions have been taken from typical equipment of the class indicated. Carefully check the drawings to see that the equipment will fit into the spaces provided.
 4. Where equipment is furnished by others, verify dimensions and the correct locations of this equipment before proceeding with the roughing-in of connections.

5. Contact Owner's Representative before any digging and investigate all existing conditions. Secure permit from Owner's Representative prior to initiation of underground excavation.

3.2 GENERAL PIPING INSTALLATION

- A. Carry all exposed and concealed horizontal lines of pipe on specified hangers properly spaced and set to allow the pipe to adjust for expansion and contraction. Use trapeze hangers for supporting groups of pipes. Piping in parallel shall be evenly spaced and supported.
- B. Conceal all piping in furred walls and partitions and pipe spaces except where specifically noted otherwise. Check all piping runs beforehand with all other trades. Run piping to maintain proper clearance for maintenance and to clear opening in exposed area. Run piping in strict coordination with mechanical piping, ducts, and equipment, plumbing work, all electrical conduit and equipment, structural, and architectural conditions. Where work of other trades prevents installation of the piping as shown on the Drawings, reroute piping at no extra cost. Verify all inverts in pitched lines before starting work.
- C. Install all exposed piping parallel to or at right angles with building walls and tight to walls or ceilings wherever possible, except where otherwise shown on the Drawings.
- D. No valve and no piece of equipment or trim shall support the weight of any pipe.
- E. Support all pipe from the building structure so that there is no apparent deflection in pipe runs. Fit piping with steel sway braces and anchors to prevent vibration and/or horizontal displacement under load when required. Do not support pipe from or brace to ducts, other pipes, conduit, or any materials shown on the Drawings. Piping or equipment be immobile and shall not be supported or hung by wire, rope, plumber's tape or blocking of any kind.
- F. Install all piping free from traps and air pockets and true to line and grade.
- G. Wherever changes in sizes of piping occur, make such changes with reducing fittings, as the use of face bushings will not, in general, be permitted. Install eccentric reducing fittings where necessary to provide free drainage of lines.
- H. Furnish and install insulating unions or insulating flanges as hereinbefore specified at all connections of ferrous and non-ferrous piping.
- I. Fire-stop all pipes penetrating fire rated construction in accordance with specification Section 07 84 13, Fire Stopping and Smoke Seals.
- J. No cutting or drilling of structural members shall be done without prior written approval of structural engineer.
- K. Rough-In Work: Proceed as rapidly as the building construction will permit. All piping shall be completed, tested and approved before being enclosed.
- L. Thoroughly clean piping before installation. Cap all pipe openings to exclude dirt until fixtures are installed and final connections are made.
- M. Provide a drip at any point in the gas lines where condensate may collect. All drips shall be readily accessible to permit cleaning or emptying.

- N. Show no tool marks or threads on exposed plated, polished, or enameled connections to fixtures.
- O. Provide each connection to faucet or fixture with an air chamber, eighteen inches (18") long, placed in a vertical position and one (1) pipe size larger than the pipe served.
- P. Pitch: Horizontal sanitary and storm drain piping shall be installed at a uniform grade of not less than one-fourth inch ($\frac{1}{4}$ ") per foot, unless otherwise indicated or directed.
- Q. Contraction and Expansion: Install all work in such a manner that its contraction and expansion will not do any damage to the pipes, the connected equipment, or the building. Install offsets, swing joints, expansion joints, seismic joints, anchors, etc., as required to prevent excessive strains in the pipe work. All supports shall be installed to permit the materials to contract and expand freely without putting any strain or stress on any part of the system. Provide anchors as necessary.
- R. Equipment and Fixtures Furnished under other Sections: For rough-ins and connections to fixtures and equipment furnished under other sections, ascertain exact sizes, services and locations before starting work. Verify accuracy of work shown on drawings before starting work. Contractor is responsible for providing proper installation. Provide proper prevention on all hot and cold-water service.
- S. All piping shall be installed within designated finished and open ceiling heights as noted on the architectural drawings.
- T. Coordinate the installation of access panels with the equipment or valve being served. Valves and equipment located in ceiling spaces shall be accessible and located no more than 2'-0" above the access panel and within arm reach. Distances greater than 2'-0" only allowed when it is not possible to meet the 2'-0" requirement. Approval from the Owner's representative shall be obtained for such installations.
- U. Provide membrane clamping device for all piping drains and hose bibbs passing through any waterproof membrane.
- V. Powder actuated fastening systems will not be allowed. Embeds, beam clamps, or drilled fasteners will be required, unless otherwise noted. Earthquake bracing shall be required for all piping.
- W. All piping into stem walls and footings shall be double half lap wrapped with one-eighth inch ($\frac{1}{8}$ ") thick "Armaflex" insulation. The Contractor shall also provide blocked out areas in stem wall and footing as required for the installation of the piping. All piping shall avoid the lower eight inches (8") of the footing and the Contractor shall coordinate and provide dropped footings as required for the installation of the underground piping.
- X. All piping on roof shall be anchored to neoprene or close-cell polyethylene blocking with pipe straps. Blocking shall be set in mastic at 6'-0" on center.
- Y. Contractor shall verify and coordinate pipe routing with location of all electrical rooms, elevator equipment rooms, rooms, and other rooms dedicated to the housing of switchgear, panels, or other electrical equipment. In no case shall piping be installed within or above the ceiling of such rooms.
- Z. Provide pipe isolation for all piping through walls and floors. No piping shall have direct contact with walls, ceilings, floors, pipe supports, or hangers.

3.3 PIPE JOINTS

- A. Ream pipe ends to remove burrs, inspect each length of pipe carefully and remove all obstructions prior to fabrication.
- B. Screwed Piping: Cut with machine cutter, hand pipe cutter or carborundum pipe wheel with file or scrapper or pipe reamer. Do not ream to exceed I.D. of pipe and thread to requirements of ANSI B2.1. Use Teflon tape on male thread prior to joining other services. No more than two full threads shall remain exposed after joining. Teflon tape shall not be used on steam trap piping.
- C. Copper Tubing: Cut square; remove burrs and clean pipe and inside of fitting to a bright finish with steel wool, wire brush, sandpaper or emery cloth. Apply solder flux with brush to tubing. Remove internal parts of solder-end valves prior to soldering. Provide dielectric unions at points of connection of all copper tubing and any ferrous piping and equipment.
- D. Threaded Joints: Use threaded joints for natural gas pipes of size 2 inches and smaller. Where possible use pipe with factory-cut threads, otherwise cut pipe ends square, remove all fins and burrs, and cut taper pipe threads per ANSI B2.1. Threads shall be smooth, clean, and full cut. Apply thread tape to male threads only. Work piping into place without springing or forcing. Backing off to permit alignment of threaded joints will not be permitted. Engage threads so that not more than two threads remain exposed. Use unions for connections to valves for which a means of disconnection is not otherwise provided.
- E. Press Joints: Press Installation Training Requirement

Installation training shall be provided on site by manufacturer personnel and documented with Engineer or safety director. Installation procedures, depth guides, and tool inspection shall be provided by manufacturer for all product types (steel or copper) for reference and safety assurance.
- F. Welded Joints: Use welded joints for natural gas piping of sizes larger than two inches and all fuel oil piping. Weld by the shielded metal-arc process using covered electrodes and in accordance with procedures established and qualified per ANSI B31.2. Each welder and welding operator shall be qualified for the ANSI procedures as evidenced by a copy of a certified ANSI B31.2 qualification test report. Contractor shall conduct the ANSI qualification test.

3.4 PIPE SUPPORTS

- A. Maximum hanger spacing and rod sizes for horizontal runs of piping shall be as noted in Table 3-1 & Table 3-2 of the California Plumbing Code.
- B. Every branch of piping over three feet (3') long shall have a separate hanger. Support at each horizontal branch connection. Provide at least one (1) hanger per branch.
- C. Support all suspended piping with clevis or trapeze hangers and rods.
- D. Hangers and supports shall be adequate to maintain alignment and prevent sagging and shall be placed within eighteen inches (18") of a joint. Support shall be provided at each horizontal branch

connection. Hangers shall not be placed on joints. Make adequate provision to prevent shear or twisting of the pipe or joint.

- E. Support for cast iron no-hub pipes shall be adjacent to joint, not to exceed eighteen inches. Provide hangers on the piping at each side of and within eighteen inches (18") of a no-hub pipe coupling so that the coupling will not bear any weight. Provide supports at every other joint, unless over four feet (4') then support on each side of the coupling within eighteen inches (18") of the joint. Hangers shall not be placed on the coupling. Provide hangers adequate to maintain alignment and prevent sagging of the pipe. Make adequate provision to prevent shear or twisting of the pipe or joint.

3.5 CLEANOUTS

- A. Size: Cleanouts of same nominal size as pipe they serve, except where they occur in piping four inches (4") and larger, in which case they shall be four inches (4") in size.
- B. Accessibility: Make all cleanouts accessible. Use graphite on all cleanouts with all-threads being thoroughly greased after acceptable pressure test.
- C. Cleanouts Locations:
 - 1. Where indicated on drawings and as noted. Exact locations as directed by the Representative.
 - 2. At all horizontal offsets.
 - 3. At ends of or storm drain lines more than five feet (5') in length.
 - 4. At one-hundred feet (100') maximum intervals on all or drain horizontal runs within the building lines.
 - 5. At base of all soil/waste stacks and storm drain lines.
 - 6. For cleanouts in finished portions of building, locations subject to Owner Representative's approval before installation.
 - 7. Do not locate floor and wall in patient rooms, electrical rooms and elevator machine rooms.

3.6 ROOF OPENINGS

- A. Flash each pipe extending through roof with properly sized lead flashing assembly. Make watertight. Install vent caps on all vents through roof.

3.7 PLUMBING FIXTURES INSTALLATION

- A. Installation: Set Fixtures level and in proper alignment with respect to walls and floors and sets of fixtures equally spaced. Install supplies in proper alignment with fixtures and with each other. Install flush valves in alignment with the fixture without vertical or horizontal offsets.
- B. Seals: Seal all wall and floor mounted fixtures watertight where fixture is in contact with wall or floors. Fill all cracks and open spaces between fixtures and wall or floor with non-elastomeric sealer. Seal fixtures to wall and floor surfaces with sealant as specified in **[Section 07 92 00]**, color to match fixture.
- C. Caulking: Caulk all deck mounted trim at the time of assembly, including fixture and casework mounted. Caulk all self-rimming sinks installed in casework.

- D. Trim: Make up trim with care and with the proper tools in order that no tool marks show after installation.
- E. Bolt carrier base supports to floor in accordance with manufacturer's installation instruction and recommendations.
- F. Water Closets and Urinals: Test and adjust all flush valves for water closets and urinals for proper flow. Bowls shall completely evacuate with a single flush. Splashing of water out of the bowl is not acceptable.
- G. Metered Faucets: Test and adjust all metered faucets for proper flow, duration of cycle.
- H. Extra Stock: Furnish special and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every ten (10) units.
- I. Installation of emergency safety equipment (emergency showers and eyewashes): Install emergency safety equipment in conformance with ANSI 2358.1-1998. Locate identification signs in accordance with this standard. Where shut-off valves are installed in the branch line leading to emergency safety equipment, the valves shall be indicating type (OS&Y or ball valve with lever handle), labeled for identification, and locked in the open position.

3.8 TESTING AND ADJUSTING

- A. Provide all equipment required for testing, including fittings for additional operating. Plumbing Inspector shall be present at time of testing.
- B. After the inspection has been approved or portions thereof, certify in writing the time, date, name and title of the person reviewing the test. This shall also include the description of what portion of the system has been approved.
- C. A complete record shall be maintained of all testing that has been approved and shall be made available at the job site.
- D. Upon completion of the work, all records and certifications approving testing requirements shall be submitted to the Owner's Representative before final payment is made.
- E. Defective work or material shall be replaced or repaired, as necessary, and the inspection and test repeated. Repairs shall be made with new materials. No caulking of screwed joints or holes will be acceptable.
- F. Protection: Isolate all equipment subject to damage from test pressure. Make no test against a service valve or meter.
- G. No part of any work shall be concealed or covered until after it is inspected, tested and approved by the Inspector. All piping for plumbing shall be completely installed and tested as required by the Plumbing Code. The test pressures indicated are a minimum only. All tests shall be as required by the governing authority as well.
- H. Sanitary Waste and Vent; Waste and Vent; and Drain Piping Systems: No-hub joints shall be tightened using a calibrated torque wrench. The water test shall be applied to the system either in its entirety or in sections. The piping shall be tightly plugged and submitted to a ten-foot (10')

head (4.3 psi) of water located at the highest point. Provide a separate standpipe above the highest point being tested or extend the system to obtain the required ten-foot (10') head of water. The water shall be kept for at least thirty (30) minutes before the inspection starts. System shall hold water four (4) hours. Coordinate test tees with wall construction. Test tees shall not interfere with construction. Testing with compressed air or gas is not recommended.

- I. Domestic Water: Test the system with water at a hydrostatic pressure of not less than one hundred twenty-five (125) psi. Provide a pressure gauge located at the highest point of the system being tested, with a shutoff valve and bleeder valve so arranged to check gauge operation. When the piping system operates at higher pressure than seventy-five (75) psi, the hydrostatic test pressure shall be fifty (50) psi above the operating pressure. The test shall be applied not less than 1 hour prior to inspection of all joints. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately as specified for the entire system. There shall be no drop at the end of four hours.
- J. Apply tests for a minimum period of four (4) hours or tests are complete.
- K. Work may be tested in sections, if necessary, for convenience. In this case, test of last section shall include connections between previously tested sections and section under test.
- L. Furnish all labor and all other utilities required to make tests. Make compliance tests in the presence of the Owner's Representative.
- M. Should any piece of equipment, apparatus, materials, or work fail in any of these tests, immediately remove and replace by perfect material, and retest the portion of the work replaced.

3.9 PIPE DISINFECTION AND CLEANING

- A. Supervision and Testing: Supervision and Testing: Perform disinfection under Plumbing Inspector's supervision. Disinfection shall be subject to written approval upon receipt of satisfactory laboratory test results.
- B. Contractor's Responsibility:
 - 1. Furnish labor, equipment, materials and transportation to disinfect domestic hot and cold-water systems and fire lines directly connected thereto, in conformity with procedures and standards described herein.
 - 2. Disinfect domestic hot and cold-water systems as required by the Public Health Department and all Authorities Having Jurisdiction.
 - 3. If no disinfection requirements are provided by the Authorities listed above, then disinfection shall conform to California Plumbing Code Sections 609.9.1 through 609.9.4.
- C. Preliminary Preparations:
 - 1. Service Cock: Provide within three feet (3') of the entrance of the supply main to the building, a three-fourths inch ($\frac{3}{4}$ ") service cock, or valve, for introducing the disinfecting agent into the lines.
 - 2. Flushing: After final pressure tests and before draining for disinfection, open each fixture or outlet until the water flow is clear.
- D. Standards Necessary for Approval:

1. The water system shall have been uniformly chlorinated under the supervision of Plumbing Inspector.
 2. The results of water sample analysis shall be negative for the Aerogenes organisms, with a coliform MPN of less than 2.2 and a total plate count of less than 100 bacteria per milliliter.
 3. If the test for the bacteriological quality of the water in the system does not meet the standards, repeat the disinfection procedure until the specified standards are met.
- E. Final Approval: Health Department will give written approval for acceptance and use of the water system after the above procedures have been successfully completed and the standards met.
- F. Temporary hook-ups shall be disinfected. All fittings and piping in temporary systems are to be disinfected.
- G. Upon completion of the work, all records and certifications approving pipe disinfections shall be submitted to the Owner's Representative before final payment is made.

3.10 PROTECTION, CARE AND CLEANING

- A. Provide adequate means for, and fully protect, all finished parts of the materials and equipment against physical damage from whatever cause during the progress of this work and until completion.
- B. During construction, properly cap all lines and equipment nozzles so as to prevent of sand, dirt, etc. Protect equipment against moisture, plaster, cement, paint or other work of other trades by covering it with polyethylene sheets.
- C. Thoroughly clean exterior and interior of piping, equipment, and materials before systems are put into operation. All systems of any nature shall be thoroughly cleaned and flushed of all pipe contaminants such as cuttings, filings, lubricant, rust, scale, grease, solder, flux, welding residue, debris, etc. Any piece of equipment or part of any system which malfunctions or is damaged due to failure or neglect on the of this Division to observe this paragraph shall be repaired or replaced to the satisfaction of the Owner's by and at the total expense of this Contract.
- D. After completed installation, clean all systems.
1. Piping, and Equipment, Non-insulated or to be insulated: Clean exterior thoroughly to remove most, plaster, cement, and dirt before insulation is applied.
 2. Piping and Equipment to Be Painted: Clean exterior of piping, and equipment, exposed in completed structure, removing rust, plaster, cement and dirt by wire brushing. Remove grease, oil, and similar materials by wiping with clean rags and suitable non-toxic solvents. Touch up primer coat as required.
 3. Motors, Pumps and Other Items with Factory Finish: Remove grease and oil and leave surfaces clean and polished.
 4. Plumbing Fixtures: Clean and polish fixtures immediately prior to final inspection of Owner Representative's occupancy. Clean floor drain grates, faucet aerators and outlets, check each fixture to insure against trap stoppage.
 5. Chrome or Nickel-Plated Work: Thoroughly polish.
 6. Factory Finished Items: Remove grease and oil and leave surfaces clean and polished.

- E. All code stamps and nameplates shall be protected from damage and must be clean and legible before final inspection.
- F. All piping shall be flushed out or blown out after pressure testing is complete and before being put into use. All strainer screens shall be removed and cleaned.
- G. After start-up and testing, strainer screens shall again be removed and cleaned.

3.11 PAINTING AND IDENTIFICATION

- A. After completion of hydrostatic tests, all system piping exposed to view in or on the building shall be painted in accordance with Section 09 91 00-Painting.
- B. Provide pipe, valve, and equipment identification, and signage in accordance with referenced standards, codes, and specifications.

3.12 ACCESSIBILITY OF EQUIPMENT

- A. The installation of valves, thermometers, gages, traps, cleanouts, control devices or other specialties requiring reading, adjustment, inspection, repairs, removal or replacement shall be conveniently and accessibly located with reference to the finished building.

3.13 CLOSING IN OF UNINSPECTED WORK

- A. Do not allow or cause any to be covered up or enclosed until inspected, tested and approved.

3.14 EMERGENCY REPAIRS

- A. The Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding the guarantee bond or relieving the Contractor of their responsibility during the bonding period.

3.15 CLEAN UP AND REMOVAL OF SCRAP

- A. For work under all Mechanical Sections, trash and scrap shall be cleaned up and removed from the site as the work progresses.

3.16 PRELIMINARY OPERATIONS

- A. The Owner reserves the right to operate portions of the mechanical system on a preliminary basis without voiding the guarantee.

3.17 EXCAVATION AND TRENCHING: (As required for this section)

- A. Trenches for underground piping shall have uniform grades same as for pipe. Pipe shall be embedded in six inches (6") minimum layer of clean sand all around.
- B. Loose earth shall be tamped solid around sides and on top of sand-covered pipe and remainder thoroughly compacted to prevent settlement of the surface. After completion of backfill, the grade shall be finished to match the existing, or as directed. All paving and walkways shall be finished to match the existing.

- C. Provide and maintain dewatering pumps as required. After piping installation, it shall be inspected and approved by the Owner's Representative before Backfill shall not be placed on or around piping for twenty-four (24) hours after pipe joints have been made and before lines are properly tested and approved.
- D. Provide barricades, signs, lanterns, shoring, sheeting, and pumping as part of Work in this Division as required to insure safe conditions. Provide shoring and cross bracing of sufficient strength to properly support the walls of all excavations at depth of four feet (4') or more as required to protect personnel, and as required by OSHA.
- E. Bury piping exterior to the building with a minimum of thirty-six inches (36") cover from top of pipe to finished grade except as otherwise shown, or as determined by invert elevations. Contractor shall verify all piping elevations, and invert elevations before starting work.
- F. Excavation and pipe installation on public property shall be fully coordinated for timing and procedures with the authorities having jurisdiction. Work shall to all local Public Work rules and regulations. All paved areas and concrete sidewalks damaged during this work shall be repaired to match existing when new to the satisfaction of the governing authorities.
- G. Dispose of all surplus excavation material and seepage water as directed by general contractor and in accordance with local codes and applicable laws.
- H. Trees: When it is necessary to excavate adjacent to existing trees, the Contractor shall use all possible care to avoid injury to trees and roots. Where a ditching machine is run close to trees having roots smaller than two inches (2") in diameter, the wall of the trench adjacent to the trees shall be hand trimmed making clean cuts through the roots. All cuts through roots one-half inch and larger in diameter shall be painted with "Tree-Seal", or equal. Trenches adjacent to trees should be filled within twenty-four (24) hours after excavation, but where this is not possible, the side of the trench adjacent to the tree shall be kept shaded with burlap or canvas. Stockpiling of earth or building materials within the drip line of trees is prohibited. Where any roots two inches (2") and larger are encountered, the Contractor shall hand tunnel under root and protect it by burlap wrapping.
- I. Water piping shall not be run in the same trench with sewer or drainage piping unless separated as required by the plumbing code.
- J. Pitch: Horizontal sanitary and storm drain piping shall be installed at a uniform grade of not less than one-fourth inch per foot, unless otherwise indicated or directed.

3.18 BACKFILL

- A. Trenches: Do not place backfill in trenches until pipe installation has been reviewed and accepted by the Owner's Representative.
- B. Within twenty-four (24) hours or as soon as pipe has been laid and inspected, place in layers to the elevation at which excavation was begun, or to a height of six inches (6") from rocks or lumps greater than four inches (4") in any dimensions. Place in six-inch (6") layers and bring up evenly and tamp continually on both sides of pipe. Use excavated materials or other approved materials as directed. Tamp by hand or with pneumatic tampers. Machine tamping and compaction by flooding or puddling will not be accepted.

- C. Compaction: Relative compaction of backfilling for pipe trenches and concrete structures shall be not less than 90 percent in accordance with Test Method No. Calif. 216 and ASTM D1557-58T. Fills below structures and the upper eighteen inches (18") of sub-grade beneath areas to be paved shall be compacted to 95%.
- D. Settling: which subsides or settles below finish grades or adjacent ground during warranty period shall be removed to top pipe and replaced with compacted fill as specified.

3.19 GUARANTEE

- A. At completion, furnish the Owner's Representative a written guarantee, in triplicate, that work has been performed in accordance with Drawings and Specifications and to replace or repair, to the satisfaction of the Owner's Representative any portion of the work that fails within the guarantee period after final acceptance provided such failure is due to Also agree to replace or repair, with like any part of the building or equipment installed by other trades but damaged by them in installing their work.
- B. During the guarantee period, make four (4) inspections of the work at six (6)-month intervals after final acceptance to check the performance of systems and correct any guaranteed items. Inspections to be made in the presence of the Owner's Representative.
- C. Guarantee in writing all plumbing work for a period of twenty-four (24) months following date of certificate of final acceptance.
- D. All apparatus shall be built and installed to deliver its full rated capacity at the efficiency for which it was designed.
- E. All plumbing and electrical apparatus shall operate at full capacity without objectionable noise or vibration.
- F. The plumbing systems shall provide the performance required at standard operating conditions.
- G. Where a manufacturer's guarantee exceeds one (1) year, the longer guarantee/warranty shall govern.

3.20 TRAINING

- A. Submit a written test schedule to the Owner's Representative for approval a minimum of three (3) weeks prior to proposed training dates.
- B. Provide three (3) sessions of two (2) hours each of instruction to the Owner regarding proper use and operation of the system. Submit a written course outline and a sample of all manuals to be used two (2) weeks prior to the scheduling of the training. Training shall include both classroom and "hands-on" sessions and shall occur after final inspection and testing. Location and timing of the training session is to be arranged with the Owner's Representative.
- C. Two weeks prior to scheduled training dates, furnish the Owner's Representative with six (6) bound copies of complete instructions, including catalog cuts, diagrams, drawings, and other descriptive data covering the proper testing, and maintenance of each type of system installed, and the necessary information for ordering replacement parts. In addition, post one (1) copy of complete instructions at the control panel location.

- D. Session shall include detailed training and instructions covering the necessary and recommended testing, operating, and maintenance procedures for each type of system. Session shall include training and instructions covering the emergency operation procedures for type of system.
- E. Session shall include training and instructions covering the emergency operation procedures for each type of system.

END OF SECTION

SECTION 23 00 00

HVAC DESIGN BUILD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this section.
- B. Commissioning shall be performed in accordance with Section 01 91 00 Commissioning & Section 23 08 00 Commissioning HVAC,

1.2 WORK INCLUDED

- A. This Section includes the design, supply and installation of a complete heating, ventilating, and air conditioning (HVAC) system(s) for the project in accordance with this specification and as shown on drawings.
- B. This specification shall be used as the basis for design on HVAC systems by the Contractor.
- C. This specification shall be used to establish the scope, character, and quality of HVAC systems, and to provide a consistent basis for developing construction cost for work of this specification.
- D. This specification and accompanying documents shall not be used by the contractor for obtaining HVAC system permits or for construction of HVAC systems. Engineering data, equipment capacities, and other related engineering criteria are provided for establishing the basis for construction cost only.
- E. The Contractor is responsible for preparing original engineering and construction documents necessary for obtaining permit and Architect's approval.
- F. Costs developed in accordance with this specification shall represent the total cost required to provide a complete and operational HVAC system.
- G. All work shall also comply with such general conditions of the specifications as are applicable including, but not limited to:
 - 1. Instruction to Bidders as established by the Architect and General Contractor.
 - 2. General and Special Conditions as established by the Architect and General Contractor.
 - 3. Providing Mechanical Basis of Design
- H. Acceptance Testing.

1.3 DESCRIPTION OF DELIVERABLE BID DOCUMENTS

- A. Preparation of construction drawings, engineering calculations, equipment, and material selection.
- B. Preparation of Mechanical Title 24 calculations and documentation.
- C. Obtaining all necessary permits from jurisdictional agencies.

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- D. Providing complete HVAC systems in place.
- E. Providing complete HVAC control systems in place.
- F. Testing, Air Balancing and Acceptance Testing of HVAC systems.
- G. Specifications: In these specifications, attempts have been made to assist the HVAC contractor in coordinating work by subcontractors by assigning specific responsibility for items and areas of work. This in no way shall diminish the HVAC contractor's responsibility to include all material and work required by this section.
- H. Drawings
 - 1. Mechanical items shown on drawings are diagrammatic. Intention is to show size, estimated capacity, approximate location, direction, and general relationship of one work phase to another, but not exact detail or arrangement.
 - 2. Before proceeding with work check and verify all dimensions in field.
 - 3. Assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.
 - 4. Make adjustment that may be necessary or requested to resolve space problems, preserve headroom, and avoid architectural openings, structural members, and work of other trades.
 - 5. For exact locations of building elements, refer to dimensional Architectural/Structural drawings and the design/build mechanical contractor's own field measurements.
- I. Description of Systems: Supply and install all materials to provide functioning systems in compliance with performance requirements specified, and any modifications resulting from reviewed shop drawings and field coordinated drawings. Installation of all systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination drawings.
- J. If any part of the Specifications or Drawings appears unclear or contradictory, apply to architect for an interpretation and decision as early as possible, including during bidding period. Do not proceed without architect's decision.
- K. Submission of documents to DSA for review and correction as necessary.

1.4 QUALITY ASSURANCE

- A. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture.
- B. All items of a given type shall be the products of same manufacturer.
- C. Supply all equipment and accessories new and free from defects.
- D. Design Qualifications
 - 1. Design for all HVAC systems shall be prepared by a mechanical contractor or professional engineer licensed in the State of California.
 - 2. Design shall utilize procedures and methods approved by the jurisdictional agencies and the State of California Energy Commission including computer programs used in calculations.

3. Engineer and or mechanical contractor shall be experienced in design of systems equal to those specified and have complete designs for projects of similar type and scope within one year prior to beginning work.

E. Staff

1. For fabrication and installation of work use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one (1) year prior to beginning work of this section, and who are completely familiar with the manufacturer's recommended methods of installation as well as the requirements of this work.
2. During the work of this Section, provide sufficient on-site full time management staff to maintain comprehensive direction and coordination of the work in this section.

1.5 REFERENCES AND STANDARDS

A. Regulatory Agency Compliance:

1. Nothing on Drawings or within these Specifications shall be construed to permit Work not conforming to applicable laws, ordinances, rules and regulations.
2. When drawings or specifications exceed requirements of applicable laws, ordinances, rules and regulations, comply with documents establishing the stringent requirement.
3. Uniform Building Code, Uniform Mechanical Code, Uniform Plumbing Code, National Electric Code, and Uniform Fire Code as published by ICBO and adopted by the jurisdictional agency.
4. California Administrative Code, including Title 8, 19 and 24. Comply with the 2019 Building Energy Efficiency Standards for Residential and Nonresidential Buildings.
5. Applicable State and Federal regulations regarding air pollution, toxic materials and safety.
6. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems".
7. Do not use materials containing asbestos in any form including flashings, sealing compounds or ductwork.
8. If any of the above requirements conflicts with one another, or the Specifications' requirements, the most stringent requirements shall govern. Where codes are silent on an issue, NFPA Standards shall apply.

B. Applicable portions of the ASHRAE Standards including the following:

1. Ventilation for Acceptable Indoor Air Quality, 62.1-2019.
2. Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems, 111-2008.

C. Comply with the applicable portions of the following SMACNA Standards:

1. HVAC Duct Construction Standards – Metal and Flexible.
2. HVAC Systems – Duct Design.
3. HVAC Systems – Testing, Adjusting, and Balancing.

D. Additional published specifications, standards, test or recommended method of trade, industry or governmental organizations as listed below apply to all work in this Section:

1. AABC – Associated air Balance Council

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2. ADC – Air Diffuser Balance Council
3. AMCA – Air Moving and Conditioning Association
4. ANSI – American National Standards Institute
5. ARI – Air Conditioning and Refrigeration Institute
6. ASME – American Society of Mechanical Engineers
7. ASTM – American Society of Testing and Materials
8. IEEE – Institute of Electrical and Electronic Engineers
9. NEMA – National Electrical Manufacturer’s Association
10. NFPA – National fire Protection Association
11. NUSIG – National Uniform Seismic Installation Guide
12. UL – Underwriter’s Laboratories

1.6 DEFINITIONS

- A. Definitions of term used in Division 15 Sections may differ from those given in general and supplementary conditions and take precedence over them.
- B. “Concealed”: embedded in masonry or other construction, installed in furred spaces, within double partitions, or hung ceilings, in trenches, in crawl spaces, or in enclosures.
- C. “Control of Actuating Devices”: automatic sensing and switching devices such as thermostats, pressure, float, electro-pneumatic switches and electrodes controlling operation of equipment.
- D. “Exposed”: not installed underground or “concealed” as defined above.
- E. “Indicated,” “shown” or “noted”: as indicated, shown or noted on drawings or specifications.
- F. “Install”: to erect, mount and connect complete with related accessories.
- G. “Motor controllers”: manual or magnetic starters (with or without switches), individual pushbuttons, or hand-off-automatic (HOA) switches controlling the operation of motors.
- H. “Piping: pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and related items.
- I. “Provide”: to supply, install and connect up complete and ready safe and regular operation of particular work referred to unless specifically noted.
- J. “Reviewed,” “satisfactory,” or “directed”: as reviewed, satisfactory, or directed by or to architect.
- K. “Similar” or “equal”: of base bid manufacture, equal in materials, weight, size, design, and efficiency or specified product, conforming to PART 2 – MATERIALS.
- L. “Supply”: to purchase, procure, acquire and deliver complete with related accessories.
- M. “Wiring”: raceway, fittings, wire, boxes and related items.
- N. “Work”: labor, materials, equipment, apparatus. Controls, accessories, and other items required for proper and complete installation.

1.7 DESCRIPTION AND SCOPE

- A. Project overview: The project consists of a 1,440 square foot lower-level wood shop, and 1,440 square foot upper level with office, toilet room and a dry science prep classroom.
- B. Project Scope Summary
 - 1. The scope of this bid is to provide materials, equipment, fabrications, installation, and tests as required for complete heating, ventilating and air conditioning systems. The work includes outdoor variable refrigerant heat recovery unit, indoor fan coils (ceiling cassettes), inline fans for outside air, MERV 13 filters as applicable by Title 24, fully functional manufacturer's controls with interlock with associated equipment, refrigerant piping with insulation, toilet exhaust system, and controls.
 - a. Provide one (1) variable refrigerant heat recovery unit on roof. School District Standards require the use of Carrier or Mitsubishi/Trane systems.
 - b. Minimum six (6) indoor ceiling cassettes with integral occupancy sensor.
 - c. Inline fan for outside air connected to individual ceiling cassette.
 - d. Refrigeration piping.
 - e. Manufacturers control system with central control capable of connecting with district web-based master control. Coordinate with the School District.
 - f. Ducts shall be located as high as possible.
 - g. Central sawdust collection system connecting directly to equipment with connections on table, and one (1) floor sweep on each long side of classroom. An allowance for a minimum of seven (7) connections. System shall draw from room and exhaust back to room through transfer of air through wall opening silencer grille
 - 2. The mechanical and architectural drawings show parts of the buildings composing this project where defined HVAC work is to be included as part of this bid.

1.8 BID INSTRUCTIONS

- A. The HVAC systems for this project are to be designed and built using a design/build approach. The design/build HVAC Contractor shall prepare a proposal for complete design and construction services based on this performance specification along with architectural and structural drawings and other program requirements.
- B. This specification is intended to:
 - 1. Specify system performance/design criteria. The HVAC Contractor's proposal shall not deviate from these Design Criteria without written approval. Questions regarding the appropriateness or correctness of requirements shall be directed to the General Contractor in writing prior to bid. Any changes in design or performance criteria will be disseminated to all bidders.
 - 2. Establish the desired level of quality, including suggested design options that H&M Mechanical Group feels will meet the performance requirements and design intent. HVAC contractors' proposals may be based on the suggested approaches or on any other design of similar quality. If there is a question as to the appropriateness of any alternative system ideas, the HVAC contractor shall review the proposed design (in the strictest confidence) with H&M Mechanical Group prior to bid.
- C. Contractor proposal shall include the following:
 - 1. A narrative of the proposed system design.
 - 2. Completed bid form.
 - a. Design and Construction Price

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- 1) Breakout prices: Where breakout prices are requested in bid form, include materials, taxes, freight, installation, and mark-up as applicable.
- b. Additive/deductive alternates: alternates listed herein must be bid. Additional voluntary alternates are strongly encouraged.
- c. Unit prices, as specified herein.

1.9 SCOPE OF WORK COORDINATION

- A. Consult all other Sections: determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete and operable installation. This section is provided to assist Contractor in coordination of work scope but shall not be construed to limit Contractor's scope of work encompassed by the contract documents.
- B. This section is provided to clarify the scope of work included in this Section relative to work provided in other Sections. The following items identify the boundary of responsibility between the HVAC subcontractor and the listed subcontractor.
- C. Plumbing contractor coordination
 1. Plumbing requirements must be identified with the HVAC Contractor proposal (in order to be included with plumbing contract bid which immediately follows the HVAC bid). Any requirements not so identified (other than scope changes) will be the responsibility of the HVAC contractor.
 2. Condensate piping: The Plumbing Contractor is responsible for all condensate piping, pans, including auxiliary drain pans and condensate pumps where required. The plumber shall be responsible for condensate piping from condensate connection to the sewer system including trap and final connections. The Plumbing contractor shall be responsible for piping from auxiliary drain pans where they are required at coils in furred spaces; pipe to visible location in ceiling not over anything that may be sensitive to water damage.
- D. Electrical contractor coordination
 1. 120V equipment: HVAC contractor to provide motors with integral overload protection. Switches such as toilet fan wall switches by Electrical Contractor.
 2. Disconnects: The electrical contractor is responsible for providing and installing all disconnects for all HVAC equipment and dust collector.
 3. Control and interlock conduit and wiring
 - a. 120V fans: The electrical contractor shall provide all wiring to equipment, including wiring through interlock control device (e.g. line voltage thermostat) where required and identified by HVAC Contractor.
 4. Control devices: All HVAC control devices including thermostats, relays, control transformers, controllers, etc. shall be provided by the HVAC Contractor and located within temperature control panels, except the following which shall be provided by the electrical contractor where directed by the HVAC Contractor.
 - a. Transformers, HOA switches, and auxiliary contacts within electrician supplied motor starters.
 - b. Time delay relays required for two-speed motor starters for change from high to low speed.
 - c. Fire alarm and life safety control relays and switches (if required), and all smoke detectors shall be furnished under Electrical Division.
 - d. Wall switches, including speed switches for conference room exhaust fans (if any).

- e. Boxes for line-voltage electric thermostats and switches (if any).
- 5. Control panels: The HVAC Contractor shall provide all required control panels including disconnects where required. The HVAC Contractor shall also provide all necessary 120V power to panels and devices, including all damper actuators. No control system related work will be done by the Electrical Contractor. The system must be stand-alone.
- 6. Lighting control: Electrical Contractor shall be responsible for all lighting controls.
- 7. Service receptacles: The Electrical Contractor shall provide service receptacles where required by code at all HVAC equipment.
- 8. Fire alarm and smoke control system. The Electrical Contractor shall provide all life safety, fire alarm, and smoke control systems including control and monitoring of all fans used as part of the life safety system, current switches or other means to provide fan status, contacts to convert economizer systems to 100% outdoor air, etc.
- 9. The HVAC work includes assisting the electrical contractor in the proper connecting of all electrical equipment required for HVAC work.

E. Wall and Ceiling Subcontractors

- 1. Architectural shafts and plenum walls: The HVAC Contractor shall identify all architectural shafts and plenum walls and their construction and sealing requirements to the architect for inclusion in architectural contract documents. It is the responsibility of the HVAC Contractor to review architectural drawings to be sure that all architectural shafts, plenums, etc. required for HVAC systems are properly located and dimensioned. Such items not identified by the HVAC Contractor prior to drywall bids shall be the responsibility of the HVAC Contractor.
- 2. Rated duct enclosures: Ducts required to be enclosed (e.g. life safety ducts, ducts crossing horizontal exit enclosures, grease ducts) shall be located to minimize the need for rated enclosures. Where required, the HVAC Contractor shall identify location and their construction requirements to the architect for inclusion in architectural contract documents. It is the responsibility of the HVAC Contractor to review architectural drawings to be sure that all rated enclosures required for HVAC systems are properly located and dimensioned. Such items not identified by the HVAC Contractor prior to drywall bids shall be the responsibility of the HVAC Contractor.
- 3. Access panels and doors: The need for access doors in inaccessible walls and ceilings shall be avoided unless absolutely necessary. Access doors shall not be used for access to balancing dampers; use instead remote control devices (see §2.6, C) Equipment shall be located wherever practicable over accessible ceilings or rooms to avoid access doors. Where they are required, access doors shall be identified by the HVAC Contractor to the Architect for inclusion into the architectural drawings to be provided and installed by the wall or ceiling contractor. It is the responsibility of the HVAC Contractor to review architectural drawings to be sure that all access doors required for HVAC systems are properly located and dimensioned. Those that are not identified by the HVAC Contractor prior to ceiling/drywall bids shall be the responsibility of the HVAC Contractor.
- 4. Air outlets: The wall/ceiling contractor shall be responsible for preparing openings for air outlets in locations identified by the HVAC Contractor on shop drawings. The ceiling contractor shall provide additional T-bar or spline and cut ceiling tile as required to accept air outlets.

F. Miscellaneous Subcontractors

- 1. Insulation: The insulation contractor shall provide all wall, roof, ceiling, and floor thermal insulation as identified on architectural drawings. Any thermal or acoustical insulation required for HVAC systems, whether mounted on or in ducts or on walls,

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shafts, roofs, ceilings, or floors shall be provided by the HVAC Contractor. This includes fan-room walls.

2. Fire-stopping: The HVAC Contractor shall provide all required fire-stopping around pipe and duct penetrations in floors and walls where required by code.
3. Equipment supports: Supports for furnaces, condensing units, etc. shall be coordinated with structural engineer to be provided by others.
4. Openings: All openings in walls, floors, roofs, and structural elements shall be by others in locations dimensioned by the HVAC Contractor.
5. Louvers: The HVAC Contractor shall identify all fixed blade louvers required for HVAC systems to be provided and installed by others. Motorized louvers or combination louver/dampers shall be provided and installed by the HVAC Contractor. It is the responsibility of the HVAC Contractor to review architectural drawings to be sure that all louvers required for HVAC systems are properly located and dimensioned. Those that are not identified by the HVAC Contractor prior to architectural metal bids shall be the responsibility of the HVAC Contractor.
6. Roof curbs and sleepers: The HVAC Contractor shall provide all roof curbs or sleepers for roof mounted fans, heat recovery unit etc. No carpenter made curbs will be provided for any HVAC equipment.
7. Hoisting: HVAC Contractor shall be responsible for hoisting and rigging of all HVAC equipment.
8. Equipment pads: The HVAC Contractor shall locate and dimension all concrete bases, housekeeping pads, and sleepers relating to his work, to be provided by others. Concrete fill for inertia bases shall be specifically identified, including dimensions as well as timing of base installation, to the general contractor prior to concrete bids. Concrete work that is not identified by the HVAC Contractor prior to concrete bids shall be the responsibility of the HVAC Contractor.
9. Roofing: Roofing contractor shall provide all roofing including cant strips and counter-flashing at the sides of roof curbs or sleepers.
10. Demolition: none required by the HVAC contractor.

1.10 JOB CONDITIONS

- A. Examine site related work and surfaces before starting work of any Section.
 1. Contractors shall be responsible for any conditions that can be visually observed at jobsite and in unconcealed, accessible areas.
 2. Contractor shall not be responsible for any conditions in concealed areas that could not be reasonably anticipated at time of bid. Any additional work caused by these conditions shall be by change order.
- B. Parking and special traffic requirements
 1. Contact General Contractor for information and constraints.
 2. Obtain all City permits, and clearances required for hoisting and rigging equipment.

1.11 PRODUCT DELIVERY, HANDLING AND STORAGE

- A. Where necessary, ship in crated sections of size to permit passing through available space.
- B. Ship equipment in original packages, to prevent damaging or entrance of foreign matter.

- C. Handle and ship in accordance with manufacturer's recommendations.
- D. Provide protective coverings during construction as specified herein.
- E. Replace at no expense to Owner, equipment or material damaged during storage or handling.
- F. Tag all items with weatherproof tag, identifying equipment by name and purchase order number.
- G. Include packing and shipping lists.

1.12 TEMPORARY OPERATION

- A. At General Contractor's request, operate HVAC equipment during construction to assist in drying walls, space conditioning, etc.
- B. Protection of equipment, such as additional filters, will be provided at additional cost above and beyond bid price. Do not include cost in bid.
- C. Warranty shall start upon beneficial use of equipment, including temporary operation.

1.13 REVIEW OF CONSTRUCTION

- A. Work may be reviewed at any time by representative or Architect.
- B. Advise Architect that work is ready for review at following times:
 - 1. Prior to concealment of work in walls and above ceilings.
 - 2. When all requirements of Contract have been completed.
 - 3. Neither backfill nor conceal work without Architect's consent.
- C. Maintain on the job site a set of Specifications and Drawings including all change orders.

1.14 DESIGN DOCUMENTS

- A. An employee of the HVAC contractor shall serve as Engineer-of-Record (third party consultant acceptable only if consultant has significant design/build experience).
- B. The HVAC Contractor/engineer shall maintain a design and detailing schedule consistent with those of the architect and other engineers to produce working drawings and shop drawings in a timely and professional manner, consistent with the project construction schedule.
- C. All HVAC system design documents shall be prepared under the supervision of the Engineer-of-Record.
- D. Calculations
 - 1. Heating and cooling load calculations and equipment selections shall be supervised and reviewed by a registered professional engineer.
 - 2. Provide calculations and documentation to demonstrate building HVAC systems compliance with Title 24 Energy Standards. Envelope, lighting, and service water heating Title 24 compliance documentation shall be provided by others. Calculations for determination of minimum room volume required for refrigerant volume.
 - 3. Details that are coordinated with structural engineer and approved by DSA.

- E. Design documents: All design drawings shall be created using AutoCAD, version 18 or higher, or compatible format. Include, at minimum, the following:
 - 1. Equipment schedules.
 - 2. Floor plans: scale to match architectural drawings or larger, minimum 1/8" scale; duct mains and all ductwork shall be drawing double line.
 - 3. Refrigerant line distribution

1.15 SUBMITTALS

- A. Submit drawings, product data, samples and certificates of compliance required as hereinafter specified in this Section.
- B. Submission Procedure
 - 1. Initial submittal
 - a. Each submittal shall have a unique serial number such as "SUBMITTAL 23 00 00-01" Variable Refrigerant Unit etc.
 - b. Submit in PDF format.
- C. Contents of Submittal
 - 1. Manufacturer's name and model number
 - 2. All information required to completely describe materials and equipment and to indicate compliance with drawings and specifications, including, but not limited to:
 - a. A schedule, for all items of the same type shall be supplied. The schedule shall include the manufacturer, the model, size, specific information that makes that item unique, the service of the item, the system served by the item.
 - b. Physical Data, as applicable
 - 1) Dimensions.
 - 2) Weight.
 - 3) Finishes and colors.
 - c. Performance Data, as applicable
 - 1) Rated capacities.
 - 2) Performance curves.
 - 3) Operating temperature and pressure.
 - d. Electrical and plumbing requirements.
 - e. Flow and wiring diagrams as applicable.
 - f. Description of system operation.
 - 3. All other pertinent information requested in individual sections.
 - 4. HVAC controls submittal shall include the following:
 - a. Hardware submittal.
 - b. Network schematics.
 - c. Sequence in plain English and programming.
 - d. Graphics screens for user interface.
 - e. Startup forms and functional test procedure.
- D. Layout Shop Drawings: None required.
- E. Operating instructions, maintenance manuals and parts lists.

1. O&M manual shall include all submittal data submitted herein above, as installed. The intent of this section is that a single document contains all relevant information about each piece of equipment.
2. In addition to the submittal data, the O&M manual shall also include the following information:
 - a. Manufacturer's name, model number, service manual, spare-parts list, and descriptive literature for all components.
 - b. Installation instructions.
 - c. Maintenance instructions.
 - d. Wiring diagrams.
 - e. Listing of possible breakdown and repairs.
 - f. Instruction for starting, operation and programming.
 - g. Detailed and simplified one line, color coded flow and wiring diagram.
 - h. Name, address and phone number of contractors equipment suppliers and service agencies.
 - i. Guarantee period, including start and end period.
 - j. Startup test readings, dated and signed by testing technician.

F. Record Drawings

1. Submit prior to final acceptance inspection, one complete marked-up set of reproducible engineering design drawings.
 - a. Fully illustrate all revisions made by all HVAC crafts in course of work.
 - b. Include all field changes, adjustments, variances, substitutions and deletions, including all Change Orders.
 - c. Exact location, type, and function of concealed valves, dampers, controllers, piping, air vents and piping drains.
 - d. Exact size, elevations, and horizontal location of piping and ducts.
 - e. Revise equipment schedules to reflect all substitutions.
 - f. Complete drawings of all HVAC systems, both new and existing.
2. These drawings shall be for record purposes for Architect's use.

1.16 NOISE AND VIBRATION

- A. Cooperate in reducing objectionable noise or vibration. If noise or vibration, because of improper installation, occurs in the building, correct these conditions at no cost to the Owner.

1.17 COMPLETION REQUIREMENTS

- A. Until the documents required in this section are submitted and approved, the system will not be considered "accepted" and final payment to contractor will not be made.
- B. O&M Manual: Submit four (4) copies of operations and maintenance manuals. Manuals shall be bound in one or more 3-ring binders with index and tabs and include the following:
1. Service telephone number of the installing contractor.
 2. Manufacturers' equipment submittals (see § 1.15F).
 3. Equipment performance curves or capacity tables, where applicable.
 4. Manufacturers' maintenance instruction sheets, wiring diagrams and parts list
 5. Address and telephone number of the nearest sales and service organization for each major piece of equipment.
 6. Operating instructions for installation as a whole and for each piece of equipment.

- C. Test and Balance reports; See § 3.12.
- D. Inspection and permit: Provide one copy of inspection certificates signed and approved by the local code authorities.
- E. Record Drawings: Update design/shop drawings to “as-built” conditions. Provide one set of reproducible drawings and one set of AutoCAD files on portable media (e.g. CD).
- F. General Training: Adjust hours based on how complicated the job is and who is being trained. Upon completion of work, provide Owner’s operating personnel two instruction periods in operation and maintenance of material and equipment. Each period shall be 3-hours continuous; first period to be immediately upon completion, and second period within warranty period.
- G. Warranty: Provide written guarantee and warranty documents for all equipment and systems, including the start and end date for each. See § 1.18.

1.18 SCHEDULE OF WORK

- A. Arrange design and construction work to conform to schedules established by the General Contractor and Architect
- B. In scheduling, anticipate means of installing equipment through available openings in structure. Provide openings and weatherproof openings as required to satisfactorily complete the work in this section.
- C. Schedule test, balance, and acceptance testing of mechanical systems:
 - 1. This phase must occur after completion of mechanical systems, including all control calibration and adjustment, and requires substantial completion of the building, including closure, ceilings, lighting, partitioning, etc.
 - 2. Allow at least 14 days after installation of all furnishings for indoor air quality purging of construction area. During this period, operate all systems and fans 24 hours on 100% outdoor air, within the limits of the heating and cooling system capacities.

1.19 GUARANTEE

- A. The HVAC Contractor shall guarantee the following:
 - 1. Guarantee all new materials, new equipment, apparatus and workmanship shall be free of defective materials and faulty workmanship for period of one year from date of filing of Notice of Completion or beneficial system usage, whichever comes first.
 - 2. That all equipment and material will produce the results specified
 - 3. The HVAC Contractor shall furnish written guarantee to replace all defective work and materials furnished under this Section, at no cost to the Owner, for this one (1) year period
- B. Provide new materials, equipment apparatus and labor to replace that determined by H&M Mechanical Group to be defective or faulty.
- C. The Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition without voiding the guarantees or relieving responsibility during the guarantee period.

- D. The warranty shall not include standard maintenance items nor repairs, or replacement of equipment damaged resulting from misuse, abuse, or lack of proper maintenance.
- E. This guarantee also applies to services including Instructions, Adjusting, Testing, Noise, Balancing, etc.
- F. Existing equipment and materials shall not have a contractor warranty. Any required repairs to existing systems shall be performed as billable service work, beyond the scope of the construction contract.

1.20 SYSTEM DESIGN

- A. The HVAC system shall be selected and designed by the contractor to provide the specified performance requirements in the most cost-optimum fashion. Acceptable design options are listed in this section. They may be used by the contractor, or an alternative approach of similar or better quality and performance may be selected. When there is doubt about the acceptability of an alternative design, the HVAC Contractor shall seek approval from the Architect and H&M Mechanical Group during the bid period. (Any inquiries other than those regarding scope will be kept confidential.)
- B. Architectural bid drawings:
 - 1. Equipment locations as shown on drawings shall be considered design constraints. Designs that require changes to same shall be bid as alternates only.
- C. Suggested HVAC systems: These systems indicate the desired level of quality, but the HVAC Contractor is not limited to them.
- D. Alternative Systems:
 - 1. HVAC contractors may propose any system for consideration. Ideas that may be acceptable include:
 - a. Variable-volume/variable-temperature zoning systems with pressure controlled by-pass (barometric-by-pass not allowed).

1.21 DESIGN CRITERIA

A. Design Temperatures and Humidity

	Heating	Cooling
Outside air dry bulb temperature	24°F	94°F
Coincident outside air wet bulb temperature	--	67°F
Inside air dry bulb temperature	68°F	74°F
Inside air relative humidity	--	50%

B. Internal Loads

- 1. Diversity factors: Loads to each room and each floor or area shall be based on the densities listed in each section below. However, central fan systems and cooling plant as well as associated risers may be sized based on the total load multiplied by the diversity factor listed. Where no diversity factor is listed, assume a diversity factor of 1.0.
- 2. Densities below are based on conditioned (net) square feet.
- 3. Occupancy Heat Gain: Occupancy shall be based on the number occupants as prescribed by Title 24. The density data in the table below should be used for bid purposes only.

Room	Density (ft ² per person)	System/plant usage factor	Sensible (Btuh/hr per person)	Latent (Btuh/hr per person)
First Floor Shop	20	1	245	155
Science Prep	20	1	245	155
Office	100	1	250	200

4. Receptacle & Process Electrical Heat Gain

Room	Lighting density (w/ft ²)	Equipment density (w/ft ²)
First Floor Shop	Max allowed Per Title 24	3
Science Prep	Max allowed Per Title 24	1
Offices	Max allowed Per Title 24	1

C. Heat Transfer Conductance of Building Envelope (BTU/ft²/hr.°F)

Envelope Component (use items listed on plan if shown)	Heating	Cooling
Walls (with R-21), Wood Frame	0.067	0.067
Roofs (with R-29), Metal Deck	0.033	0.033
Typical New Glass (low E with metal frame), NFRC	0.360	0.36

D. Window Shading Coefficients: Ignore shading devices in load calculations.

Glass Type	SHGC
NFRC rating	0.25

E. Miscellaneous Design Constraints

1. Roof mounted equipment: Equipment on roof must be located so that they are least visible from the street or sidewalks.
2. Location of ceiling mounted systems and equipment
 - a. Do not locate any equipment requiring access doors above drywall or other inaccessible ceilings. (Ceiling access doors are acceptable in toilet rooms and other back-of-house type spaces.)
 - b. Access doors shall not be used for access to balancing dampers above inaccessible ceilings such as drywall ceilings; instead use remote control devices (e.g. Young's Regulator). For slot diffusers with plenums, locate remote control connection at top of plenum accessible through slot.

F. Indoor Air Quality Measures

1. Ventilation: Outdoor air rates shall be in accordance with Title 24. Minimum rates must be maintained under any reasonably expected thermal load condition.
2. Access: space shall be provided around all ventilation equipment as recommended by the manufacturer for routine maintenance and inspection including but not limited to filter replacement and fan belt adjustment and replacement.
3. Filtration
 - a. All recirculating fan systems shall have a filter to protect ductwork and coils from particulate accumulation. This includes fan powered mixing boxes (if used).
4. Duct liner
 - a. On supply air ductwork, use liner only where absolutely required for sound control. Suggest only using liner on exterior ductwork and 5' plenums downstream of VAV boxes.
 - b. On return and exhaust ducts, use liner only as required for sound control.
 - c. Liner shall have a resilient, cleanable coating.

G. Energy Conservation Measures

1. Provide time schedule control of all HVAC systems.
2. Motors
 - a. All motors shall be premium efficiency, except $\frac{3}{4}$ Hp and less shall be ECM.
 - b. Motors driven by variable frequency drives shall meet the requirements of NEMA MG-1 part 31.40.4.2. No exceptions.
3. Fans
 - a. Exhaust fans shall be selected for low noise, not low first cost.
4. Equipment Efficiency: See specified equipment requirements under MATERIALS below.

PART 2 - MATERIALS

2.1 VARIABLE REFRIGERANT HEAT RECOVERY UNIT

- A. Refer to plans: Carrier or Mitsubishi/Trane, 2 or 3-pipe systems acceptable. System shall include outdoor heat recovery unit and fan coils identified on plans
- B. Single-point power connection to outdoor unit.
- C. Integrate manufacture's central managerial control shall comply with the following controls.
 1. Automatic demand shed controls: EMS shall be programmed with capability to implement centralized demand shed for all non-critical zones. Critical zones shall not be impacted by demand shed conservation measures. Upon activation of a demand shed command from the main EMS server via EMS operating software, zone EMS unitary controller shall increase (step up) current cooling setpoint by a minimum of 4°F (adjustable) and/or lower (step down) current heating setpoint by a minimum of 4°F (adjustable). Cooling and heating setpoints shall reset to original previous settings once the demand shed command is released at the main EMS server. All temperature step up/step down and reset changes shall be programmed to occur at a defined rate of change as determined by authorized facility operator using EMS operating software. In addition to the implementation of automatic demand shed control strategies, the EMS shall allow for system-wide global adjustment to all cooling and heating setpoints from main EMS

server apart from demand shed conservation measures and shall allow for all global setpoint change commands to be deactivated.

2. Zone pre-occupancy purge: the EMS shall schedule the zone to be occupied one (1) hour prior to the actual time of anticipated occupancy. During this one (1) hour purge period, status of zone occupancy sensor shall be ignored, and the outside air damper shall be commanded to min cfm setting to ensure proper ventilation is achieved. All optimal start, warm-up or pull-down routines shall commence prior to pre-occupancy purge cycle.
3. Vacant mode control: when the zone has been scheduled for occupancy for at least one hour and the occupancy sensor has confirmed that zone has been vacant for 5 minutes (adjustable: maximum 30 minutes), zone shall be placed into vacant mode.
4. Reset cooling and heating setpoints up and down by 2°F (adjustable) or more.
5. Minimum outdoor air ventilation requirements in the zone need only be maintained 15 minutes out of every 60 minutes while the zone is in vacant mode.
6. Upon detection of occupancy, vacant mode shall be cleared.
7. A Pelican energy management system (EMS) shall consist of thermostats (sensors), gateways and related accessories as indicated below and all related programming for a complete and fully operational web-based management system using a cloud server program complying with the following specifications.
8. The entire EMS shall include a network of commercial internet programmable thermostats which use IEEE 802.15.4 mesh wireless communication protocol to reach a wireless gateway (WG). The WG must connect to the owner's wide area network (WAN) over a tcp/ip connection. access and control of EMS is through a web-based management tool which sits on a cloud server and must be accessible either locally or remotely via the internet.
9. The variable refrigerant fan coil unit is controlled by space temperature via a pelican TS200 thermostat that is connected to the fan coil unit utilizing a factory provided adaptor.
10. Cooling, heating, and ventilation modes will be determined by the set points residing in the Pelican TS200 thermostat. The central manager shall enable the compressor sequencing to provide cooling and the hot gas valve to maintain space heating setpoint. Ventilation shall be maintained at minimum during occupied mode.
11. Each unit will be directly controlled by its own dedicated internet Pelican programmable thermostat (IPT).
12. Internet programmable thermostat shall be a wireless communicating commercial programmable thermostat, pelican TS200, that uses IEE 802.15.4 for networking communication and a wiring terminal block for controlling a single zone hvac unit. The ipt shall include a keypad interface which includes digital pushbuttons for warmer/cooler setpoint control, room temperature display, ambient OSA temperature display and digital pushbutton after-hours override timer control and light button. Provide visual led indicator lights at wall mounted wireless pelican thermostat which communicate zone status and unit operation.
13. The IPT must be configurable using a web-based app. Thermostat configuration, shall be done at the thermostat. Web based configuration setting options shall include:
 - a. Naming the thermostat
 - b. Grouping multiple thermostats.
 - c. Cycles per hour (1 - 6).
 - d. Anticipation degrees (0°F - 0.5°F)
 - e. Calibration degrees (2.0°F - -2.0°F)

- f. Heat stages (0 - 2)
 - g. Cool stages (0 - 2)
 - h. Fan stages (1 - 2)
 - i. Fan circulation minutes per hour.
 - j. Temperature display (fahrenheit or celsius)
 - k. Heat range temperature setting limitation
 - l. Cool range temperature setting limitation
 - m. Ability to disable and enable keypad control through schedule.
 - n. Heat consumption (kw, btu, ton, or watt)
 - o. Cool consumption (kw, btu, ton, or watt)
 - p. Notification sensitivity (high, medium, low)
 - q. Alarm of exceeding temperature based on a safe range
 - r. Schedule set times (2, 3, 4, or variable).
14. IPT settings and control through the web base app shall be in real-time and include
- a. Space temperature
 - b. System mode (heat, cool, auto, off).
 - c. Fan mode (auto, on).
 - d. Current set point.
 - e. Relay status (heat/cool and fan).
 - f. Historical trend graphs.
 - g. Scheduling
 - h. Lock and unlock entire thermostat's keypad
 - i. Lock and unlock the thermostat's fan mode setting only

2.2 DUCTWORK AND ACCESSORIES

A. Materials and joints:

- 1. Ductwork shall be galvanized sheet metal except as herein noted.
- 2. The gauge of metal, type of joints, hanging, reinforcing and other details of construction shall conform to the SMACNA HVAC Duct Construction Standards for commercial installations. Residential round duct construction gauges and fittings allowed.
- 3. Supply duct shall be lined for minimum of 3' for sound attenuation.
- 4. Static pressure classes shall be as required by the fan system and acoustical requirements with 1" classification minimum.
- 5. Flexible duct:
 - a. Shall be listed by UL under Class One air duct and UL 181. All flexible ducts, even low pressure ducts, shall be 4" pressure class to increase longevity.
 - b. Length shall not exceed 5 feet and shall be oversized as specified under Design Criteria. Ducts shall be supported and required by CMC.
 - c. Vinyl or zinc coated steel helix duct, shall be used on supply air systems with air temperatures greater than 120°F.
 - d. Flexible duct, other than acoustical flex duct, shall consist of a vinyl or zinc coated steel helix, solid liner and outer sheathing. Aluminum duct is also acceptable provided noise criteria can be met.
 - e. Flexible duct on supply air systems shall include 1" fiberglass insulation.
 - f. Final duct shall be installed with bends to maximize noise attenuation.

B. Duct Flexible Connectors

- 1. Duro Dyne Insulflex or equal.
- 2. R=4.2

3. Factory attached to 3" wide metal on both sides of flexible connections.
4. Constructed in accordance with UL 181, Class 1, air duct with flanged connections.
5. Flexible, neoprene-coated glass fabric not lighter than 30oz/sq.yd.

C. Ductwork Sealing

1. Comply with Title 24 energy Standards and UL 181, UL 181A and UL 181B
2. All ductwork shall be sealed per SMACNA sealing class 'A'.
3. Seal the gores of gored elbows and end caps.
4. Duct sealant shall be Foster 32-17 "SAFETEE™ Duct Sealant" which is water based. Pressure applied tapes are not acceptable.
5. Gasketed joints (e.g. TDC, TDF, and Ductmate) and longitudinal joints with sealant installed during fabrication do not require additional sealing.
6. Flexible ducts shall be connected using Panduit strap on the inner liner, sealed with tape, then the outer liner shall be sealed with tape.
7. Outdoor duct exposed to weather:
 - a. Four bolt connector type joints utilize interior joint gasket material, a bead of butyl rubber sealant at the joint and continuous "metal" clip or cleat over the top of all four (4) joints; top, bottom and sides.
 - b. Other joints including S & drive and longitudinal joints utilize butyl rubber foil backed tape or mastic with canvas.

2.3 DAMPER REGULATORS

A. Manufacturers:

1. Ventfabrics.
2. Ventlock.
3. Young.

B. At accessible dampers, provide locking quadrant operators.

1. Un-insulated ducts: Young No. 403.
2. Insulated ducts: Young No. 403B

C. At inaccessible dampers, provide with remote operators.

1. Flush to Ceiling: Young 270-301-EZ mounting bracket for Bowden Cable Controls. Use with Young 5020CC round or 830ACC rectangular dampers OR 270-301-EZ-B kit for dampers furnished separately.
2. Alternatively provide Young 270-275 for controller mounted in diffuser/register.

2.4 AIR OUTLETS

A. Titus, Price, Krueger, Metal-Aire, Continental, Tuttle & Bailey, Shoemaker, or equal

B. Styles

1. Historically compatible in certain rooms; coordinate with architect.
2. General

- a. Ceiling supply diffusers: Perforated face with deflector in neck (Titus PSS or equal with black interior) or other grilles with Architect's approval.
 - b. Ceiling return/exhaust grilles: perforated face grilles with black interior, or other grilles with Architect's approval.
 - c. Sidewall grilles, double deflection side wall grilles, or other grilles with Architect's approval.
 - d. Floor grilles: Steel face or extruded aluminum, no face screws, designed to withstand the abuse of chairs.
 - e. Toe kick grilles: Steel face or extruded aluminum to match floor grilles.
- 3. Egg-crate grilles not acceptable in any location.
- 4. Opposed blade dampers not allowed on any grilles.
- C. Borders and Frames
 - 1. Diffuser trim to match ceiling type
- D. Interior of perforated diffusers (back-pan and blades) painted flat black
- E. All visible portions of grille boxes painted flat black on the inside; grille box duct liner pins painted black

2.5 FILTERS

- A. Farr, Flanders, or equal
- B. Ducted system shall have a minimum MERV 13 rating.
- C. Construction Filters: Provide temporary construction filters.
- D. Start-up Procedures: Supply fans shall not be operated unless filters are installed; including temporary filters for use during construction. If the final pressure drop of the temporary filters is reached during construction or test and balance, replace them with a spare set. Remove temporary construction filters and install clean final filters before air balancing.

2.6 DUCT INSULATION

- A. Certainteed, Owens Corning, Manville, Knauf or equal
- B. Insulation shall:
 - 1. Meet minimum thickness requirements of Title 24 and CMC.
 - 2. Meet mold, humidity, and erosion resistance requirements of CMC Standard.
 - 3. Have flame spread not more than 25 and smoke density of not more than 50 when tested as a composite installation per CMC.
- C. Ductwork shall be insulated/lined as follows:
 - 1. In concealed space, including ceiling plenum: Shall be insulated with 1-1/2" Fiberglass, 3/4 lb. density, faced Duct Wrap.
 - 2. Exposed to outdoors: Shall be internally lined with Certainteed Toughgard Duct Liner, 1-1/2 lb. density, 2" thick.
 - 3. Plenums at fan inlet and discharge, for acoustical attenuation: Shall be internally lined with Certainteed Toughguard Duct Liner, 1-1/2 lb. density, 1" thick.

4. Longitudinal joints shall be stapled. For rectangular ducts exceeding 24 inches, insulation on the bottom shall be additionally secured with adhesive.

2.7 REFRIGERANT PIPING

- A. Piping materials shall be Type hard drawn ACR Copper acc. ASTM Standard B280.
- B. Comply with ASME B31.5 Refrigeration piping and ASHRAE Standard 15
- C. Joints shall be brazed using Silv-Phos high-temperature solder melting point above 900°F, StaBrite not allowed.
- D. Insulate all refrigerant piping per Title 24.

2.8 EXHAUST FANS

- A. Provide back draft dampers on exhaust fans as required complying with code and Title 24.
- B. Motors: Factory stock on direct drive less than ¾ horsepower.

2.9 VIBRATION ISOLATORS

- A. Manufacturers
 1. Vibration Isolation
 - a. Mason Industries, Inc.
 - b. Kinetics Noise Control, Inc.
 - c. M.L. Saussé & Co. (Vibrex).
 - d. Or equal.
 2. Seismic Restraints
 - a. Hangers: Any manufacturer who can verify compliance with SMACNA standards and the California Building Code.
 - b. Strut – Channel Framing: Any manufacturer who can verify compliance with California Building Code standards.
 - c. Anchors – Drill-in, wedge type: Any manufacturer within the ICBO standards approved for seismic.
 - d. Snubbers: Any manufacturer within the California Building Code standards.
- B. Vibration Isolator Types
 1. Housed isolation
 2. Size for weight of unit and associated items that hang from the springs.
 3. Spring isolators shall incorporate the following:
 - a. All spring to be single soil steel with minimum spring coil outer diameter of 0.8 of loaded operating weight.
 - b. Horizontal spring stiffness within 0.8 to 1.25 times rated vertical spring stiffness.
 - c. Corrosion resistance where exposed to corrosive environment with:
 - 1) Springs neoprene coated
 - 2) Hardware cadmium plated
 - 3) All other metal parts hot dipped galvanized
 - d. Reserve deflection (from loaded to solid height) of 50% of rated deflection.
 - e. Minimum 6 mm (1/4”) thick neoprene acoustical base pad on underside, unless designated otherwise.

- f. Designed and installed so that ends of springs remain parallel; neoprene cups not acceptable.
 - g. Noise pads of 1/2 inch or 1 inch thickness below the spring base to reduce the chance that the springs shall be resonant with the equipment forcing frequencies or support structure.
 - h. Leveling device.
 - i. Where operating weight differs from installed weight provide built-in adjustable limit stops to prevent equipment rising when weight is removed. Stops shall not be in contact during normal operation.
- 4. Type "C" – spring hanger rod isolators shall incorporate the following:
 - a. Spring element seated on steel washer within neoprene cup.
 - b. Steel retainer box encasing spring and neoprene cup.
 - c. Minimum 1/2 inch clearance between retainer box and spring hanger rod.
 - d. Minimum 15 degrees angular clearance between rod and retainer box.
 - e. Equal to Mason 30N.
 - 5. Type "F" – pad type elastomeric mountings to incorporate the following:
 - a. 5/16 to 3/8 inch minimum thickness per layer.
 - b. 50 psi maximum loading
 - c. Ribbed or waffled design.
 - d. 1/16 inch galvanized steel plate between multiple layers of pad thickness.
 - e. 1/16 inch deflection per pad thickness.
 - f. Suitable bearing plate to distribute load.
 - g. Bolts through equipment and pad shall be oversized and provided with resilient washers, bushings and lock nuts.
 - h. Equal to Mason Type W series.
 - 6. Type "H" – Combination spring/elastomeric hanger rod isolators to incorporate the following:
 - a. Spring and neoprene isolator elements in steel box retainer.
 - b. Characteristics of spring and neoprene as described in Type "C" hanger isolators.
 - c. Factory preloading to 75 percent of rated load.
 - d. Equal to Mason PC30N.

C. Anchors, Inserts and Fasteners

- 1. All anchors and inserts shall be installed according to the CBC standards.
- 2. Do not use any anchor or insert in concrete which does not have a signed structurally engineered design value based on its installed applications and one of the following:
 - a. ICBO evaluation report.
 - b. Lab test report verifying compliance.
- 3. Powder Actuated Anchors
 - a. Not allowed on initial building construction; allowed only for revisions made after initial construction and with Owner approval.
 - b. Hardened steel stud with threaded shank; size or shank to match hanger rod size.
 - c. Use only with non-shock loads.
 - d. Maximum load safety factors:
 - 1) Maximum anchor load: 100 ponds.
 - 2) Static loads: 5
 - 3) Vibratory loads: 8-10
 - e. For concrete and steel: not to be used for light weight concrete, brick or concrete block.
 - f. 10% testing rate required, testing by contractor.
 - g. Similar to Omark "Drivit".

4. All over-head concrete anchors or inserts shall be selected to comply with ICBO report or CBC table for the anchor or insert.
5. Torque testing of anchors shall be allowed to verify compliance of anchor installation. However, torque testing shall not justify usability of anchor. Only load or pull testing shall be allowed to justify usability of anchors. Failure of torque shall constitute failure of anchor.
6. Bolts and nuts
 - a. Bolts and heavy hexagon nuts: ANSI B18.2.1 and ASTM A307 or A576.
 - b. Bolts, underground: ASTM A325.
 - c. Expansion anchors: Federal Specification A-A-1992.

2.10 SEISMIC RESTRAINTS

- A. Provide seismic restraints to meet the more stringent requirements of the CBC or the local building code.
- B. Restraints shall not short-circuit vibration isolation equipment under normal operation.
- C. Design and provide restraints to prevent permanent displacement in any direction caused by lateral motion, overturning, or uplift of HVAC equipment, piping and ductwork. Restraints shall meet requirements of CBC.
- D. Published specifications standards, tests or recommended methods of trade, industry or governmental organizations apply to work in this section:
 1. NUSIG – National Uniform Seismic Installation Guidelines.
 2. “Guidelines for Seismic Restraints of Mechanical Systems and Plumbing Piping Systems”
 - a. Published by SMACNA and PPIC.
 - b. Approved by State of California.
 3. CBC – California Building Code
 4. CMC – California Mechanical Code
 5. General:
 - a. Capable of safely accepting indicated external forces without failure.
 - b. Maintain equipment, piping and ducts in a captive position.
 6. Seismic Design Criteria
 - a. $Z = 0.40$.
 - b. $I_p = 1.00$
 - c. Soil Profile Type plus the value of N_a (in lieu of a value for C_a) as required for Section 1632 of CBC calculation of seismic design force F_p .
 7. Bracing system - One of the following methods as most applicable for each brace:
 - a. Material used, except for pipes, shall be structural steel with ASTM A36. Steel pipes shall conform to ASTM A501.
 - b. Complete system of factory fabricated components.
 - c. Complete system of job fabricated components.
 - d. Miscellaneous metal structural shapes.
- E. Manufacturers:
 1. Hangers: Any manufacturer who can verify compliance with the NUSIG standards.

2. Strut – Channel Framing: Any manufacturer who can verify compliance with the NUSIG standards.
3. Anchors:
 - a. Poured in place – Any manufacturer within the NUSIG standards.
 - b. Drill In – Any manufacturer within the NUSIG standards.

F. Seismic load calculations for mechanical equipment, piping, and ductwork.

1. Calculations required for supports and bracing for situations not covered by referenced “Guidelines”.
2. Include horizontal and vertical loads at connections to building structures for all seismic restraints, including those covered by referenced “Guidelines”. Coordinate reaction loads and attachment details with structural engineer for building.
3. Calculations made and signed by registered structural engineer knowledgeable in seismic design:
 - a. Hired under this Section of work.
 - b. Cost of calculations borne under this Section.

G. Anchors, Inserts and Fasteners

1. General
 - a. Capable of safely accepting indicated external forces without failure.
 - b. Maintain equipment, piping and ducts in captive position.
2. All anchors and inserts shall be installed according to the NUSIG standards.
3. Do not use any anchor or insert in concrete which does not have a signed structurally engineered design value based on its installed application and one of the following:
 - a. ICBO evaluation report.
 - b. Lab test report verifying compliance.
4. All over-head concrete anchors or inserts shall be selected from listings within NUSIG-AA and shall have maximum allowable design tension or shear values no greater than those listed within NUSIG-AA.
5. All anchors, inserts or connections to the structure shall be submitted to the Contracting Officer for approval.

2.11 IDENTIFICATION OF PIPING

A. Above ground piping:

1. All piping is to be identified as follows: Brady Perma-Code, MSI Marking Services Inc., or equal, pressure sensitive pipe markers consisting of pipe content wording and arrow indicating directions of flow on ANSI color background. Arrow and wording are two separate markers which shall be placed immediately adjacent to each other. Provide at each end of each marker, two and one-fourth inch wide self-sticking clear tape around periphery of pipe or insulation to further secure marker. All markers shall be applied to clean surfaces free of dust, grease, oil or any other material which will prevent adhesion. Install after cleaning, painting and insulation is complete. Pipe identification shall comply with ANSI A13.1 for the “Scheme Identification of Piping Systems”.
2. Location and visibility for pipe identification:
 - a. On all horizontal runs spaced twenty feet (20') maximum but not less than once in each room at entrance and exit of each concealed space.
 - b. At each branch and riser takeoff.
 - c. Within one foot (1') of each valve and control device.

- d. At every change in directional flow.
- e. At every pipe passage through wall, floor and ceiling construction.
- f. Where capped piping is provided for future connections, provide legible and durable metal tags indicating symbol identification.
- g. At all wall and ceiling access
- h. Near major equipment items and other points of origination and termination.
- i. Attention shall be given to visibility with reference to pipe markings. pipe lines are located above or below the normal line of vision; the lettering be placed below or above the horizontal centerline of the pipe.

3. ANSI Color Coding of Piping:

SERVICE	COLOR OF FIELD	COLOR OF TEXT
Refrigerant	Blue	Mauve (Pink)

4. Size of Legend Letters:

OUTSIDE DIAMETER OF PIPE COVERING	MINIMUM LENGTH OF COLOR FIELD	MINIMUM SIZE OF TEXT
$\frac{3}{4}$ " to 1-1 $\frac{1}{4}$ "	8"	$\frac{1}{2}$ "
1 $\frac{1}{2}$ " to 2"	8"	$\frac{3}{4}$ "

2.12 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
7. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 RECORD DRAWINGS

- A. Keep an accurate dimensional record of installed systems and equipment. Maintain a set of record ("as-built") drawings up to date as construction progresses. Drawings shall be maintained at the jobsite and available for inspection by the general contractor, other subcontractors, and Owner's representatives.

3.2 INSTALLATION AND WORKMANSHIP

- A. All equipment and material shall be installed in a neat and workmanlike manner.
- B. On closed systems, supplement inhibitor if system is fully or partially drained.
- C. Repair all damaged or temporarily removed walls, roofs, roofing, equipment, etc.
- D. Follow manufacturer's installation instructions and recommendations.
- E. Thoroughly clean all equipment, free of dust, scale, filings, plaster, grease, oil, paint, and other construction debris.
- F. All equipment must be anchored to the building. All hung equipment shall incorporate vibration isolation.

3.3 CLEANING

- A. General
 - 1. During construction:
 - a. Keep openings in piping closed to prevent entrance of foreign matter.
 - b. Clean pipe, fittings, and valves internally.
- B. Ducts: Vacuum any visible debris from inside ducts, duct plenums, and grille boxes.
- C. Thoroughly clean all equipment, ducts, etc. free of dust, scale, filings, plaster, grease, oil, paint, and other construction debris.
- D. Use connected fan(s) to blow air through all duct systems until they are free of all foreign materials.

3.4 PROTECTION OF WORK DURING CONSTRUCTION

- A. Protect from damage, water, dust, etc., material, equipment and apparatus provided under this Division, both in storage and installed, until Notice of Completion has been filed.
- B. Provide protective covers, skids, plugs or caps to protect equipment and materials from damage and deterioration during construction. Protect exposed coils with plywood or other suitable rigid covers to avoid damage to fins.
- C. Cover motors and other moving machinery to protect from dirt and water during construction.
- D. Cover with plastic open ends of lined ductwork where exposed to weather.
- E. Material, Equipment or Apparatus

1. Material, equipment, or apparatus damaged because of improper storage or protection will be rejected.
2. Remove damaged material, equipment or apparatus from site and provide new, duplicate, material, equipment, or apparatus in replacement of that rejected.
3. Porous materials, such as pipe insulation, shall be protected from weather. If such material becomes wet during construction, it shall be removed and replaced at no cost to Owner; drying is not sufficient due to possible microbial contamination.

3.5 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.6 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."
- B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 1. Near each valve and control device.
 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

3.7 DUCTWORK

- A. Duct leakage testing: Not required.

3.8 PIPING

- A. Install pipes and pipe fittings in accordance with recognized industry practices which will achieve permanently leak resistant piping systems, capable of performing each indicated service without piping failure. Install each run with minimum joints and couplings but with adequate and accessible unions for disassembly and maintenance/replacement of valves and equipment. Reduce sizes where indicated by use of reducing fittings. Align piping accurately at connections, within 1/16th-inch misalignment tolerance.
- B. Escutcheons: Provide stainless steel escutcheons at piping penetrations of walls where exposed to public view and required for proper appearance. Provide galvanized steel escutcheons at penetrations of masonry walls elsewhere. Escutcheons not generally required at drywall penetrations where not exposed to public view.

C. Sleeves

1. Provide sleeves where pipes pass through floors above grade, roofs, poured-in-place masonry walls, and exterior walls
2. Sleeves shall be standard weight steel pipe, except sleeves for concealed piping through floors not in structural members may be 25-gauge galvanized sheet metal.
3. Floor sleeves for piping shall extend from the bottom of the slab to 2-inches above the finished floor.
4. Seal between piping and sleeve with fire-rated caulk at all penetrations of fire-rated partitions and floors
5. Make sleeves through outside walls watertight. Caulk between uninsulated pipe and sleeve
6. Size sleeves for insulated pipes to allow full thickness insulation.

3.9 LEAKAGE TESTING

- A. Duct leakage testing: Duct leakage tests are not required, unless required by code, but the Owner may elect to conduct one at his cost. If tests are performed, they shall be in accordance with the SMACNA Duct Leakage Testing Manual. If duct systems do not meet the leakage classes listed in this manual at applicable duct rating pressure, leaks shall be sealed and tests rerun, both at the HVAC contractor's expense.

3.10 VIBRATION ISOLATION

A. Installation

1. Install isolators and seismic restraints in accordance with manufacturer's written instructions.
2. Vibration isolators must not cause any change of position of equipment or piping resulting in piping stressor or misalignment.
3. Make no rigid connections to isolated equipment and building structure that degrade noise and vibration isolation system herein specified.
 - a. Electrical conduit connections to isolated equipment shall be flexible liquid tight conduit of sufficient length to incorporate a right-angle bend, an offset of not less than 8 inches or a loop to allow free motion of equipment.
 - b. The HVAC Sub-contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building" unless permitted in this Specification. Building includes, but is not limited to, beams, studs and walls, except slab mounted equipment.
 - c. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering or electrical, to avoid any contact which would reduce the vibration isolation.
4. Do not use isolator leveling bolts as jacking screws.
5. Verify that all installed isolators and mounting systems permit equipment motion in all directions.

- B. Floor Mounted Equipment: No spring vibration isolation required, mount equipment on resilient pads.

C. Equipment Isolation

1. Provide 1-inch operating clearance between equipment or structural bases and housekeeping pad.
2. Position equipment, structural base and concrete bases on blocks or wedges at proper operating height.
3. Provide operating load conditions prior to transferring base isolator loads to springs and removing wedges.
4. Adjust or provide additional resilient restraints to flexibly limit start-up equipment lateral motion to ¼ inch.
5. Prior to start-up, clean out all foreign matter between bases and equipment.
6. Verify that there are no isolation short circuits in the base, isolators or seismic restraints or conduit, pipe and duct connections.
7. Position all corner or side seismic restraints with equipment in operation for proper operating clearance. Weld or bolt seismic restraints to seismic anchor plates in housekeeping pad.

D. Piping and Ductwork Isolation

1. Piping and Ductwork: No spring isolation required.
 - a. Option: Hang piping and ductwork using resilient hangers.
2. Flexible Duct Connections
 - a. Install at connections to fans and air handling units.
 - b. 2 inch slack in fabric: install to allow minimum movement of 1 inch in both tension and compression.
 - c. Protect from direct solar and rain exposure with sheet metal shroud where outdoors or use UV-resistant flexible duct material.

3.11 SEISMIC CONTROL

- A. Install seismic restraints for pipes, ducts, and equipment per CBC and SMACNA or Mason Industries Guidelines for pipe and duct bracing.
- B. Design and provide restraints to prevent permanent displacement in any direction caused by lateral motion, overturning, or uplift.
 1. Prepare designs and include on shop drawings, including arrangements, sizes and model numbers indicated or referenced in applicable standards. Each shop drawings shall bear a Structural or Civil Engineer's stamp and signature registered in the State of California.
 2. Where designs, etc., are neither indicated nor referenced, contractor shall submit such designs, together with supporting calculations prepared by Structural or Civil Engineer registered in State of California. Calculations shall substantiate seismic restraint capability to safely accept external forces without failure and maintain equipment in position.
 3. Capable of safely accepting external forces per CBC without failure.
- C. Provide resilient restraining devices as required to prevent motion is excess of ¼ inch.
- D. Coordinate seismic bracing requirements with other sections to result in:
 1. Vertical pipe and duct restraints to coincide with and take place of required hangers.
 2. Longitudinal pipe bracing to coincide with required pipe anchors.

- E. Bracing shall not short circuit vibration isolation systems or transmit objectionable vibration or noise.

3.12 STARTUP

- A. Fully complete all manufacturer's start-up instructions and recommendations.
 - 1. Start, test, and perform complete start up, operating and performance tests on
 - a. Fans
 - b. Heat Recovery units
 - c. Exhaust Fans
 - d. Other operating equipment identified on plans.
- B. Start-up Procedures
 - 1. Follow the manufacturers' instructions.
 - 2. Record all readings from startup testing and include in Operations and Maintenance Manual. See § 1.17C.2

3.13 TESTING AND BALANCING

- A. Test and adjust all items of heating, ventilating and air conditioning system to provide design conditions
 - 1. Test and adjust all items of air conditioning system to provide design conditions. Testing and balancing shall be performed in complete accordance with AABC or NEBB National Standards for Field Measurements and Instrumentation as applicable to air distribution and hydronic systems.
 - 2. A test and balance report and testing procedure submittal is ***required as part of the HVAC submittals***. The test and balance submittal must include a copy of all the reports that will be submitted for the final test and balance report and a written description of the balance procedures.
 - 3. In general, systems shall be balanced so that one or more balancing valves/dampers remains wide open; if further flow reduction is required, fan or pump speed shall be reduced, or impellers trimmed (in the case of pumps).
 - 4. Air Systems
 - a. Test and adjust each air outlet and intake to within 10% of design requirements.
 - b. Each grille, diffuser and register shall be identified as to locations and area. Size, type and manufacturer of diffusers, grilles, and registers shall be identified and listed. Readings and tests of diffusers, grilles, and registers shall include design, initial test, and final adjusted FPM velocity and CFM.
 - c. Total air quantities for all air-handling units shall be determined by pitot tube traverse of main ducts, traverse of filter banks of coils, and by totaling the readings of individual air outlets. All three methods should be employed where possible so that comparisons can be made.
 - d. Total air quantities shall be obtained by adjustment of fan speeds. The HVAC contractor shall include the costs of dampers, pulley and belt changes in his contract.
 - e. Test and adjust scheduled airflows to each VAV box within 10% of design requirements (if used).
 - f. Minimum outside air quantities shall be established by pilot tube traverse of outside air duct or louver, or by deduction from pitot traverse of return air and outside air ducts. Balance by measurement of return air, outside air, and mixed air temperatures shall NOT be used due to inherent inaccuracy.

5. Provide at completion of running tests, two (2) complete sets of data listed below for all items of equipment for incorporation in Owner's Operation and Maintenance Manual for the job.
 - a. Name and address of testing agency and name of individual responsible for the work.
 - b. Make, model and latest calibration date of testing equipment.
 - c. Sketch or written description sufficient to identify individual devices tested
 - d. Final air and water quantities and static pressures at each piece of air handling equipment.
 - e. Manufacturer, size, model, serial number, motor hp, rpm, voltage, full load amps, v-belt sheave sizes, grooves, belts, sizes, length, starter heater size, rating and fuse size of each fan, filter quantity size and type, variable speed drive and pump.
 - f. Pertinent running test data, including final instrument set points and adjustments as left.

3.14 FINAL DOCUMENTATION

- A. It shall be the responsibility of the mechanical contractor to submit all applicable Title 24 NRCC and Green Building forms as they apply for obtaining the Final Certificate of Occupancy.
- B. The installing controls contractor shall put all systems back into proper operation for normal conditions after each phase of the Acceptance Requirements for Code Compliance is completed.

END OF SECTION

SECTION 23 08 00

COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Supplementary General Conditions, Division 01 - General Requirements, and Division 23 are hereby made a part of this Section as if repeated herein.

1.2 DEFINITIONS

- A. Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. ATT: Acceptance Test Technicians, Trade Contractor designated responsible individual.
- C. CC: Commissioning Coordinator
- D. CxA: Commissioning Authority.
- E. HVAC&R: Heating, Ventilating, Air-Conditioning, and Refrigeration.
- F. Systems, Subsystems, Equipment, and Components: Where these terms as used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

1.3 WORK INCLUDED

- A. Commissioning of selected systems and equipment specified under Division 23 - Heating, Ventilating, and Air-Conditioning (HVAC).

1.4 RELATED SECTIONS

- A. Section 01 91 00, COMMISSIONING.

1.5 CONTRACTOR'S RESPONSIBILITIES'

- A. Perform commissioning tests as prescribed on the Acceptance Test requirements form NRCC-MCH-01-E, Section 23 05 93 Testing, Adjusting, and Balancing for HVAC, Controls per Sections 23 09 00 and 23 09 23, and control sequences as outlined in referenced specifications and/or plans.
- B. Attend construction phase controls coordination meeting.
- C. Attend testing, adjusting, and balancing review and coordination meeting.
- D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection.
- E. Provide information requested by the CxA for final commissioning documentation.

1.6 CxA's RESPONSIBILITIES

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- A. Review project specific construction checklists and commission process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.
- B. Provide test data, inspection reports, and certificates in Systems Manual.

1.7 CC RESPONSIBILITIES

- A. Visual observation of commissioning testing as performed by the ATT.
- B. Verify testing, adjusting, and balancing of Work are complete.

1.8 COMMISSIONING SCOPE

- A. Work includes the completion and documentation of formal commissioning procedures by the Contractor on selected equipment and systems as outlined below. Commissioning is defined as the process of verifying and documenting the installation and performance of selected building systems to meet the specified design criteria, thereby satisfying the design intent and the Owner's operational needs. Refer to Section 01 91 00 Commissioning for detailed description of the commissioning process.
- B. The Trade Contractor shall be responsible for participation in the commissioning process as outlined in this specification, section 01 91 00 Commissioning, and as directed by the CC as overseen by the CxA.
- C. Fully commission the following equipment and systems:
 - 1. In-line outside air supply fans.
 - 2. Ceiling exhaust fans.
 - 3. Heat recovery system including outdoor unit and indoor fan coils and associated appurtenance.
 - 4. Sawdust collection system.
 - 5. Testing and Balancing Air systems.
 - 6. Building HVAC control systems.
 - 7. Alternative systems as proposed by Mechanical Contractor.

1.9 RESOURCES

- A. Provide required personnel with tools and equipment necessary to perform testing specified in this Section.
- B. Provide equipment factory representative for startup work as necessary or as specified.
- C. Provide the following information to the CxA for inclusion in the commissioning plan:
 - 1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
 - 2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
 - 3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
 - 4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.

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5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

PART 2 - PRODUCTS

2.1 DOCUMENTATION

- A. The Trade Contractor has specific responsibilities for assisting in the development of test procedures and test forms, and in performing and documenting commissioning tests, as directed by the CC and as overseen by the CxA.
- B. The Trade Contractor shall provide, wherever the Project Documents require, systems check and testing, test reports, checklists, operational verifications and demonstration, or other similar language, written testing procedures and documentation of tests, whether specified or not in the commissioning sections.
- C. The CC shall identify personnel responsible for specific commissioning tasks.

2.2 TEST EQUIPMENT

- A. The Trade Contractor shall provide all test equipment, whether specified or not, to execute Functional Performance Tests.
- B. The test equipment shall be provided in sufficient quantities to execute testing in an expedient fashion.
- C. The test equipment shall be of industrial quality and suitable for testing and calibration with accuracy within the tolerance necessary to demonstrate system performance.
- D. Equipment shall be certified to an accuracy of 10% of the smallest tolerance to be measured. For example, if a flow meter is required to be ± 5 gpm, the calibration device must have an accuracy of ± 0.5 gpm.
- E. The test equipment shall have calibration certification per equipment manufacturer's interval level or within one year if not specified.

PART 3 - EXECUTION

3.1 GENERAL

- A. All tests and readings during the equipment and system start-ups shall be recorded with signature of the Contractor's technician performing work and date work as performed.
- B. Verify that operations manual/procedures are complete, on-site, and fully reviewed by Contractor's start-up technician prior to start-up and testing.

3.2 START-UP AND INITIAL CHECKOUT

- A. The Contractor shall follow the start-up and initial checkout procedures specified for each system and piece of equipment.
- B. Inspect equipment and confirm that it is clean and ready for operation with all shipping tags and restraints removed.
- C. This work shall be performed by the Contractor with the assistance of factory personnel where specified.
- D. All tests and readings during the equipment and system start-ups shall be recorded with signature of the Contractor's technician performing work and date work was performed.

3.3 COMMISSIONING

- A. Participate as a member of the Commissioning Team:
 - 1. Commissioning Team, Commissioning Coordinator, Commissioning Schedule, and System/Equipment Matrix are defined in Section 01 91 00 Commissioning.
 - 2. Assist the Commissioning Coordinator in the creation and maintenance of the Commissioning Schedule and System/Equipment Matrix.
 - 3. Provide regular feedback to the Commissioning Coordinator as to the status of tasks identified in the Commissioning Schedule.
 - 4. Attend Commissioning Team meetings.
- B. Acceptance/Functional Tests:
 - 1. Prepare functional checklists for each piece of equipment and each system listed in §1.4.B. Acceptable forms shall be submitted to Owner's Representative for review.
 - 2. Verify that start-up is complete prior to starting functional testing.
 - 3. Provide all materials and labor, including testing and inspection, to complete the functional checklists.
 - 4. Collect checklists and submit to the Owner's Representative for review and approval.
 - 5. Address Owner's Representative punch list items before functional testing begins.
- C. Testing, Adjusting, and Balancing:
 - 1. See Section 23 05 93 Testing, Adjusting and Balancing.
 - 2. Complete test and balance of all air and/or hydronic systems, including spot checks, with discrepancies and problems remedied before functional testing begins.
- D. Functional Testing:
 - 1. Review functional test procedures to ensure feasibility, safety and equipment protection and provide revisions deemed to be necessary in writing to Commissioning Coordinator.
 - 2. Provide skilled personnel to assist in balancing air systems and implementation of proper controls in accordance with Title 24 requirements' and demonstration of system performance. Coordinate required skills with Controls Contractor.
 - 3. The installing Division 23 Contractors shall retain responsibility for complete and fully functional systems and sub-systems installed under their contract. Commissioning procedures and functional testing do not relieve or lessen this responsibility.
- E. Remedial Work: See Section 01 91 00 Commissioning.

3.4 TRAINING

- A. Provide and document, per CGC 5.410.2.5.2, a program for training of the appropriate maintenance staff for each piece of equipment type and/or system.

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3.5 COMMISSIONING REPORTS

- A. For each piece of equipment or system listed in §1.8.C provide the following where applicable:
 - 1. Start-up and Factory Test Reports.
 - 2. Acceptance/Functional Test Reports.
 - 3. Testing, Adjusting, and Balancing Report per Section 23 05 93 Testing, Adjusting and Balancing.
 - 4. Training: Submit Training documentation per §3.4 Training.
- B. Provide reports to Owner's Representative per CGC 5.410.2.5 and CGC 5.410.4.5 the requisite documentation and Training, Operation & Maintenance Manual with detailed systems manual and systems instruction along with instructions and copies of guaranties/warranties for each system. Included shall be OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.

END OF SECTION

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