



Johnson Student Center

1530 W. 17TH STREET, SANTA ANA, CA 92706

INCREMENT 2

NEW BUILDING



Technical Specifications Volume 1

August 13, 2018



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Johnson Student Center

1530 W. 17TH STREET, SANTA ANA, CA 92706

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HPI Architecture

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08.06.2018

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SIGNED: 08/06/18

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT

04 116810

ACS PB FLS RF SS cy

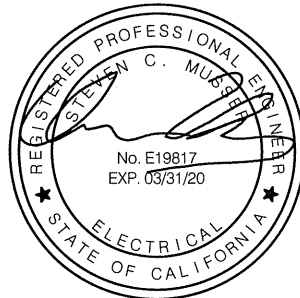
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08.06.2018

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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 – GENERAL

1.01 SUMMARY

- A. The Project consists of new construction of the Johnson Student Center at Santa Ana College for Rancho Santiago Community College District, in compliance with the Contract Documents and Code requirements. The scope of work includes:
 - 1. Building Demolition: Demolition of the existing Johnson Center Building in its entirety and slab on grade and surrounding site structures, features and landscape/irrigation.
 - 2. Increment 1 - Demolition of the existing Johnson Center Building foundation including piles and pile caps, existing underground utility lines, and surrounding site and earthwork, over-excavation, recompaction of soil, and placement of engineered fill material in preparation for new building.
 - 3. Increment 2 - New Building: Architectural, structural, mechanical, electrical, plumbing, fire alarm, IT and AV systems and fire suppression system. Site improvement includes, accessible path of travel, accessible parking stalls, road improvement, hardscape and landscape improvements.
- B. The furnishing of all labor, materials, equipment, services, and incidentals necessary for Work of Johnson Student Center, 1530 W. 17th Street, Santa Ana, California 92706.

1.02 RELATED DOCUMENTS

- A. Master Facilities Lease Agreement
- B. Drawings
- C. Specifications

1.03 USE OF PREMISES

- A. Contractor shall sequence, coordinate, and perform the Work to impose minimum impact on the operation and use of the facilities and/or Project site. Contractor shall install all necessary protection for existing improvements, Project site, property, and new Work against dust, dirt, weather, damage, vandalism, and maintain and relocate all protection to accommodate progression of the Work.
- B. Contractor shall confine entrance and exiting to the Project site and/or facilities to routes designated by the District Representative.
- C. Contractor to coordinate with District Representative to obtain keys. Contractor will be required to sign a release form. Key requests need to be made three (3) days in advance. If Contractor loses a key or fails to return a key to the District, Contractor shall be fined \$1,000 for each key lost.
- D. Obtain and pay for the use of field offices, storage, work areas, or parking needed for operations or Contractor's employees. Obtain and pay for all public right of way fees associated with utility connections, street use permits and protective canopies over public right of ways.
- E. Within existing facilities, District Representative may remove portable equipment, furniture, and supplies from Work areas prior to the start of Work. Contractor shall cover and protect remaining items in areas of the Work.
- F. Provide and maintain unimpeded access for police, fire fighting, or rescue equipment.
- G. Contractor is advised school may be in session during performance of the Work. Contractor shall utilize all available means to prevent generation of unnecessary noise/vibrations and maintain noise/vibration levels to a minimum. When required by the District Representative, Contractor shall immediately discontinue noise-generating activities and/or provide alternative methods to minimize noise generation. Contractor shall install and maintain air compressors, tractors, cranes, hoists,

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vehicles, and other internal combustion engine equipment with mufflers, including unloading cycle of compressors. Contractor shall discontinue operation of equipment producing objectionable noise as determined by District Representative and/or District Representative. When applicable, District Representative will provide a testing schedule to indicate when work may not occur.

- H. Contractor shall furnish, install, and maintain adequate supports, shoring, and bracing to preserve structural integrity and prevent collapse of existing improvements and/or Work modified and/or altered as part of the Work.
- I. Contractor shall secure site, building entrances, exits, and Work areas with locking devices in an acceptable manner to District Representative.
- J. Contractor assumes custody and control of Owner property, both fixed and portable, remaining in existing facilities vacated during the Work.
- K. Contractor shall cover, maintain, and protect surfaces of rooms and spaces in existing facilities turned over for the Work, including Owner property remaining within as required to prevent soiling or damage from dust, dirt, water, and/or fumes. Contractor shall protect areas adjacent to the Work in a similar manner. Prior to Owner occupancy, Contractor shall clean all surfaces including Owner property.
- L. Contractor shall protect all surfaces, coverings, materials, and finished Work from damage. Mobile equipment shall be provided with pneumatic tires.
- M. The District reserves the right to place and install equipment in areas of the Project prior to Substantial Completion provided that it doesn't interfere with the completion of the Work. This partial occupancy shall not constitute acceptance of the Work by the District Representative.
- N. Contractor shall not permit the use of portable and/or fixed radio's or other types of sound producing devices including Walkman's, iPod's, and similar devices.

1.04 EXISTING CONDITIONS

- A. Contractor shall document the existing site and produce still photographs or video recording on DVD, sufficiently detailed, of existing conditions of adjoining construction, roads, and site improvements that might be misconstrued as damage caused by construction operations.
- B. Contractor shall protect items indicated to remain against damage and soiling during construction.
- C. Contractor shall sequence work in a manner that will prevent any damage upon new construction elements.
- D. Contractor shall replace any items damaged during construction.

1.05 WORK NOT IN CONTRACT

- A. The term "NIC" shall be construed to mean that portions of the Project are not to be furnished, installed or performed by the Contractor. The term shall mean "Not in Contract" or Not a Part of the Work to be performed by the Contractor" except that coordination and installation of certain NIC items specified shall be the Contractor's responsibility. District will award separate contracts for products and installation for the following work and other work as may be indicated on Drawings as NIC (Not in Contract), including:
 - a. Performing tests and inspections specified in the Contract Documents.
- B. When the work of this Contract requires the Contractor to make allowance for the above in his work, and to provide supports, power, conduits, stub-outs and other services to these items, the drawings, manufacturer's data and other information necessary for the Contractor's work will be provided by the District Representative upon request.

1.06 OWNER FURNISHED CONTRACTOR INSTALLED (OFCI) MATERIALS

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Certain materials identified in the Contract Documents as Owner Furnished Contractor Installed (OFCI) will be delivered to the Project site by the District Representative. Contractor shall unload, store, uncrate, assemble, install, and connect Owner supplied materials.

- A. Not less than One-Hundred and Twenty (120) days before the date the Contractor needs to have the OFCI materials on site, Contractor shall notify District Representative of the scheduled date for needed OFCI materials. Upon delivery to Project site, Contractor shall store OFCI materials inside rooms and/or protected spaces and will be responsible for security of OFCI materials until Substantial Occupancy. District Representative will sign receipt or bill of lading as applicable.
- B. Contractor shall, within ten days after delivery, uncrate and/or unpack OFCI materials in presence of District Representative who shall inspect delivered items. District Representative shall prepare an inspection report listing damaged or missing parts and accessories. District Representative shall transmit one copy of the report to Contractor. District Representative will procure and/or replace missing and or damaged OFCI materials, as indicated in inspection report.
- C. Contractor shall install OFCI materials in the locations and orientation as indicated in the Contract Documents. Contractor shall verify exact locations with District Representative before final installation of OFCI materials.
- D. If required, District Representative will furnish setting and or placement drawings for OFCI materials.
- E. Contractor shall install OFCI materials by proper means and methods to ensure an installation as recommended by the manufacturer. Contractor shall furnish and install all necessary fasteners and required blocking to properly install OFCI materials.
- F. Contractor shall install OFCI materials with manufacturer recommended fasteners for the type of construction to which the OFCI materials are being fastened and/or anchored.
- G. Contractor shall provide final connections of any electrical, signal, gas, water, waste, venting and/or similar items to OFCI materials. Contractor shall, prior to final connection, verify the operating characteristics of OFCI materials are consistent with the designated supply.

1.07 CONTACTOR FURNISHED OWNER INSTALLED (CFOI) MATERIALS

- A. Certain materials are identified in the Contract Documents as Contractor Furnished Owner Installed (CFOI). CFOI materials shall be delivered to District Representative by Contractor. Contractor shall furnish the following per the contract documents:
 - a. Key cores - Contractor to provide in accordance with Section 08 71 00, Door Hardware. Materials must be received directly from the manufacturer six months prior to occupancy.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION (Not applicable)

END OF SECTION 01 11 00

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SECTION 01 12 16 - PHASING OF THE WORK (INCREMENT 2)

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Requirements for phasing of the Work include logistics, phasing, and completion of designated phases prior to commencement of subsequent phases.

1.02 RELATED SECTIONS

- A. Section 01 11 00: Summary of Work.
- B. Section 01 31 13: Project Coordination.
- C. Section 01 32 13: Construction Schedule.
- D. Section 01 33 00: Submittal Procedures.
- E. Section 01 50 00: Construction Facilities and Temporary Controls.
- F. Section 01 77 00: Closeout Procedures.

1.03 SUBMITTALS

- A. Contractor shall submit a Project site logistics plan in accordance with and as required by this Section.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 LOGISTICS

- A. Prior to commencement of the Work, Contractor shall prepare and submit to the District Representative, a detailed Project site logistic plan, in the same size and scale of the Drawings, setting forth Contractor plan of the Work relative to the following, but not limited to, items:
 - 1. In accordance with local ordinances a truck access route to and from the Project site.
 - 2. The identification of any overhead wire restrictions for power, street lighting, signal, and/or cable.
 - 3. Local sidewalk access and street closure requirements.
 - 4. Protection of sidewalk pedestrians and vehicular traffic.
 - 5. Project site fencing and access gate locations.
 - 6. Construction parking.
 - 7. Material staging and/or delivery areas.
 - 8. Material storage areas.
 - 9. Temporary trailer locations.
 - 10. Temporary service location and proposed routing of all temporary utilities.
 - 11. Location of temporary and/or accessible fire protection
 - 12. Trash removal and location of dumpsters.
 - 13. Concrete pumping locations.
 - 14. Crane locations.

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15. Location of portable sanitary facilities.
16. Mixer truck wash out locations.
17. Traffic control signage.
18. Perimeter and site lighting.
19. Stockpile and/or lay down areas.
20. Emergency Vehicle Access Routes.

- B. A revised Project site logistic plan may be required by the District Representative for separately identified phases of the Work as set forth in this Section.
- C. Contractor is responsible for securing and obtaining all approvals and permits from authorities having jurisdiction relative to logistic plan activities.

3.03 PHASING OF THE WORK

- A. Project will be constructed in separate Milestone increments, as identified or as described in this Section and/or the Contract Documents. Phasing will also delineate Work to be completed in each designated phase. Unless otherwise approved or directed by the District Representative, each phase shall be completed according to the approved Construction Schedule prior to the commencement of the next subsequent phase. Contractor shall incorporate and coordinate the Work of Separate Work Contracts relative to this Project into the Phasing and Construction Schedule.
- B. Contractor shall install all necessary Work for phased Work before completion of the designated phase.

3.04 PHASING OF THE WORK – GENERAL

- A. Contractor shall prepare the Milestone Schedule in order to complete the Work and related activities in accordance with the phasing plan. Contractor shall include all costs to complete all Work within the Milestones and Contract Time.
- B. Owner will be seriously damaged by not having all Work completed within the Milestones and/or Contract Time. It is mandatory the Work be complete within the Milestones and Contract Time.

3.05 PHASING OF THE WORK – SPECIFIC

1. Refer to the Master Facilities Lease.

END OF SECTION 01 12 16

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SECTION 01 21 00 - ALLOWANCES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements governing Contract allowances.
 - 1. Allowances as set forth in the Master Facilities Lease are to be used as compensation for items as set forth in this Section. When applicable, the amount listed for each allowance is to be included in the Guarantee Maximum Price and shall be listed separately in the Schedule of Values and Application for Payment.

1.02 RELATED SECTIONS

- A. Section 01 29 73: Schedule of Values Procedures.
- B. Section 01 29 76: Progress Payment Procedures.
- C. Section 01 32 13: Construction Schedule.
- D. Section 01 50 00: Construction Facilities and Temporary Controls.

1.03 ALLOWANCES

- A. Use the allowances only as authorized for Owner purposes and only by submitting a form that indicates the amounts to be charged to the respective allowance amount to the District Representative.
- B. District Representative and Architect will review Contractor's basis for its use of any Allowance costs included in Contract Sum as required, and prior to the execution of Work described in Allowances.
- C. At Final Completion of the Work or at any time designated by the District Representative, credit unused amounts remaining in the allowances to the Owner via Change Order.
- D. This Contract may include an allowance for unforeseen and unanticipated conditions that the District solely determines should be charged as an Allowance. If directed by the District in the Request for Proposal, the Contractor shall include an Allowance in its proposal in the amount prescribed by the District for the exclusive use by the District for Unforeseen Conditions not otherwise defined or included in the Drawings and Specifications. Any unused allowance shall be returned to the District using a credit change order for the full amount of the value unused.

1.04 ALLOWANCE DISBURSEMENT

- A. Contractor shall submit a request for allowance disbursement to the District Representative. Include all substantiating and/or required data along with the request. The Contractor shall use the form provided by the District.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

3.01 SCHEDULE OF ALLOWANCES

Schedule of Allowances shall be as shown on the Master Facilities Lease.

END OF SECTION 01 21 00

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SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Construction Drawings, Technical Specifications, Addenda, and general provisions of the Contract, including Facilities Lease Agreement and other Division 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Requirements and descriptions for products and scopes of Work identified as Alternate in the Drawings and Specifications and listed as "Alternate " on the Contract Document.

1.03 RELATED DOCUMENTS AND SECTIONS

- A. Refer to product Specification Sections indicated in Alternate descriptions and as may be affected by alternate products and scope descriptions.

1.04 GENERAL REQUIREMENTS FOR ALTERNATES

- A. To enable the District to compare total costs where alternative materials and methods might be used or where scope of Work might be altered, Alternates have been established as described in this Section.
 - 1. Unless otherwise specifically provided, the work described in Alternates shall be completed with no increase in Contract Time.
 - 2. Alternates will be accepted based on District's needs and budget.
- B. Amount or stated sum included in Guarantee Maximum Price and as stated in executed Agreement shall include all costs for Work described in Contract Documents.
- C. Bid Proposal Form or other means prescribed for submission of proposed cost of Work shall include line items for each Alternate described in this Section. No Alternates other than as described in this Section shall be submitted, except in accordance with product options and substitutions provisions specified in the Facilities Lease Agreement.
- D. Each Alternate is identified herein by number. This identification shall be used whenever referring to Work described in Alternate and when submitting cost proposals and payment requests.
- E. Alternate construction described in Alternates and revised scopes of Work shall be performed only when such Alternate is made a part of the Work by specific provision in the Lease Leaseback Agreements, if selected by the District prior to execution of the Agreement, or by Change Order or Change Directive if selected subsequent to execution of the Agreement.
- F. Costs for Alternates shall be valid for no less than ninety (90) calendar days from date of Agreement, and District may select any or all Alternates during that time. Once an Alternate is selected and the Contract modified for Work as described in the Alternate(s), changes to return to original scope of Work will be made only by Change Order or Change Directive in accordance with provisions of the Facilities Lease Agreement for changes.

1.05 PRODUCTS AND EXECUTION

- A. If District elects to proceed on the basis of one or more of the described Alternates, Contractor shall make all modifications to Work as required to provide complete products, in place and fully functional, including all labor, equipment, services and incidental consumables necessary to apply, install and finish Work described in Alternate in accordance with requirements specified in related product Sections of these Specifications.

- B. Cost for Alternates shall be complete and include all net increases and decreases in Contract Amount for Work described in Alternate and for all changes in related Work. No claims for additional costs to District will be honored other than as stated in cost proposal for each Alternate.

1.06 ALTERNATES

- A. Alternate Bid Item 1 (Increment 2): West Plaza Landscape and Hardscape improvements. Includes plumbing, electrical, and telecom utility stub outs to “future” West Lunch Shelter/Kiosk. See Civil, Landscape, Electrical, Plumbing and Low Voltage Drawings.
- B. Alternate Bid Item 2 (Increment 2): West Plaza Lunch Shelter / Kiosk Structure
- C. Alternate Bid Item 3 (Increment 2): Anti-Graffiti Resistant Coating on lower half of exterior plaster walls adjacent to a walkable surface. See Exterior Elevations for locations and Specification Section 099623.
- D. Alternate Bid Item 4 (Increment 2): Provide laminated insulated glazing for all glazing within 7'-0" high from the first floor.
- E. Alternate Bid Item 5 (Increment 2): Provide built-in casework on south wall of the Health & Wellness Filing Room J110-14. See Enlarged Plan 9/A7.10 and Interior Elevations 8 and 14 on Sheet A7.11 for location.
- F. **Alternate Bid Item A Demolition (ADD) – Furnish and Install Acoustical Curtain/Sound Blanket.**

Contractor shall furnish and install acoustical curtain/sound blanket on 8-foot chain link fence in lieu of privacy screen, as shown on attached Sketch SK4-2.

Product shall be exterior grade, UV resistant heavy-duty faced quilted fiberglass absorber bonded to a reinforced loaded vinyl barrier.

The quilted blanket shall be configured as hanging panels.

Curtain panels shall be constructed with grommets across the top and bottom and exterior grade Velcro seals along the vertical edges.

Panel size: 46" (w) x 96" (h) nominal.

Blankets shall meet the following minimum criteria:

NRC: 0.75

STC: 25

Temperature range: -20 degrees to 180 degrees Fahrenheit

ASTM E84 Class 1 or A Fire Rating

Panels shall be secured on fence with zip-ties.

- G. **Alternate Bid Item B Demolition (ADD) – Design, Furnish and Install Temporary Noise Barrier.**

Contractor shall design, furnish and install temporary noise barrier as shown on attached Sketch SK4-1. The temporary noise barrier shall have a Sound Transmission Class of STC-30, or greater, based on certified sound transmission loss data taken according to ASTM Test Method E90.

Contractor shall omit 8-foot fence and screen in areas where temporary noise barrier is being installed.

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The temporary barrier shall be lined with glass fiber, mineral wool, or other similar noise curtain type noise-absorbing material at least 1-1/2-inches thick and have a Noise Reduction Coefficient rating of NRC-0.85, or greater, based on certified sound absorption coefficient data taken according to ASTM Test Method C423. The curtain material shall be meet ASTM E84 Class "A" fire resistance.

The materials used for the temporary noise barrier shall be sufficient to last three years, and shall be maintained in good repair during the construction period.

The design and details for the temporary noise barrier framework and supports shall be prepared and stamped by a Registered Professional Engineer licensed in the state of California. The Contractor shall be responsible for the design, detailing, and adequacy of the framework and supports, ties, attachment methods, and other appurtenances required for the proper installation of the noise control barrier. The Contractor shall submit the design and detailed engineering drawings to the Architect of Record for review in accordance with Specifications Section 013300.

The barrier shall be at least 16-foot tall, secured above, at the ground, and at intermediate points by framework and supports designed to withstand 80 mph wind loads plus a 30 percent gust factor.

When barrier units are joined together, the mating surfaces of the barrier sides shall be flush with each other. Gaps between barrier units, and between the bottom edge of the barrier panels and the ground, shall be closed with material that will completely fill the gaps, and be dense enough to attenuate noise.

The acoustical curtains shall be properly attached to support frames and shall be installed in vertical and horizontal segments with the vertical segments extending the full curtain height to the ground. All seams and joints shall have a minimum overlap of 2 inches and be sealed using Velcro or double grommets spaced 12 inches on center.

Contractor shall review available utilities As-builts and perform underground utilities survey prior to excavating or drilling for the posts.

The temporary noise barrier shall remain in place after the completion of the project and be turned over to the District.

END OF SECTION 01 23 00

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SECTION 01 26 13 - REQUEST FOR INFORMATION PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Procedure for requesting information of the intent of the Contract Documents.

1.02 RELATED SECTIONS

- A. Master Facilities Lease.
- B. Section 01 11 00: Summary of Work.
- C. Section 01 31 13: Project Coordination.
- D. Section 01 32 13: Construction Schedule.
- D. Section 01 77 00: Contract Closeout.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PROCEDURE

- A. Contractor shall prepare a Request for Information. Refer to Appendix A for a sample RFI form. Contractor shall transmit the Request for Information to Architect with sketches, pictures and a suggested solution (if applicable) with a concurrent copy to the District Representative. If approved by the District in advance, the Contractor may use an RFI form generated by the Contractor's Project Management software as long as the form contains the same level of information as outlined in the District's RFI form.
- B. Architect response is a clarification of the intent of the Contract Documents and does not authorize changes in the Contract Amount, Milestones, and/or Contract Time.
- C. A Request for Information may be returned with a stamp or notation "Not Reviewed," if:
 - 1. The requested information is ambiguous or unclear.
 - 2. The requested information is equally available to the requesting party by researching and/or examining the Contract Documents.
 - 3. Contractor has not reviewed the Request for Information prior to submittal.
- D. Review Time: After receipt by Architect and District Representative, allow **five (5)** business days for response time by Architect. Contractor shall verify and is responsible for verifying Architect and District Representative receipt of a Request for Information.
- E. Subcontractor-Initiated and Supplier-Initiated RFIs: RFIs from subcontractors and material suppliers shall be submitted through, be reviewed by and be attached to an RFI prepared, Signed and submitted by Contractor. RFIs submitted directly by subcontractors or material suppliers will be returned unanswered to the Contractor.
 - 1. Contractor shall review all subcontractor and supplier initiated RFIs and take actions to resolve issues of coordination, sequencing, and layout of the Work.
 - 2. RFIs submitted to request clarification of issues related to means, methods, techniques and sequences of construction or for establishing trade jurisdictions and scopes of

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subcontracts will be returned without interpretation. Such issues are solely the Contractor's responsibility.

3. Contractor shall be responsible for delays resulting from the necessity to resubmit an RFI due to insufficient or incorrect information presented in the RFI.
- F. RFI Log: Contractor shall prepare and maintain a log of RFIs, and at any time requested by the Architect, Project Inspector, or District Representative, the Contractor shall furnish copies of the log showing all outstanding RFIs.

END OF SECTION 01 26 13

APPENDIX A – Sample RFI Form

REQUEST FOR INFORMATION (RFI)

School Name:	_____	RFI Number:	_____
Project Name:	_____	Date:	_____
Contractor:	_____	Project No.:	_____
Issued To:	_____	DSA No.:	_____
<i>(Architect)</i>	_____	Contract No.:	_____

_____	_____	_____
Drawing Number Detail	Drawing Page	Specification

SUBJECT: _____

Information Requested:

Suggested Course of Action:

Schedule Impact: YES NO Cost Impact: YES NO

Request Issued By: _____

Contractor's Signature *Name (Printed)* *Date*

Response:

Response Issued By: _____

Architect's Signature *Name (Printed)* *Date*

Responses Reviewed By: _____

Architect's Signature *Name (Printed)* *Date*

Proceeding with the Work in accordance with the above information indicates the Contractor's acknowledgement that there will be no change in the Contract Sum or Contract Time. If the Contractor considers that a change in Contract Sum or Contract Time is required, before proceeding with the work obtain authorization from the Owner by notifying the Owner and the Architect within five (5) working days and submit an itemized proposal within ten (10) days.

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SECTION 01 29 73 – SCHEDULE OF VALUES PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Procedure for submission of a Schedule of Values for review and approval by the District Representative.

1.02 RELATED SECTIONS

- A. Master Facilities Lease.
- B. Section 01 21 00: Allowances.
- C. Section 01 29 76: Progress Payment Procedures.
- D. Section 01 31 13: Project Coordination.
- E. Section 01 32 13: Construction Schedule.
- F. Section 01 32 29: Project Forms.
- G. Section 01 33 00: Submittal Procedures.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PREPARATION

- A. In accordance with the Facilities Lease Agreement, Contractor shall commence preparation of a Schedule of Values on the form included in Section 01 32 29.
- B. Contractor shall coordinate the preparation of a Schedule of Values with preparation of the Construction Schedule as set forth in Section 01 32 13.
- C. Round amounts to the nearest whole dollar; the total shall equal the Contract Amount.
- D. Provide a breakdown of the Contract Amount in enough detail acceptable to District Representative to facilitate continued evaluation of Application for Payment and progress reports. Coordinate with the Project Manual table of contents and Schedule of Values form under Section 01 32 29. Provide breakdown of all subcontract amounts.
- E. Provide separate line items for items in the Schedule of Values for total installed value of that part of the Work.
- F. Provide separate line item for labor and material when applicable.
- G. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item except the amounts shown as separate line items as indicated under Schedule of Values form.
- H. Temporary facilities and other cost items that are not direct cost of actual work-in-place shall be shown as separate line items as indicated under Schedule of Values form.
- I. If at any time, District Representative determines, in its reasonable discretion, that the schedule of Values does not approximate the actual cost being incurred by Contractor to perform the Work, Contractor shall prepare, for District Representative approval, a revised Schedule of Values, which then shall be used as the basis for future progress payments. Without changing the Contract Amount, District Representative reserves the right to require Contractor:

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1. To increase or decrease amounts within the line items in the Schedule of Values;
and,
2. To conform the price breakdown to Owner accounting practice.

END OF SECTION 01 29 73

SECTION 01 29 76 - PROGRESS PAYMENT PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements relative to an Application for Payment, referred to as Tenant Improvement Payments and Lease Payments on the Master Facilities Lease.
 - 1. Coordinate the Schedule of Values and Application for Payment with, but not limited to, the Construction Schedule, submittal log, and list of Subcontractors.

1.02 RELATED SECTIONS

- A. Master Facilities Lease.
- B. Section 01 21 00: Allowances.
- C. Section 01 29 73: Schedule of Values Procedures.
- D. Section 01 32 13: Construction Schedule.
- E. Section 01 32 29: Project Forms.
- F. Section 01 74 19: Construction and Demolition Waste Management.
- G. Section 01 77 00: Contract Closeout.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 APPLICATION FOR PAYMENT (TENANT IMPROVEMENT PAYMENTS)

- 3.1 Subject to the provisions set forth in the Facilities Lease(s), each month while Contractor is providing Construction Services, District shall pay to Contractor a sum equal to one hundred percent (100%) of value of the Tenant Improvement Payments associated with the construction service work performed up to the last day of the previous month, less aggregate of previous payments and less retention. If all of the necessary information is submitted and accurate (including the schedule of values), District shall approve the Tenant Improvement Payments within thirty (30) days after District's receipt of the periodic estimate for partial payment and District shall pay such payments within thirty (30) days after the District's approval of the periodic estimate for partial payment.
- 3.2 Each Application for Tenant Improvement Payment shall be supported by the following or each portion thereof unless waived by the District in writing:
 - 3.2.1 The amount paid to the date of the Application for Tenant Improvement Payment to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;
 - 3.2.2 The amount being requested under the Application for Tenant Improvement Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

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- 3.2.3 The balance that will be due to each of such entities after said payment is made;
- 3.2.4 A certification that the As-Built Drawings and annotated Specifications are current;
- 3.2.5 Itemized breakdown of work done for the purpose of requesting partial payment;
- 3.2.6 An updated and acceptable construction schedule in conformance with the provisions herein;
- 3.2.7 The additions to and subtractions from the Guaranteed Project Cost and Contract Time;
- 3.2.8 A total of the cumulative retention withheld prior to the current Application for Payment, and that to be withheld under the current Application for Payment (5% of the current Application for Payment);
- 3.2.9 Verified material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the District may require from time to time;
- 3.2.10 The percentage of completion of the Contractor's Work by line item;
- 3.2.11 Schedule of Values updated from the preceding Application for Tenant Improvement Payment;
- 3.2.12 A duly completed and executed "Conditional Waiver and Release on Progress Payment" compliant with Civil Code section 8132 from each subcontractor of any tier and supplier to be paid from the current Tenant Improvement Payment;
- 3.2.13 A duly completed and executed "Unconditional Waiver and Release on Progress Payment" compliant with Civil Code section 8134 from each subcontractor of any tier and supplier that was paid from the Tenant Improvement Payment from sixty (60) days prior; and
- 3.2.14 A certification by the Contractor of the following:
 - a. The Contractor warrants title to all Work performed as of the date of this payment application. The Contractor further warrants that all Work performed as of the date of this payment application is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, workers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work, except those of which the District has been informed.
 - b. If requested by the District, a third party, or as required by the California Department of Industrial Relations, all requested or required certified payroll record ("CPR(s)") for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work for the period of the Application for Payment.

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- c. Except as expressly provided for herein, no payments shall be made by the District on account of any item of the Work, including without limitation, materials or equipment that, at the time of the Contractor's submittal of an Application for Tenant Improvement Payments, has/have not been incorporated into and made a part of the Work.
- 3.3 The parties agree that the District may, in its sole and absolute discretion, decrease any and all remaining Tenant Improvement Payments and/or Lease Payments for Project scope of work to a fixed amount, after such work has reached Substantial Completion Date or Final Completion, and still allow for Work Modifications as may be agreed upon by the parties pursuant Section 9 hereof for minor work added to the Project's additional scope of work. Tenant Improvement Payments shall be made on the basis of monthly estimates which shall be prepared by Contractor on a form approved by District and certified by Architect and Project Inspector, or any other approved representative of the District, and filed before the fifth day of the month during which payment is to be made. Work completed as estimated shall be an estimate only and no inaccuracy or error in said estimate shall release Contractor or any bondsman from such work or from enforcing each and every provision of this document and District shall have the right subsequently to correct any error made in any estimate for payment.
- 3.4 Contractor shall not be entitled to have any payment estimates processed or be entitled to have any payment made for work performed so long as any lawful or proper direction concerning non-complying work or any portion thereof given by the District lacks correction by Contractor. District shall withhold from Tenant Improvement Payments and/or Lease Payments 150% of the estimated value of non-complying work unless satisfactorily corrected or remedied.
- 3.5 In no event shall the cumulative total of the Lease Payments and Tenant Improvements Payments ever exceed the GMP as defined herein, unless specifically allowed.
- 3.6 Title to new materials and/or equipment for the work of this contract, on a continuous basis while the Project is being completed, shall vest in the District. However, responsibility for such new material and/or work of this contract shall remain with the Contractor until incorporated into the work and accepted by District; no part of said materials and/or equipment shall be removed from its place of storage except for immediate installation in the work of this contract; and Contractor shall keep an accurate inventory of all said materials and/or equipment in a manner satisfactory to the owner or his authorized representative.
- 3.7 Notwithstanding anything to the contrary stated above, the Contractor may include in its Request for Payment the value of any structural steel, glue laminated beams, trusses, bleachers and other such custom-made materials prepared specifically for the Project and unique to the Project so long as all of the following requirements are satisfied:
 - 3.7.1 The aggregate cost of materials stored off-site shall not exceed Twenty Five Thousand Dollars (\$25,000) at any time or as otherwise agreed to be District in writing;
 - 3.7.2 Title to such materials shall be vested in the District as evidenced by documentation satisfactory in form and substance to the District, including, without limitation, recorded financing statements, UCC filings and UCC searches;
 - 3.7.3 With each Contractor Request for Payment, the Contractor shall submit to the District a written list identifying each location where materials are stored off-site (which must be a bonded warehouse) and the value of the materials at each location. The Contractor shall procure insurance

- satisfactory to the District (in its reasonable discretion) for materials stored off-site in an amount not less than the total value thereof;
- 3.7.4 The consent of any Surety shall be obtained to the extent required prior to payment for any materials stored off-site;
- 3.7.5 Representatives of the District shall have the right to make inspections of the storage areas at any time; and
- 3.7.6 Such materials shall be 1) protected from diversion, destruction, theft and damage to the reasonable satisfaction of the District; 2) specifically marked for use on the Project; and 3) segregated from other materials at the storage facility.
- 3.8 Reasons to Withhold Payment. The District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District's opinion, the representations to the District required by Article 9.4 cannot be made. The District may withhold payment, in whole, or in part, to such extent as may be necessary to protect the District from loss because of, but not limited to:
1. Defective Work not remedied;
 2. Stop Notices served upon the District;
 3. Liquidated damages assessed against the Contractor;
 4. The cost of Substantial Completion and Final Completion of the Contract if there exists reasonable doubt that the Work cannot be completed for the unpaid balance of any Contract Price or by the Substantial Completion Date or the Final Completion Date, as applicable;
 5. Damage to the District or other contractor;
 6. Unsatisfactory prosecution of the Work by the Contractor;
 7. Failure to store and properly secure materials;
 8. Failure of the Contractor to submit on a timely basis, proper and sufficient documentation required by the Contract Documents, including, without limitation, acceptable monthly progress schedules, Shop Drawings, Submittal schedules, schedule of values, product data and samples, proposed product lists, executed Change Order, Construction Change Documents, and verified reports;
 9. Failure of the Contractor to maintain As-Built drawings;
 10. Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment;
 11. Unauthorized deviations from the Contract Documents (including but not limited to Unresolved Notices of Deviations (DSA Form 154));
 12. Failure of the Contractor to prosecute the Work in a timely manner in compliance with established progress schedules and the Substantial Completion Date and/or the Final Completion Date;
 13. Failure to properly pay prevailing wages as defined in Labor Code section 1720, et seq.;

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14. Failure to properly maintain or clean up the Site;
15. Payments to indemnify, defend, or hold harmless the District;
16. Any payments due to the District including but not limited to payments for failed tests, or utilities changes or permits;
17. Failure to submit an acceptable schedule in accordance with Article 9;
18. Failure to pay Subcontractor or suppliers as required by Article 31;
19. Failure to secure warranties, including the cost to pay for warranties;
20. Failure to provide release from material suppliers or subcontractors when requested to do so;
21. Items deducted pursuant to Article 17.7;
22. Incomplete Punch List items under Article 13.6 which have gone through the Article 12.2 process; or
23. Allowance(s) that have not been used.

3.9 Prerequisites for Final Tenant Improvement Payment. The following conditions must be fulfilled prior to Final Tenant Improvement Payment:

- 3.9.1 A full and final waiver or release of all Stop payment notices in connection with the Work shall be submitted by Contractor, including a release of Stop payment notice in recordable form, together with (to the extent permitted by law) a copy of the full and final release of all Stop payment notice rights.
- 3.9.2 A duly completed and executed "Conditional Waiver and Release on Final Payment" compliant with Civil Code section 8136 from each subcontractor of any tier and supplier to be paid from the current Tenant Improvement Payment;
- 3.9.3 A duly completed and executed "Unconditional Waiver and Release upon Final Payment" compliant with Civil Code section 8138 from each subcontractor of any tier and supplier that was paid from the previous Tenant Improvement Payment; and
- 3.9.4 The Contractor shall have made all corrections to the Work that are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of District required under the Contract Documents.
- 3.9.5 Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.
- 3.9.6 Contractor must have completed all requirements set forth under "Closeout Procedures," Including, without limitation, an approved set of complete As-Built Drawings.
- 3.9.7 Architect shall have issued its written approval that final payment can be made.
- 3.9.8 The Contractor shall have delivered to the District all manuals and materials required and provided a required staff training as outlined in the Contract Documents.
- 3.9.9 The Contractor shall have completed final clean up as provided herein.

3.10 Retention

3.10.1 The retention (5% of the total Contract Price), less the total Lease Payments and less any amounts disputed by the District or that the District has the right to withhold pursuant to provisions herein, shall be paid as follows:

- a. After approval by the District of the Architect's Certificate of Payment,
- b. After the satisfaction of the conditions set forth herein, and
- c. Within sixty (60) days following Project Completion pursuant to Public Contract Code section 7107.
- d. No earlier than thirty-five (35) days of the recording of the Notice of Completion by District, if a Notice of Completion is recorded by the District.

3.10.2 No interest shall be paid on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents.

3.11 Reallocation of Withheld Amounts. District may, in its discretion, apply any withheld amount to payment of outstanding claims or obligations as defined in Article 29.3. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then such amount shall be considered as a payment made under Contract by District to Contractor and District shall not be liable to Contractor for such payments made in good faith. Such payments may be made without prior judicial determination of claim or obligation. District will render Contractor an accounting of such funds disbursed on behalf of Contractor.

If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, District may, after ten (10) calendar days written notice to the Contractor and without prejudice to any other remedy make good such deficiencies. The District shall adjust the total Contract price by reducing the amount thereof by the cost of making good such deficiencies. If District deems it inexpedient to correct Work which is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract price (of at least 150% of the estimated reasonable value of the nonconforming Work) shall be made therefor.

3.12 Payment After Cure. When the grounds for declining approval are removed, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

END OF SECTION 01 29 76

SECTION 01 31 13 - PROJECT COORDINATION

PART 1 – GENERAL

- 1.01 SECTION INCLUDES
- A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
- 1.02 RELATED SECTIONS
- A. Section 01 12 16: Phasing of the Work
 - B. Section 01 31 19: Project Meetings.
 - C. Section 01 32 13: Construction Schedule.
 - D. Section 01 33 00: Submittal Procedures.
 - E. Section 01 45 23: Testing and Inspection.
 - F. Section 01 73 29: Cutting and Patching.
 - G. Section 01 91 13: General Commissioning Requirements.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

- 3.01 COORDINATION
- A. It is the Contractor's responsibility to coordinate the Work to minimize conflicts and optimize efficiency.
 - B. School occupancy will remain in session during the school year
 - C. The placement of pipes, conduits, other materials, and the locations, size and reinforcement of holes in the building structure shall conform to the structural Drawings and Specifications. When the requirements of the Mechanical, Electrical or other sections of the Specifications or Drawings are in conflict with the structural requirements, the structural requirements shall take precedence. The Contractor shall take all precautions prior to coring into a building structure. The Contractor must notify the structural engineer and obtain written approval prior to completing any structural penetrations if the structural integrity of an existing building structure is compromised. Refer to section 01 73 29, Cutting and Patching.
 - D. Verify that utility, and other building system requirement characteristics of operating equipment are compatible with existing utilities, and other existing building systems. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
 - E. Contractor shall coordinate operations included in various sections of Contract Documents to assure efficient and orderly installation of each part of Work. Coordinate Work operations included under related sections of Contract Documents that depend on each other for proper installation, connection, and operation of Work, including but not limited to:

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1. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
 3. Provide provisions to accommodate items scheduled for later installation.
 4. Prepare and administer provisions for coordination drawings.
- F. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required in notices, reports, attendance at meetings, and:
1. Prepare similar memoranda for District Representative and Separate Work Contract where coordination of their Work is required.
- G. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of schedules.
 2. Installation, relocation, and removal of temporary facilities.
 3. Delivery and processing of submittals.
 4. Progress meetings.
 5. Project closeout activities.
- H. Conservation: Coordinate Work operations to assure operations are carried out with consideration given to conservation of energy, water, materials, and:
1. Salvage materials and equipment involved in performance of, but not actually incorporated into Work.
- I. Contractor shall provide advance notice (minimum of two (2) working days) to District Representative of any required electrical or HVAC shut down activities for the District to properly prepare for these activities and the down time that will occur.
- J. Contractor shall provide advance notice (minimum of two (2) working days) to District Representative of any required testing of active cabling for the District to properly prepare for these activities and the down time that will occur.

3.02 SUBMITTALS

- A. Coordination Drawings: Contractor shall prepare coordination drawings to coordinate the installation of products and materials fabricated, furnished and installed by separate entities, under different parts of the Contract. Contractor shall notify District Representative and Architect of all major conflicts in writing in a timely manner so that the design team can respond without construction delays. Coordination drawings shall address the following at a minimum:
1. Limitations in available space for installation or service. Contractor shall overlay plans of each trade and verify space requirements and conflicts between trades. Minor changes and adjustments that do not affect design intent shall be made by Contractor and shall be highlighted for Architect's review.
 2. Incompatibility between items provided under different trades (such as difference in voltage between equipment specified under Divisions 22 and 23 and electrical power provided under Division 26.)

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3. Inconsistencies between drawings, specifications and codes (between trades and within each trade).
 4. Additional items required for existing facilities construction projects shall be designed and prepared from available as-built drawings that are verified through non-invasive and non-destructive, visual observation only. Contractor shall field verify actual existing conditions during and upon completion of demolition work and incorporate findings into preparation of coordination drawings. Minor changes and adjustments that do not affect design intent shall be made by Contractor and shall be highlighted for District Representative and Architect's reviews.
- B. Contractor and each Subcontractor shall provide and forward reproducible copies and AutoCAD or Revit drawing files in the order described here:
1. Structural shop drawings shall indicate location and sizes of columns, beams and other structural members, as well as wall, roof and slab penetrations, and will be provided to mechanical, electrical, low voltage and plumbing Sub-Contractors for coordination. Structural items shall be indicated using black lines.
 2. HVAC Subcontractor will indicate all ductwork, piping and equipment complete with installation and dimensioned service clearances, duct and pipe sizes, fitting types and sizes, top or bottom of duct and pipe elevations, distances of ducts, pipes and equipment from building reference points and hanger and support locations. Minor changes and adjustments that do not affect design intent shall be made by Subcontractor and shall be highlighted for District Representative and Architect's reviews. Forward drawings to plumbing Subcontractor for further coordination. HVAC items shall be indicated using orange lines.
 3. Plumbing Subcontractor will indicate all plumbing lines, and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger/support locations Coordinate with HVAC Subcontractor. Minor changes and adjustments that do not affect design intent shall be made by Subcontractor and shall be highlighted for District Representative and Architect's reviews. Upon completion, drawings shall be forwarded to Fire Sprinkler Subcontractor for further coordination. All Plumbing items shall be indicated using blue lines.
 4. Fire sprinkler Subcontractor will indicate fire sprinkler piping and equipment complete with installation and dimensioned service clearances, pipe sizes, fitting types and sizes, top or bottom of pipe elevations, distances of pipes and equipment from building reference points and hanger or support locations. Coordinate with Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-Contractors and shall be highlighted for District Representative and Architect's reviews. Upon completion drawings shall be forwarded to Electrical Contractor for further coordination. Fire sprinkler equipment shall be indicated using red lines.
 5. Electrical and Low Voltage Subcontractors will indicate service and feeder conduit runs and other electrical equipment complete, including low voltage with installation and dimensioned service clearances, sizes, top or bottom of conduit and rack elevations, distances of conduits and equipment from building reference points and hanger and support locations. Coordinate with Fire Sprinkler, Plumbing and HVAC Subcontractors. Minor changes and adjustments that do not affect design intent shall be made by sub-Contractors and shall be highlighted for District Representative and Architect's reviews. Upon completion drawings shall be forwarded to Contractor for further coordination. Electrical

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work shall be indicated in dark green lines. Low voltage work shall be indicated in light green lines.

6. Contractor will be responsible for the overall coordination review. As each coordination drawing is completed, Contractor will meet with Architect and/or District Representative to review and resolve conflicts on coordination drawings.
7. Coordination meetings will be held in Project field office of Contractor. Contractor is required to distribute Shop Drawings, cut sheets and submittals to Subcontractors where appropriate. Reviewed coordination drawings will be maintained in Project field office of Contractor. Meeting minutes shall be developed by Contractor and submitted to District Representative within five (5) days.
8. All Contractors shall review and sign the final coordinated set of drawing(s) prior to construction of system(s) depicted in the drawing(s).

END OF SECTION 01 31 13

SECTION 01 31 19 - PROJECT MEETINGS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements for Project meetings, including but not limited to, the following:
 - 1. Preconstruction meeting.
 - 2. Pre-installation conferences.
 - 3. Progress meetings.
 - 4. Meetings as required by District Representative.

1.02 RELATED SECTIONS

- A. Section 01 12 16: Phasing of the Work.
- B. Section 01 31 13: Project Coordination.
- C. Section 01 32 13: Construction Schedule.
- D. Section 01 33 00: Submittal Procedures.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PRECONSTRUCTION MEETING

- A. District Representative will schedule a preconstruction meeting before starting the Work, at a time and date determined by District Representative. Meeting shall be held at the Project site or another location as determined by District Representative. Meeting will be held in order to review responsibilities, procedures, and other administrative requirements contained within the Contract Documents. Major trades may attend.
- B. Authorized representatives of District, Project Inspector, Architect, Contractor and other parties shall attend the meeting. All participants at the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda items shall include significant items which could affect progress of the Work, including, but not limited to the following:
 - 1. Identification of District Representative, key team members, and roles/responsibilities
 - 2. Preliminary Construction Schedule.
 - 3. Critical work sequencing and coordination of other work on campus.
 - 4. Designation of responsible personnel and emergency contacts.
 - 5. Procedures for processing field decisions.
 - 6. Request for Proposal.
 - 7. Request for Information.
 - 8. Construction Change Directive, Immediate Change Directive, and Change Order.
 - 9. Procedures for processing Applications for Payment.
 - 10. Labor Compliance and Wage Determinations.

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11. Submittal and review of Shop Drawings, Product Data, material lists, and Samples.
 12. Preparation of project record documents.
 13. Use of the Project site and/or premises, staging plan, trucking routes, haul routes, etc.
 14. Parking availability.
 15. Office, work, and storage areas.
 16. Equipment deliveries and priorities.
 17. Safety procedures.
 18. Emergency response.
 19. First Aid.
 20. Security.
 21. Housekeeping.
 22. Working hours.
 23. Insurance Services including OCIP.
 24. Environmental Health and Safety / Import and Export Testing Requirements.
 25. Substantial Occupancy, Administrative Closeout and Contract Completion requirements and procedures.
 26. Storm Water Pollution Prevention Plan (SWPPP).
 27. CEQA Compliance.
 28. Local Hire.
 29. CSWPA.
- D. District Representative shall prepare and issue meeting minutes to attendees and interested parties no later than three (3) calendar days after the meeting date.

3.02 PRE-INSTALLATION CONFERENCES

- A. Contractor shall coordinate and conduct pre-installation conferences at the Project site as required by related Sections of the Contract Documents.
- B. Contractor, manufacturers, and fabricators involved in or affected by the installation and its coordination or integration with other preceding and/or subsequent installations of Work shall attend the meeting. Contractor shall advise District Representative, Project Inspector, and Architect of scheduled meeting dates and provide an agenda 48 hours prior to meeting.
 1. Contractor shall review the progress of construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related Construction Change Directives and Change Orders.
 - d. Purchases.
 - e. Deliveries.
 - f. Shop Drawings, Product Data, and quality-control samples.
 - g. Review of mockups.
 - h. Possible conflicts.

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- i. Compatibility problems.
 - j. Time schedules and work sequence.
 - k. Weather limitations.
 - l. Manufacturer's recommendations.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities.
 - q. Space and access limitations.
 - r. Governing regulations.
 - s. Safety.
 - t. Inspecting and testing requirements.
 - u. Required performance results.
 - v. Recording requirements.
 - w. Protection.
2. Contractor shall record significant discussions and directives received from each conference. Contractor shall, within three (3) calendar days after the meeting date, distribute the minutes of the meeting to all concerned parties, including but not limited to, District Representative, Project Inspector, and Architect.

3.03 PROGRESS MEETINGS (OWNER MEETINGS)

- A. Progress meetings will be held at the Project site at regular intervals, typically bi-weekly or weekly, as determined by the District Representative.
- B. In addition to representatives of Contractor, District Representative, and Architect, each Subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of the Work shall, if requested by District Representative, be represented at these meetings. All participants at the meeting shall be familiar with the Project and authorized to conclude all matters relating to the Work.
- C. Failure of Contractor to be so represented at any progress meeting which is held at a mutually agreed time or for which a written notice is given, shall not relieve Contractor from abiding by any and all District Representative determinations or directives issued at such meeting.
- D. District Representative will review and correct or approve minutes of the previous progress meeting and will review other significant items affecting progress. Topics for discussion as appropriate to the status of the Project include but are not limited to:
 1. Safety (OCIP).
 2. DSA Field Engineer notes.
 3. Interface requirements.
 4. Construction Schedule.
 5. Sequence and coordination.
 6. Status of submittals / RFIs.
 7. Deliveries.
 8. Off-site fabrication.
 9. Access.

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10. Site utilization.
 11. Temporary Construction Facilities and Controls.
 12. Hours of work.
 13. Hazards and risks.
 14. Housekeeping.
 15. Quality of materials, fabrication, and execution.
 16. Unforeseen conditions.
 17. Testing and Inspection.
 18. Defective Work.
 19. Construction Change Directive.
 20. Immediate Change Directives (ICDs).
 21. Contingency Budget Usage.
 22. Documentation of information for Tenant Improvement Payments.
 23. Tenant Improvement Payments.
 24. Storm Water Pollution Prevention Plan.
 25. CSWPA Compliance.
 26. CEQA Compliance and EIR mitigation measures
 27. Building Commissioning
 28. Other items as required or as brought forth.
- A. No later than three (3) calendar days after each progress meeting, District Representative will prepare and distribute minutes of the meeting to each present and absent party. Include a brief summary, in narrative form, of progress, decisions, directives, actions taken, and all other issues since the previous meeting and report.
1. Schedule Updating: Contractor shall revise the Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized, and issue the revised schedule at the next scheduled progress meeting.

3.04 ADDITIONAL MEETINGS

- A. District Representative, upon giving notice to the intended parties and without further obligation, may require additional meetings to discuss Work and/or Project related activities.

END OF SECTION 01 31 19

SECTION 01 32 13 - CONSTRUCTION SCHEDULE

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Required procedures, preparation, submittals, reviews, updates, and revisions to the construction schedule.

1.02 RELATED SECTIONS

- A. Master Facilities Lease.
- B. Section 01 11 00: Summary of Work.
- C. Section 01 12 16: Phasing of the Work.
- D. Section 01 23 00: Alternates.
- E. Section 01 29 73: Schedule of Values Procedures.
- F. Section 01 29 76: Progress Payment Procedures.
- G. Section 01 31 13: Project Coordination.
- H. Section 01 33 00: Submittal Procedures.
- I. Section 01 45 23: Testing and Inspection.
- J. Section 01 50 00: Construction Facilities and Temporary Controls.
- K. Section 01 78 36: Warranty Procedures.

PART 2 – PRODUCTS

2.01 SCHEDULING SOFTWARE

- A. Contractor shall utilize Primavera Project Planner™ for Windows® (P6) software (latest version) by Primavera Systems, Inc., or equivalent scheduling software to employ the Critical Path Method (CPM) in the development and maintenance of the construction schedule network using the Precedence Diagram Mode (PDM). The scheduling software shall be capable of being resource loaded with manpower and materials. It shall also be capable of generating time-scaled logic diagrams, resource histograms and profiles, bar charts, layouts and reports with any and/or all activity detail. The Contractor shall provide the District with one license copy of the scheduling software for use by District staff and or District's consultant. The license shall cover the duration of the project.

PART 3 – EXECUTION

3.01 SUBMITTALS

- A. Contractor shall retain a construction scheduler to work in enough capacity to perform all of the requirements outlined in this Section. Scheduler shall have a minimum of five (5) years' experience. The Scheduler shall be able to plan, coordinate, execute, and monitor a CPM schedule as required for this Project. Scheduler will cooperate with District Representative and shall be available on site for monitoring, maintaining and updating schedules in a timely manner. District Representative has the right to refuse to accept the Scheduler based upon a lack of experience as required by this Section or based on lack of performance and timeliness of schedule submittals and of fragments on past projects. If District Representative does not accept the

proposed Scheduler, Contractor shall within one (1) week of disapproval, propose another scheduler who meets the experience requirements stated above.

- B. Contractor shall submit two originals and three copies of all bar charts, reports and/or other required schedule data as outlined in this Section. Contractor shall electronically deliver the schedule file in its original format at the time of submittal (PDF and PRX file formats).
- C. Contractor shall submit the Preliminary Construction Schedule within **fourteen (14)** calendar days after Notice to Proceed.
- D. Contractor shall submit the Proposed Baseline Schedule within **thirty (30)** calendar days after Notice to Proceed.
- E. Contractor shall submit the Monthly Schedule Updates, Four-Week Rolling Schedules, and Recovery Schedules as required.

3.02 PRELIMINARY CONSTRUCTION SCHEDULE

- A. Contractor shall develop and submit a Preliminary Construction Schedule as required by this Section. It shall be submitted in computer generated network format and shall be organized by Activity Codes representing the Contractor's intended sequencing of the Work. The Preliminary Construction Schedule shall include activities for the first 90 calendar days following the NTP such as mobilization, preparation of submittals, specified review periods, procurement items, fabrication items, milestones, and detailed construction activities.
- B. Upon District Representative's acceptance of the Preliminary Construction Schedule, Contractor shall update the accepted Preliminary Construction Schedule each month (beginning with month 1) and submit these updates until Contractor's Baseline Schedule is fully developed and accepted. Since updates to Preliminary Construction Schedule are the basis for payment to Contractor during the first three-month period, submittal and acceptance of such updates shall be a condition precedent to making of monthly payment, as referenced in Facilities Lease Agreement.
- C. Provide a written narrative describing Contractor's approach to mobilization, procurement, and construction during the first ninety (90) calendar days including crew sizes, equipment and material delivery, site access, submittals, and permits.
- D. Submit Bar Charts, Tabular Reports, Electronic Data, and Plots in accordance with this Section.

3.03 BASELINE SCHEDULE CPM NETWORK

- A. Within **thirty (30)** calendar days of the Notice to Proceed, Contractor shall submit a detailed Proposed Baseline Schedule that covers the entire duration of the Project. This schedule shall convey Contractor's plan for organizing, managing, and executing the Work.
- B. The Proposed Baseline Schedule shall include activity descriptions, sequencing, logic relationships, duration estimates, by CSI section, resource loading, and other information as set forth in this Section.
 - 1. The Proposed Baseline Schedule shall include all Milestones stipulated in Specification Section 01 12 16, the Facilities Lease Agreement, as well as all activities required to achieve timely completion of the Milestones.
 - 2. The Proposed Baseline Schedule shall include activities for: all construction activities, the NTP, Milestones, submittals, coordination drawings, re-submittals, procurement of materials and equipment, manufacturing, fabrication & delivery, owner furnished contractor installed items (OFICI), contractor furnished owner installed items (key and cores), access restrictions, work restrictions, phased occupancy, testing, start-up, and contract closeout activities. The Proposed Baseline Schedule shall allow a period for District Representative and Architect to review each submittal, as required by Section 01

- 33 00 and other sections which require additional time for District Representative reviews and deferred submittal reviews by Division of State Architect (DSA).
3. The Proposed Baseline Schedule shall include start and completion dates for: temporary facilities, construction of mock-ups, prototypes, samples, punch list, District Representative interfaces and furnishing of items, separate work contracts, regulatory agency approvals, and permits required for performance of the Work.
 4. The Proposed Baseline Schedule shall allow for all foreseeable factors and risks which affect performance of the Work. Include allowances for weather conditions, applicable laws, transportation, traffic, air quality, noise, or any other applicable regulatory requirements, regulations or collective bargaining agreements pertaining to labor.
 5. Contractor shall not use any float suppression techniques such as preferential sequencing or logic, special lead/lag constraints or unjustifiable over-estimating of activity durations in preparing the Proposed Baseline Schedule except that "Finish No Later Than" constraints are permitted for Milestones. No "Zero Free Float" constraints, No "Early" Constraints, and No "Mandatory Finish" constraints shall be utilized.
 6. The Proposed Baseline Schedule shall include activity durations based on the crew sizes and equipment utilization that Contractor will maintain during the Project. No activity durations shall exceed fifteen (15) working days unless approved by the District Representative. Non-construction activities such as procurement, delivery, or submittal activities are exempted.
 7. Contractor shall include with the Proposed Baseline Schedule a written narrative report sufficiently comprehensive to explain the rationale behind Contractor's approach to the Work including but not limited to: activity durations, manpower flow, average crew sizes, equipment requirements, production rates, constraints, holidays and other non-work days, potential problem areas, permits, coordination with regulatory authorities, utilities, separate work contracts and other parties, and long lead delivery items requiring more than thirty (30) days from the date of order to delivery to the Project site.
- C. At the District Representative's request, furnish a detailed written explanation of Contractor's basis for specific durations, logic, phasing, or other information. Such an explanation shall include Contractor's rationale for selecting the number of crews, crew composition, number of shifts per day, number of hours in a shift, number of work days per week, construction equipment, and similar factors.
- D. The Proposed Baseline Schedule activities shall contain the following data:
1. Activity ID numbers shall consist of no more than eight alphanumeric characters. Following District Representative acceptance of the Baseline Schedule, Activity ID numbers shall not be changed.
 2. Activity Descriptions shall provide adequate information that readily identifies each activity, work scope, and location.
 3. Activity codes specified in Section 3.03.G shall be applied to each activity.
- E. At District Representative's request, furnish a written explanation for each lead or lag relationship and each constrained date. Unjustifiable leads, lags, and constraints may result in District Representative's rejection of the Proposed Baseline Schedule.
- F. Calendar Identification: In the scheduling software, identify all activities that will require overtime shifts, double shifts, and work on weekends or holidays. Identify non-work days and holidays in the schedule calendar. All milestones stipulated in Specification Section 01 12 16, Phasing of the Work shall be placed on a calendar with seven days per week. No holiday or non-work day restrictions are permitted on this calendar.

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- G. Activity Codes: As a minimum, the Activity Codes shown in Table 1 below shall be assigned to each activity.

Table 1

<u>Name</u>	<u>Length</u>	<u>Description</u>
TYPE	2	Type of activity (for example: mobilization, submittals, procurement/fabrication, construction, milestones, etcetera.)
AREA	2	Area or Building (for example: Bldg A, Building B, Courtyard, Athletic Fields, Street Work, etcetera.)
STAG	2	Stage (for example: Foundations, Superstructure, Exterior, Interior, Roof, Floor Number etcetera.)
SBST	2	Substage (a specific area within a stage such as: main electrical room, kitchen, room number, etcetera.)
RESP	7	Responsible Party (subcontractor and/or trade)
SPEC	5	CSI section number

1. District Representative may require additional coding of activities. The mandatory activity code requirements listed in Table 1 are not to be construed as setting limits on Contractor's management and coordination responsibilities, but are intended to guide Contractor in the administration of its contractual responsibilities.

- H. Milestones are designated dates in which Work or portions thereof are required to start and complete in accordance with the Contract Documents.

1. Where the term completion or similar terms are used in regards to a Milestone, it shall be construed to mean all portions of the Work in the indicated phase, area, and zone are complete and acceptable to District Representative. Where the term start or similar terms are used in the designation of a Milestone, it shall be construed to mean a portion of the Work in the indicated phase, area, or zone is required to be commenced.
2. A Proposed Baseline Schedule extending beyond the Milestones or Contract Time will not be acceptable.
3. Finish Milestones shall be constrained with Late Finish (Finish No Later Than) type constraints in accordance with the dates stipulated in Specification Section 01 12 16, Phasing of the Work, Appendix A.
4. In the scheduling software, in the "Project Overview" menu, assign the "Project Must Finish By" date to match the Substantial Completion and Contract Completion Milestone dates stipulated in Specification Section 01 12 16, Phasing of the Work.
5. A Proposed Baseline Schedule indicating Work completed in less time than the Milestones and/or Contract Time will not be acceptable. Rather, Contractor shall show any unused contract time as float.
6. Milestones shall be placed on a calendar with seven days per week. No Holiday or non-work day restrictions are permitted on this calendar.

- I. The Critical Path shall be clearly indicated on all schedules submitted. An activity is defined as critical when its Total Float is less than or equal to zero (0) days.

- J. Contractor shall allow Float time for Inclement Weather, Government Delay, and Free Float in the Baseline Schedule in accordance with the Facilities Lease Agreement.

- K. Contractor shall submit computer generated reports and plots with the Proposed Baseline Schedule submittal package. Format shall display the following columns: Activity ID, Activity

Description, Original Duration, Remaining Duration, Percent Complete, Early Start, Early Finish, Late Start, Late Finish, and Total Float. Unless otherwise noted, bar charts and reports shall be on 8 ½ by 11 paper and bound.

1. Bar charts shall be generated separately for:
 - a. Milestones only.
 - b. Activities sorted by Early Start date and organized by Project, Area, Stage, and Substage. (The network shall show continuous flow of all activities from left to right).
 - c. Activities sorted by Responsibility.
 - d. Summary level of all activities sorted by craft/trade and area.
 2. Tabular Reports:
 - a. Total Float sorted low to high
 - b. Predecessors and Successors sorted by Activity ID.
 3. Electronic data: Provide an electronic file in its original format of the Proposed Baseline Schedule. The electronic P6 files shall be saved in “.XER” and/or “.STX” type format.
 4. Plots: Produce a color bar chart on E-size paper (30-inch by 42-inch) organized (at a minimum) by project, area, stage, and substage.
- L. District Representative will notify Contractor of any adjustments that are required for the Proposed Baseline Schedule to be accepted. Contractor shall perform any required adjustments to the Proposed Baseline Schedule and resubmit it for acceptance certifying in writing that all information contained therein complies with the Contract Documents. District Representative will review the Proposed Baseline Schedule for accuracy, reasonableness, and conformance with the Contract Documents and shall provide comments within ten days of receipt. Within five days after receiving District Representative comments, Contractor shall both incorporate changes to address District Representative concerns and resubmit the Proposed Baseline Schedule for District Representative back-check. This process will continue until the Proposed Baseline Schedule is accepted as the Baseline Schedule. Once accepted by District Representative, the Baseline Schedule will be the basis upon which Contractor shall prepare updates that record and report actual performance and progress. The accepted Baseline Schedule and subsequent Monthly Updates shall be the basis for consideration and analysis of requests for time extensions and Contractor progress payments.
- M. District Representative acceptance of the Baseline Schedule or Contractor’s failure to identify or include an element of the Contract, shall not release Contractor’s obligation to complete all required Work in accordance with the Contract Documents.

3.04 REQUIREMENTS FOR MONTHLY/WEEKLY SCHEDULE UPDATING

- A. Once the Baseline Schedule is accepted by District Representative, Contractor shall submit Monthly Schedule Updates beginning with month No. 1. The current month’s schedule update cannot be accepted until the previous Monthly Schedule Update has been accepted by District Representative.
- B. Monthly Schedule Update Format
 1. Initially, the Contractor shall status a current Monthly Schedule Update with actual Work progress only. No logic ties shall be modified. Status all Actual Start and Finish dates, adjust Remaining Durations where needed, and update Percent Completion of activities. If Contractor chooses to modify logic or add activities (other than out-of-sequence corrections) it shall be done in accordance with Section 3.06.

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2. Once the schedule is stated in accordance with Section 3.04.B.1, Contractor shall print (and submit with Monthly Schedule Update) a report of "out-of-sequence" logic that results from the updating process. Contractor shall then correct all "out-of-sequence" logic to reflect Contractor's actual Work sequence.
 3. During construction, Contractor may desire to break down specific activities into greater detail. If greater detail is necessary, then Contractor shall identify expanded activities such that the Baseline Schedule activities that the expanded activities originated from are readily apparent. Contractor shall not allow the aggregate duration of the expanded activities to exceed the duration assigned to the Baseline Schedule activity unless permitted by District Representative in writing.
 4. The Data Date for the Monthly Schedule Updates shall be the last day of the month. At a minimum, three days prior to the submission of the Monthly Schedule Update, Contractor shall meet in person with District Representative to present the proposed Percentages of Completion and Actual Start and Actual Finish dates. If the District Representative takes no exceptions to the percentages of completion and actual dates then the Monthly Schedule Update may be implemented.
 5. Written Narrative Report: Contractor shall include a written report to explain the Monthly Schedule Update. The narrative shall, at a minimum include the following headings with appropriate discussions of each topic:
 - a. Introduction.
 - b. A Summary of Work which was on-going This Pay Period.
 - c. Problem Areas and Proposed Solutions.
 - d. Critical Path.
 - e. Current and Anticipated Delays.
 - f. Coordination of Work with Others.
 - g. Milestone Status.
 - h. Denote changes in logic and added Fragnets.
 - i. Denote additions/deletions of activities.
 6. In updating the Schedule, Contractor shall not modify Activity ID numbers, schedule calculation rules/criteria, or the Activity Coding Structure required.
 7. Submit bar charts, tabular reports, written narrative, electronic data, and plots in accordance with this Section.
- C. Four-Week Rolling Schedule: At each Weekly Progress Meeting, Contractor shall present a Four-Week Schedule in Bar Chart format. It shall show one (1) week of actual and three (3) weeks of forecasted progress. The Four-Week Rolling Schedule shall be used as a basis for discussing progress and work planned during the three (3) weeks.
1. The Four-Week Rolling Schedule shall be based on the most recent District Representative Accepted Monthly Schedule Update. It shall include weekly updates to all construction, submittal, fabrication and procurement, and separate work contract activities. Contractor shall ensure that it accurately reflects the current progress of the Work.
 2. Contractor shall discuss actual dates and any variances to critical or near critical activities.
 3. Upon request by District Representative, Contractor shall provide the Four-Week Rolling Schedule in electronic format.

4. If the Four-Week Rolling Schedule indicates activities are behind schedule, Contractor shall provide a Recovery Schedule in accordance with Section 3.05.

3.05 RECOVERY SCHEDULES

- A. If a Monthly Schedule Update indicates negative float greater than ten (10) workdays on a critical path as result of events controlled by the Contractor or due to Unforeseen events, Contractor shall prepare a Proposed Recovery Schedule demonstrating Contractor's plan to regain the time lost. The Recovery Schedule shall be submitted either in advance of or concurrent with the Monthly Schedule Update and Contractor progress request. Both the Monthly Schedule Update and the Proposed Recovery Schedule shall be based on the same percentages of completion and actual dates accepted by District Representative under Section 3.05 B.
- B. The Proposed Recovery Schedule shall be based on a copy of the Monthly Schedule Update for the calendar month during which the negative float first appears.
- C. The Proposed Recovery Schedule shall include a narrative that identifies the causes of the negative float on the critical path and provides Contractor's proposed corrective action to ensure timely completion of all Milestones and the Substantial Completion Date. Contractor's corrective actions shall include but are not limited to increasing concurrent operations, increasing labor, adding multiple shifts in a 24-hour period, and adding overtime.
- D. During any period of time when Contractor is found to be behind schedule by District Representative, the Monthly Schedule Update described above shall become a weekly requirement to provide a greater degree of focus on the timely completion of the Work. These Updates shall be submitted to District Representative every Monday morning. When Contractor is deemed by District Representative to be back on schedule, Contractor may revert to submitting the schedule monthly.
- E. Contractor's progress payment may not be processed until District Representative accepts the Proposed Recovery Schedule. Following such an acceptance, the Proposed Recovery Schedule will be known as the Recovery Schedule and future Work will be performed by Contractor in accordance with it.

3.06 FRAGNETS AND TIME EXTENSION REQUESTS

- A. Float is not for exclusive use or benefit of either District Representative or Contractor but is an expiring resource available to both parties on a non-discriminatory basis. If required to meet specified Milestones, either party may utilize float. Adjustments to Milestones or Contract Time will only be authorized by Change Order and only to the extent the claimed adjustments exceed total float along the most critical path of the current Monthly Schedule Update in effect at the time of the claimed adjustments. The claimed adjustments to the Milestones and/or Contract Time must also cause the Beneficial Completion Date to exceed that currently indicated in the Monthly Schedule Update. Contractor alleged claimed adjustments to an existing negative float path will not receive consideration until the activity with the highest negative float is driven even further negative.
 1. Alleged Claimed adjustments to the Milestones or Contract Time will be administered in conjunction with those set forth in the Facilities Lease Agreement.
- B. Pursuant to the float sharing requirements of this Section, the use of float suppression techniques such as preferential sequencing or logic, special lead or lag logic restraints, and extended activity times or durations are prohibited. The use of float time disclosed or implied by the use of alternate float suppression techniques shall be proportionally shared to benefit District Representative and Contractor. The use of any technique solely for the purpose of suppressing float will result District Representative rejection of the submitted Monthly Schedule Update.

- C. In the event Contractor believes the Project has suffered an adverse impact arising from events predicated by the Facilities Lease Agreement, Contractor may prepare a Time Extension Request by submitting a Schedule Fragnet and a written narrative outlining the detail of the impact. A Schedule Fragnet must demonstrate a critical path delay. Such a delay must adversely impact the Substantial Completion Date for Contractor to receive a time extension. To demonstrate such an impact successfully, Contractor shall prepare a Schedule Fragnet based on a copy of District Representative accepted Monthly Schedule Update for the calendar month during which the adverse impact occurred. This "copy" of the District Representative accepted Monthly Schedule Update shall however first be updated (by District Representative and Contractor jointly) with both Percentages of Completion and Actual Dates up to the day the delay commenced. This process will provide the "pre-delay" project status. Once District Representative and Contractor have agreed to the "pre-delay" project status, Contractor should make a copy of this "pre-delay" schedule and this copy is to be the starting point for Contractor's Schedule Fragnet development. District Representative will evaluate the activities, logic, durations, etcetera, in the Schedule Fragnet and will evaluate if the adverse impact arose from events described by the Facilities Lease Agreement. The Fragnet shall also include Contractor-caused delays that affect the critical or near critical path in the network and should be accounted for in the Time Impact Analysis if overlapped at any point in time with District Representative -caused delay. If rain impact days were granted between the Start and Finish of District Representative -caused delay period, they should be accounted for in the Time Impact Analysis as well. Provided District Representative determines such an impact occurred, Contractor may be due a time extension equal to the number of proportioned days of variance/delay that resulted to the Substantial Completion Date.
- D. Activities added into a Schedule Fragnet to demonstrate the impact of adverse event shall be assigned a unique activity code. The Schedule shall be organized by this unique activity code.
- E. The Schedule Fragnet shall incorporate logic that accurately ties reflective of the adverse event to pre-event predecessor activities and post event successor activities.
- F. The format and components of a Schedule Fragnet submittal shall be in accordance with this Section and the Facilities Lease Agreement. It is crucial for the Fragnet to be submitted within the same month of discovery so it can be resolved during the monthly schedule update review. The notice shall be transmitted to District Representative within the stipulations outlined in the Facilities Lease Agreement.
- G. If District Representative accepts Contractor's Schedule Fragnet and an extension is granted, a Change Order or Contingency Budget approval will be prepared and granted. District Representative will advise what change order or contingency number the time extension will become. When Contractor receives this Change Order or Contingency number, all the activities added to the Schedule Fragnet shall be given Activity Identification Numbers that corresponds with the Change Order number or Contingency number. Contractor shall resource-load the activities if required by District Representative. If resource loading is required, the resource loading shall include a breakdown of labor, material, and equipment quantities.
- H. If District Representative rejects Contractor's Schedule Fragnet in part based on improper forecast logic or activity tasks then it shall be revised accordingly to conform to District Representative review comments and resubmitted. If the forecast logic and activity tasks cannot be agreed to then the pre-delay schedule outlined in Section 3.06.C shall be compared to the actual as-built data in the succeeding month of the encountering issue, event, condition, circumstance, and/or cause. The variance to the project between the pre-delay and post delay schedules shall be discussed in Contractor's written narrative and proportioned between the different parties involved in the delay.
- I. If District Representative rejects Contractor's Schedule Fragnet in whole then Contractor may follow the procedures set forth in the Facilities Lease Agreement.

3.07 FAILURE TO COMPLY WITH REQUIREMENTS

- A. At any time during the project if Contractor fails to comply with the specified requirements, District Representative reserves the right to engage independent estimating and scheduling consultants to fulfill these requirements. Upon notice to Contractor, District Representative shall assess against Contractor, incurred costs for these additional services.
- B. In such an event, District Representative will require, and Contractor shall participate and provide requested information to ensure the resulting Milestones Schedule accurately reflects Contractor's plan to execute the Work in compliance with the Contract Documents. If it becomes necessary for District Representative to recommend logic or duration revisions as a result of Contractor failure to furnish acceptable data, and if Contractor has objections to the recommendations, Contractor shall provide notice to District Representative within three (3) days and Contractor shall provide an acceptable alternate plan. If Contractor fails to so note any objections and provide an acceptable alternate plan, or if Contractor implements the recommendations of District Representative without so noting any objections, Contractor will be deemed to have waived all objections and concurred with the recommended logic/duration revisions provided by Architect and/or District Representative
- C. Submittal of any Monthly Schedule Updates are subject to review and acceptance by District Representative. District Representative retains the right, including, but not limited to the Facilities Lease Agreement, to withhold progress payments in whole or part until Contractor submits a Monthly Schedule Update acceptable to District Representative.

3.08 CONTRACTOR RESPONSIBILITY

- A. Nothing in this Section shall be construed to be a usurpation of Contractor authority, responsibility, and obligation to plan and schedule Work as Contractor deems necessary, subject to all other requirements of the Contract Documents.
- B. Contractor shall involve the subcontractors, manufacturers, and suppliers in the development and periodic updating of the schedule.

3.09 RECORD DOCUMENTS

- A. Prior to Contract Completion of the Work, Contractor shall submit an as-built time-scaled network diagram reflecting the actual dates of all activities.

END OF SECTION 01 32 13

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SECTION 01 32 29 - PROJECT FORMS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. The following, but not limited to, District administrative forms and documents listed in this Section to be utilized in the administration of the Work.
- B. Electronic versions of these forms will be made available if requested from the District Representative.
- C. From time to time, Owner may release new revisions and new Project Forms. At any time during the Project, if requested by District Representative, Contractor shall use the newly released Project Form(s).

1.02 RELATED DOCUMENTS

- A. Master Facilities Lease.
- B. Division 01.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 PROCEDURES: Contractor to utilize the following District standard forms (refer to Appendix A for a copy of the forms listed below)

- A. Application for Tenant Improvements Payments and Lease Payments/Schedule of Values: This form is used in requesting a progress tenant improvement payments and lease payments and to establish the basis of the certified tenant improvement payments.
- B. Change Order: This form is used to adjust the Contract Amount, Milestones and/or the Contract Time.
- C. Conditional Waiver and Release Upon Progress Payment: Use this form when the claimant is required to execute a waiver and release in exchange for or in order to induce the payment of a progress payment and the claimant has not been paid.
- D. Conditional Waiver and Release Upon Final Payment: Use this form when the claimant is required to execute a waiver and release in exchange for or in order to induce the payment of the Final Payment and the claimant has not been paid.
- E. [RESERVED]
- F. Immediate Change Directive: This form is used to issue an Immediate Change Directive.
- G. Unconditional Waiver and Release Upon Progress Payment: Use this form when the claimant is required to execute a waiver and release in exchange for or in order to induce payment of a progress payment and the claimant asserts in the waiver that he or she has in fact been paid the progress payment.
- H. Unconditional Waiver and Release Upon Final Payment: Use this form when the claimant is required to execute a waiver and release in exchange for or in order to induce payment of the Final payment and the claimant asserts in the waiver that he or she has in fact been paid the Final Payment.
- I. [RESERVED]

SANTA ANA COLLEGE
JOHNSON STUDENT CENTER DEMOLITION (INCREMENT 2)

- J. Construction Waste Management Plan: This form is used to provide a Waste Management Plan, submitted in accordance with Specification Section 01 74 19 and prior to any waste removal.
- K. Construction Waste Management Progress Report: This form is used to provide a Waste Management Monthly Progress Report, summarizing waste generated by Project and submitted monthly with Application for Payment.
- L. Letter of Assent: This form is to be signed by all Contractors awarded work covered by the Community and Student Workforce Project Agreement (CSWPA).
- M. CSWPA Craft Request Form: This form is to be used to request Craft Workers from the applicable union that will fulfill all hiring requirements for the project.
- N. Core Employee List: This form is to be completed by All Prime Contractors/Consultants, Subcontractor/Sub-consultants intending to employ core workers. Complete this list and then forward to the District's Labor Compliance Consultant.
- O. Monthly Employee Utilization Form: This form is to be completed monthly and then to be forwarded to the District's Labor Compliance Consultant.
- P. Modified Certified Payroll Form: This form is to be completed monthly and then to be forwarded to the District's Labor Compliance Consultant in addition to the electronic Certified Payroll.
- Q. Checklist of Labor Law Requirements: This form is to be completed by all Contractors, acknowledging and understanding the Federal and State Labor Law.
- R. Request for Import Material Testing: This form is to be completed and provided to District Representative in accordance with Specification Section 01 45 24.
- S. [RESERVED]
- T. Certificate of Substantial Completion: This form is to be completed and signed by all parties once project has been determined to be substantially complete.
- U. Warranty Guarantee Form: This form shall be filled out and signed by Contractor and Subcontractors prior to completion of closeout activities.

END OF SECTION 01 32 29

01 32 29 – PROJECT FORMS

APPENDIX A

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CERTIFICATE OF SUBSTANTIAL COMPLETION

DATE:

SITE:	CONTRACT #:	
PROJECT NAME:	PROJECT ID#:	DSA#:
CONTRACTOR:	CONTRACT DATE:	

- This Certificate of Substantial Completion applies to **all work** under the Contract Documents.
- This Certificate of Substantial Completion applies to **the following specific parts** of the Contract Documents:

--

The work performed under the above-referenced Contract has been reviewed and found, by the signatory's (below) best knowledge, information and belief, to be "Substantially Completed" as defined in the Contract. The Substantial Completion Date of the Project or portion thereof designated above is hereby established as _____, 20__.

- The completion of the Punch List for Final Completion is attached hereto

This list may not be inclusive, and the failure to include an item on such list does not alter the responsibility of the Contractor to reach Final Completion of all work in accordance with the Contract Documents. Such work shall be completed or corrected to the satisfaction of the District within the number of days provided in the Contract for Punch List work.

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of the Contract's obligation to complete the Work in accordance with the Contract Documents.

Contractor
Date

Inspector
Date

Architect
Date

RSCCD Project Manager
Date

RSCCD Director
Date

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Project Name: _____

Project No.: _____ DSA Application No. _____

Conditional Waiver and Release Upon Final Payment

CALIFORNIA 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.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

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 \$ _____.

Date: _____
_____ (Company Name)

BY: _____
_____ (Signature)

_____ (Title)

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Project Name: _____

Project No.: _____ DSA Application No. _____

Conditional Waiver and Release Upon Progress Payment

CALIFORNIA 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.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

Through Date: _____

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 claimant has not received payment; (3) The following progress payments for which the claimant has previously provided a conditional waiver and release but has not received payment: Date(s) of waiver and release: _____, Amount(s) of unpaid progress payment(s): \$ _____; (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.

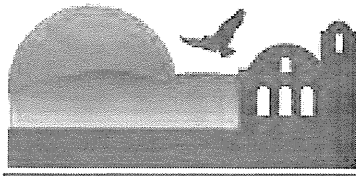
Date: _____

(Company Name)

BY: _____
(Signature)

(Title)

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RSCCD – CSWPA Project Checklist of Labor Law Requirements

The federal and state labor law requirements applicable to the contract are composed of but not limited to the following items. Please check to indicate that you understand:

- The contractor's **duty to pay prevailing wages** under Labor Code Section 1770 et seq., should the project exceed the exemption amounts;
- The contractor's **duty to employ registered apprentices** on the public works project under Labor Code Section 1777.5;
- The **penalties for failure to pay prevailing wages** (for non-exempt projects) **and employ apprentices** including forfeitures and debarment under Labor Code Sections 1775 and 1777.7;
- The requirement to **keep and submit copies upon request of certified payroll records** under Labor Code Section 1776, and penalties for failure to do so under Labor Code Section 1776(g);
- The **prohibition against employment discrimination** under Labor Code Section 1777.6; the Government Code, and Title VII of the Civil Rights Act of 1964;
- The **prohibition against accepting or extracting kickback from employee wages** under Labor Code Section 1778;
- The **prohibition against accepting fees** for registering any person for public work under Labor Code Section 1779; or for filling work orders on public works under Labor Code Section 1780;
- The **requirement to list all subcontractors** under Public Contracts Code Section 4104;
- The **requirement to be properly licensed** and to require all subcontractors to be properly licensed and the penalty for employing workers while unlicensed under Labor Code Section 1021 and under the California Contractors License Law, found at Business and Professions Code Section 7000 et seq;
- The **prohibition against unfair competition** under Business and Professions Code Sections 17200-17208;
- The **requirement that the contractor be properly insured for Workers Compensation** under Labor Code Section 1861;
- The **requirement that the contractor abide by the Occupational, Safety and Health laws and regulations** that apply to the particular construction project;
- The **federal prohibition against hiring undocumented workers**, and the requirement to secure proof of eligibility/citizenship from all workers.
- The **requirement to provide itemized wage statements** to employees under Labor Code Section 226.

I acknowledge that I have been informed and am aware of the foregoing requirements and that I am authorized to make this certification on behalf of my company.

Date

Signature

Company Name

License Number

Phone Number

E-Mail Address

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CORE EMPLOYEES LIST
TO BE COMPLETED BY ALL PRIME
CONTRACTORS/CONSULTANTS,
SUBCONTRACTORS/SUBCONSULTANTS
INTENDING TO EMPLOY CORE WORKERS

FIRM NAME: _____

PROJECT: _____ **CONTRACT NO.:** _____

PRIME CONTRACTOR: _____ **TELEPHONE NO.:** _____

The following is a list of anticipated “Core Employees” which are defined by the Community and Student Workforce Project Agreement (§5.6), have been on the active payroll for at least **thirty (30) out of the last one hundred eighty (180) days** prior to the award, and have been **residents of Orange County** for the one hundred eighty (180) working days prior to the award of the contract. Pursuant to the requirements of SB 1362 and California Labor Code section 3099.2, all employees performing **electrical work** for a subcontractor holding a C-10 license **must be certified. If employees working on project are found to be not certified, they shall be immediately removed.** Failure to provide proof of this documentation on all anticipated employees will be considered a violation and subject the subcontractor to corrective action up to and including being removed from the project.

The prime contractor/consultant and any subcontractor/subconsultant, at any tier, must submit this prior to commencing work on the project [§7.1].

Name	Last 4 Digits of SSN	Trade	ZIP Code of residence	Certificate # (Electricians only)

Certification:
 I certify that the information contained hereon is true and correct.

Signature: _____ **Date:** _____

Name/Title: _____

SUBMIT ORIGINAL TO:

The Solis Group
RSCCD CSWPA Administrator
131 N. El Molino Ave., #100, Pasadena, CA 91101
FAX: (626) 685-6985 • PHONE: (626) 698-8751

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CSWPA CRAFT REQUEST FORM

TO THE CONTRACTOR: Please complete and fax this form to the applicable union to request craft workers that fulfill all hiring requirements for this project. A duplicate fax request is to be sent to the Project Labor Coordinator. After faxing your request, please call the Local to verify receipt and substantiate their capacity to furnish workers as specified below. Please print your Fax Transmission Verification Reports and keep copies for your records.

The Rancho Santiago Community College District (District) Community and Student Workforce Project Agreement sets the goal that 66% of all of the labor and craft positions shall be from workers residing in the County of Orange and 50% of the positions are filled by residents of the District's service area which covers the following zip codes:

92602	92606	91610	92612	92614	91618 92620	92686	92627	92660
92675	92676	92679 92688	92701	92703	92704	92705	92706	92707
92707	92708	92780	92782	92802	92805 92806	92807	92808	92840
92843	92861	92862	92865	92866	92867	92868	92869	92883 92887

TO THE UNION: Please complete the "Union Use Only" section on the next page and fax this form back to the requesting Contractor. Be sure to retain a copy of this form for your records and send a copy to Project Labor Coordinator.

CONTRACTOR USE ONLY

To: Union Local # _____ Fax: _____ Date: _____

Cc: Project Labor Coordinator

From: Company: _____ Issued By: _____
 Contact Phone: _____ Contact Fax: _____

PLEASE PROVIDE ME WITH THE FOLLOWING UNION CRAFT WORKERS

Craft Classification (i.e., plumber, painter, etc.)	Journeyman or Apprentice	Local Resident	Number of workers needed	Report Date	Report Time
TOTAL WORKERS REQUESTED = _____					

Please have worker(s) report to the following work address indicated below:

Project Name: _____ Site: _____ Address: _____
 Report to: _____ On-site Tel: _____ On-site Fax: _____

Comment or Special Instructions: _____

UNION USE ONLY

Date dispatch request rec'd:
Dispatch received by:
Classification of worker requested:
Classification of worker dispatched:

WORKER REFERRED

Name:			
Date worker was dispatched:			
Is the worker referred a:		(check all that apply)	
District (zip code) resident	(See zip code list above)	Yes _____	No _____
Veteran		Yes _____	No _____
Graduate of District's JATC	(Carp, Elect & O.E., only)	Yes _____	No _____
Current District JATC apprentice	(Carp, Elect & O.E., only)	Yes _____	No _____
Orange County resident		Yes _____	No _____
Regular dispatch from out of work list		Yes _____	No _____

[This form is not intended to replace a Local Union's Dispatch or Referral Form normally given to the employee when being dispatched to the jobsite.]

CSWPA LETTER OF ASSENT

To be signed by all Contractors awarded work covered by the Community and Student Workforce Project Agreement prior to commencing work.

[CONTRACTOR'S LETTERHEAD]

[DATE]

The Solís Group

131 N. El Molino Ave., #100

Pasadena, CA 91101

Attention: RSCCD CSWPA Administrator

Re: Rancho Santiago Community College District Community and Student Workforce Project Labor Agreement

Dear Sir:

This is to confirm [Name of Company] agrees to be party to and bound by the Rancho Santiago Community College District Community and Student Workforce Project Agreement – for School Construction Major Rehabilitation Funded by Measure Q effective _____, as such Agreement may from time to time be amended by the negotiating parties or interpreted pursuant to its terms. Such obligation to be a party and bound by this Agreement shall extend to all work covered by the Agreement undertaken by this Company on the Project pursuant to [Contract No. _____ and Name of Project/School], and this Company shall require all of its subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical Letter of Assent prior to their commencement of work.

Sincerely,

[Name of Construction Company]

By:

[Name and Title of Authorized Executive]

[Copies of this Letter must be submitted to the Project Labor Coordinator and to the Council consistent with Article 4, Section 4.4(b)]

ATTACHMENT B - CSWPA CRAFT REQUEST FORM

TO THE CONTRACTOR: Please complete and fax this form to the applicable union to request craft workers that fulfill all hiring requirements for this project. A duplicate fax request is to be sent to the Project Labor Coordinator. After faxing your request, please call the Local to verify receipt and substantiate their capacity to furnish workers as specified below. Please print your Fax Transmission Verification Reports and keep copies for your records.

The Rancho Santiago Community College District (District) Community and Student Workforce Project Agreement sets the goal that 66% of all of the labor and cmft positions shall be from workers residing in the County of Orange and 50% of the positions are filled by residents of the District's service area which covers the following zip codes:

92602	926M	91610	92612	92614	91618 92620	92686	92627	92660
92675	92676	92679 92688	92701	92703	92704	92705	92706	92707
92707	92708	92780	92782	92802	92805 9JN06	92807	92808	92840
92843	92861	92862	92865	92866	92867	92868	92869	928M 92887

TO THE UNION: Please complete the "Union Use Only" section on the next page and fax this form back to the requesting Contractor. Be sure to retain a copy of this form for your records and send a copy to Project Labor Coordinator.

CONTRACTOR USE ONLY

To: Union Local# _____ **Fax# ()** _____ Date: _____
 Cc: Project Labor Coordinator
 From: Company: _____ Issued By: _____
 Contact Phone: 1 3 _____ Contact Fax: I I _____

PLEASE PROVIDE ME WITH THE FOLLOWING UNION CRAFT WORKERS.

Craft Classification (i.e., plumber, painter, etc.)	Journeyman or Apprentice	Local Residen t	Number of workers needed	Report Date	Report Time
TOTAL WORKERS REQUESTED = _____					

Please have worker(s) report to the following work address indicated below:

Project Name: _____ Site: _____ Address: _____
 Report to: _____ On-site Tel: _____ On-site Fax: _____
 Comment or Special Instructions: _____

Modified Certified Payroll Report Instructions

Certified Payroll Reports (CPRs) are required by California Labor Code §1776 in order to report payment of prevailing wage. They are to be submitted weekly starting with the first week of work and are accompanied by a Statement of Compliance. Non-Performance statements can be submitted for weeks where no work is performed.

Basic Information:

Name of Contractor/Subcontractor - List the name of the contractor

Address - List the address of the contractor

Contractors License #/Specialty License # - List the contractors License # as issued by the California State Licensing Board and any other specialty licenses

Payroll No. - 1st payroll to be marked "1" and so on. Please also add "Final" for the contractor's final payroll on the project

For Week Ending - the date of the last day in the weekly pay period

Project Name and Location - List the name of the project and an address (or approximate address if none exists)

Contract No. - For general contractor, list the contract # for the contract with the awarding agency. For subcontractors, list contract # for contract with prime contractor

(1) NAME, ADDRESS, AND SOCIAL SECURITY NUMBER OF EMPLOYEE - California Labor Code §1776 requires that the correct name, address, and social security number be reported.

(2) No. of W/H Exemptn - List number of withholding exemptions for the employee

(3) Work Classification - Please list a DIR-recognized work classification (i.e. Electrician Inside Wireman, Laborer Group 1, Ironworker Apprentice 3, etc.) as listed on the DIR website: <http://www.dir.ca.gov/oprl/DPreWageDetermination.htm>

(4) Veteran or RSCCD Program Participant Status - The CSWPA counts veterans of the U.S. Armed forces and RSCCD Apprentice Program Participants as District Residents. Mark "Y" if the worker is a veteran of the U.S. Armed Forces or "N" if they are not. RSCCD Program Participants are workers who have either graduated from or are currently enrolled in one of District's sponsored apprentice programs. These programs are:

Carpentry (SW Carpenters Local 2361 and 803) - Acoustical Tile, Drywall/Lather, Drywall Finisher, Plastering, Concrete, Finish Carpentry, Framing, Tilt-up, Millwright, and Pile Driver
Electrician (IBEW Local 441 and OC NECA) - Inside Wireman and Sound Installer
Operating Engineers (Local 12) - Heavy Equipment Operator, Heavy Duty Repair, Inspection, and Rock Products Industry
Surveying (Local 12) - Survey Chainman, Rodman and Chief of Party

(5) Day and Date - List the day and date for each day of the week. Then for each worker, list the straight time and overtime hours worked for each day. It is recommended to confirm the straight time and overtime rules for the employee's work classification as posted on the DIR website <http://www.dir.ca.gov/oprl/DPreWageDetermination.htm>

(6) Hour Total - Report the total straight time and overtime hours worked for the week.

(7) Pay Rate - List the worker's basic hourly rate for straight time and overtime

(8) Gross Amount

This Project - total gross amount earned for this pay period for this project

All Projects - total amount earned for all projects (if employee worked on other projects for the week)

Federal tax, FICA, State Tax, SDI, WAC, Other - list all deductions taken out of employee's gross pay, amounts listed under "Other" deductions

Total Deductions - List total amount deducted from employee's paycheck

(9) Net Wages Paid for Week - Amount paid to the employee. Gross wages minus all deductions.

Check No. - Please list the check number for the employee's weekly paycheck

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Facility Planning, District Construction & Support Services
 2323 North Broadway, Suite 112
 Santa Ana, CA 92706-1640

Immediate Change Directive

Date: _____
 Project Name: _____
 Project No.: _____
 Architect: _____
 Contractor: _____

Change Directive No.: _____
 Reference RFI No.: _____
 Reference COR No.: _____

Initiated By: District
 Architect
 Contractor
 Other: _____

WORK REQUIRED: _____

REASON FOR CHANGE DIRECTIVE: _____

STATUS OF WORK/CONSTRUCTION ACTIVITIES AFFECTED: _____

CONTRACTOR IS AUTHORIZED TO PROCEED WITH THE WORK PURSUANT TO THE CONSTRUCTION SERVICES AGREEMENT IN THE FOLLOWING MANNER:

- Not to Exceed, Time & Materials (T&M)* _____
 Complete work within dollar limit stated, submit daily time tickets
- Guaranteed Unit Price* _____
 Complete work for agreed amount (Unit Price)
- Lump Sum, Not to Exceed:* _____

Additional Days Required: _____
 Days beyond Approved Contract Completion Date

Schedule Activity Nos. Affected: _____

THE ADDITIONAL COST AND/OR CREDIT FOR THE ADDITIONAL AND/OR DELETED WORK SCOPE SHALL BE APPLIED TO PROJECT ALLOWANCES AND/OR CONTINGENCIES AS FOLLOWS:

This Immediate Change Directive (ICD) authorizes the Contractor to proceed with the work as described herein. Contractor agrees to furnish all labor and material and perform all of the above described work in accordance with the above terms in compliance with the applicable sections of the Contract Documents. By signing this ICD, the Contractor agrees with the compensation indicated herein. If Contractor disagrees with the compensation indicated herein, Contractor may file a Claim pursuant to the Contract. If this ICD is issued on a T&M basis, the Contractor shall notify the District immediately when 80% of the NTE amount is reached. The ICD is not valid until signed by both the Architect and the Construction Manager on behalf of the Rancho Santiago Community College District governing Board. Signature below represents approval of this ICD. Provisions herein for adjustment of compensation and/or time shall constitute mutual accord and full satisfaction with respect to all impacts, disruptions, delays of costs (including, without limitations, any home office, overhead, whatsoever related to the change specified herein.

CONTRACTOR: _____
 Approved By: _____
 Date: _____

DISTRICT CM: _____
 Approved By: _____
 Date: _____
ARCHITECT: _____
 Approved By: _____
 Date: _____

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REQUEST FOR EXPORT MATERIALS TESTING FORM

Date:	
Project Name:	
RSCCD Project No.:	
Contractor:	
School Site Exporting Material (Name and Address):	

Location of Soil Receiving Site:

Receiving Site Address:	
Receiving Site City:	
Major Cross Streets:	

Receiving Site Owner Information:

Owner Name:	
Contact Name:	
Contact Phone Number:	

Receiving Site History:

Describe Current Site Use:	
Describe Site History:	
Available Environmental Documents:	

Export Soil Description:

Material Type:			
Import Soil Volume:			(Tonnage)
If in place material, depth and acres of excavation:			
<input type="checkbox"/> Only portion of material is available or <input type="checkbox"/> All required material is available	<input type="checkbox"/> Stockpile or <input type="checkbox"/> In Place		
Area ready on Import Site?	<input type="checkbox"/> Yes <input type="checkbox"/> No		

Schedule:

Date and time when results are needed:	
Date formal report is needed:	

Comments:

--

Note: Contractor shall submit receiving facilities profile along with this testing form. Requests for export materials testing must be received a minimum of two (2) weeks in advance of material needing to be exported.

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REQUEST FOR IMPORT MATERIALS TESTING FORM

Date:	
Project Name:	
RSCCD Project No.:	
Contractor:	
School Site Receiving Import (Name and Address):	

Location of Soil Borrow Site:	
Borrow Site Address:	
Borrow Site City:	
Major Cross Streets:	

Soil Owner Information:	
Soil Owner Name:	
Contact Name:	
Contact Phone Number:	

Site History:	
Describe Current Site Use:	
Describe Site History:	
Available Environmental Documents:	

Borrow Soil Description:	
Material Type:	<input type="checkbox"/> Fill Soil <input type="checkbox"/> Other: _____
Import Soil Volume:	(Tonnage)
If in place material, depth and acres of excavation:	
<input type="checkbox"/> Only portion of material is available or <input type="checkbox"/> All required material is available	<input type="checkbox"/> Stockpile or <input type="checkbox"/> In Place
Materials already on Import Site?	<input type="checkbox"/> Yes <input type="checkbox"/> No

Schedule:	
Date and time when results are needed:	
Date formal report is needed:	

<u>Comments:</u>

Note: Requests for testing at District pre-tested sites must be received four (4) weeks in advance of material being needed on site. Requests for non-pre-tested sites must be received eight (8) weeks in advance of material being needed on site.

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Board Date: January 0, 1900

Project Name: 0

Project/Bid No. 0

Contractor: 0

Site: 0

Contract #: 0

Change Order (CO) No. : 0

Contract Schedule Summary					
Notice to Proceed Date	Original Contract Duration (Days)	Original Contract Completion Date	Previous Extension Days Approved	Proposed CO Days Requested	New Revised Completion Date
01/00/00	0	01/00/00	0	0	1/0/1900

Change Order Summary			
Description	Number	Amount	% of Contract
Original Contract Amount		\$0.00	
Previous Change Orders	0	\$0.00	#DIV/0!
This Change Order	0	\$0.00	#DIV/0!
Total Change Order (s)		\$0.00	#DIV/0!
Revised Contract Amount		\$0.00	

Items in Change Order							
Item No.	Description	Requester	Reason	Ext. Day	Credit	Add	Net
1	0	0	0	1/0/1900	\$0.00	\$0.00	\$0.00
							\$0.00
							\$0.00
Subtotal					\$0.00	\$0.00	\$0.00
Grand Total							\$0.00

- 1- CODE REQUIREMENT
- 2 - FIELD CONDITION
- 3 - INSPECTION REQUIREMENT
- 4 - DESIGN REQUIREMENT
- 5 - OWNER REQUIREMENT

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Rancho Santiago Community College District
 2323 North Broadway
 Santa Ana, CA 92706

TENANT IMPROVEMENT PAYMENT NO. _____

For the period: _____ to _____
 Contractor: _____
 Address: _____
 Phone: _____

DSA # _____
 Project Name _____
 P.O. No. _____
 Vendor # _____

A. ANALYSIS OF ADJUSTED CONTRACT AMOUNT TO DATE

1. Original contract amount	\$	-
2. Change made from Approved Change Orders	\$	-
3. Adjusted contract amount to date	\$	-

B. COMPUTATION OF PAYMENT DUE

1. Work completed to date on original contract	\$	-
2. Extra work performed to date	\$	-
3. Total work performed to date	\$	-
4. Less: 5% retained	\$	-
5. Net amount earned to date	\$	-
6. Amount to be withheld because of: _____	\$	-
7. Balance	\$	-
8. Less: Amount of previous payments	\$	-
9. Amount due this payment	\$	-
10. Unpaid balance on RSCCD amount of _____	\$	0.00

C. CERTIFICATION OF CONTRACTOR OR HIS DULY AUTHORIZED REPRESENTATIVE

To the best of my knowledge and belief, I certify that all items and prices of work and material shown on this periodical estimate are correct; that all work has been performed and materials supplied in full accordance with the terms and conditions of the construction contract documents covering the work of the indicated contract, and all change orders approved by the **Board of Trustees**; that this is a true and correct statement of the contract account up to and including the last day of the period covered by this estimate and that no part of the amount "Amount Due This Payment" has been received.

I further certify that this payment will be used to pay all just and lawful bills against the undersigned for labor, materials and expendable equipment employed in the performance of the indicated contract.

 Contractor Date

 Director Date

 Inspector Date

 Asst. Vice Chancellor Date

 Architect Date

 Vice Chancellor Date

 Construction Sprvsr/Mngr. Date

E. CERTIFICATE OF PAYMENT

This is to certify that _____
 Contractor is entitled to a payment of _____
 \$0.00

For the work performed at the _____
 in accordance with terms of contract dated _____

Completion Accepted

 RSCCD

 Date

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REQUEST FOR INFORMATION (RFI)

School Name: _____

RFI Number: _____

Project Name: _____

Date: _____

Contractor: _____

Project No.: _____

Issued To:
(Architect) _____

DSA No.: _____

Contract No.: _____

Drawing Number Detail

Drawing Page

Specification

SUBJECT:

Information Requested:

Suggested Course of Action:

Schedule Impact: Yes No

Cost Impact: Yes No

Request Issued by:

Contractor's Signature

Name (Printed)

Date

Response:

Response Issued by:

Architect's Signature

Name (Printed)

Date

Response Reviewed by:

Project Manager

Name (Printed)

Date

Proceeding with the Work in accordance with the above information indicates the Contractor's acknowledgement that there will be no change in the Contract Sum or Contract Time. If the Contractor considers that a change in Contract Sum or Contract Time is required, before proceeding with the work obtain authorization from the Owner by notifying the Owner and the Architect within five (5) working days and submit an itemized proposal within ten (10) days.

cc:



Project Name: _____

Project No.: _____ DSA Application No. _____

Unconditional Waiver and Release Upon Final Payment

CALIFORNIA 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.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

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 \$ _____.

Date: _____
_____ (Company Name)

BY: _____
_____ (Signature)

_____ (Title)

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Project Name: _____

Project No.: _____ DSA Application No. _____

**Unconditional Waiver and Release
Upon Progress Payment
CALIFORNIA 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.

Identifying Information

Name of Claimant: _____

Name of Customer: _____

Job Location: _____

Owner: RANCHO SANTIAGO COMMUNITY COLLEGE DISTRICT

Through Date: _____

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 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.

Date: _____

(Company Name)

BY: _____
(Signature)

(Title)

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WARRANTY GUARANTEE FORM

The following is a warranty and guarantee by the undersigned for warranty of the work installed/completed at (description of the location. Capitalized terms not defined herein shall have the meanings assigned to them in the Contract Documents applicable to the Warranted Work at the time it was furnished and installed at the Project.

The undersigned hereby warrants and guarantees that: 1) the Warranted Work (including, without limitation, all pieces and parts thereof that are incorporated into the Warranted Work), unless otherwise expressly permitted or required by the Contract Documents, is of first-class quality and new; and 2) the Warranted Work conforms with the requirements of the Contract Documents and Applicable Laws; and 3) the Contractor agrees to repair or replace all of the Work that may prove to be defective in workmanship or material and any other adjacent Work that may be displaced in connection with such replacement within a period of **two (2) years** from the date of Final Completion as defined in the Contract, ordinary wear and tear and unusual abuse or neglect excepted.

The date of Final Completion is _____, 20__.

SYSTEM OR ITEM	WARRANTY DURATION (YEARS)

In the event the Contractor fails to comply with the above-mentioned conditions within a reasonable period of time, as determined by the District, but not later than seven (7) calendar days after being notified in writing by the District, the Contractor authorizes the District to proceed to repair or replace the defective Work at the expense of the Contractor. The Contractor shall pay the costs and charges therefor upon demand.

Warranties shall provide by written endorsement that if warranted Work fails and is replaced, removed or substantially rebuilt, that the original warranty on such Work shall be renewed, whereas the full warranty periods starts over again, commencing from when Work covered by warranty was corrected.

The responsibility of the undersigned under this warranty includes, without limitation, replacement, removal and repair not only of the Warranted Work, but also of related or adjoining portions of work, equipment, materials or property as necessary to provide access for correction of the Warranted Work, as well as any other loss or damage (including, without limitation, economic loss) resulting directly or indirectly to the District from the failure of the Warranted Work to comply with the terms of this warranty. All costs, expenses, damages and other losses to the District due to the failure of the Warranted Work to comply with the terms of this warranty shall be deemed to be expenses of undersigned and shall be paid by the undersigned to the District upon demand.

***Signatures are on the next page**

Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of Subcontractor or Supplier	Date
Print Name		Signature of General Contractor	Date

Representative to be contacted for Service Subject to the Terms of Contract:		
Name:	Phone #	Email
For After Hours Emergency Contact		
Name	Phone#	Email

Representative to be contacted for Service Subject to the Terms of Contract:		
Name:	Phone #	Email
For After Hours Emergency Contact		
Name	Phone#	Email

END OF DOCUMENT



Instructions regarding Form:

1. General:
 - a. Attach proposed Recycling and Waste Bin Location Plan.
 - b. Attach name and contact data for each recycling or disposal destination to be used.
2. Column 1: "Material Types" – Enter types of materials targeted for recycling, reuse, and/or salvage, either on or off-site, and include a category for waste materials requiring disposal.
3. Columns 2 – 4: "Estimated Generation" – Enter estimated quantities (tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated and state number of salvageable items.
4. Column 5: "Estimated Landfill" – Enter quantities (tons) of materials to be disposed in landfill.
5. Column 6: "Disposal Location" – Enter end-destination of recycled, salvaged, and disposed materials.

(DELETE TEXT BOX BEFORE PROVIDING TO DISTRICT REPRESENTATIVE)

CONSTRUCTION WASTE MANAGEMENT PLAN

PROJECT NAME: _____

PROJECT SITE ADDRESS: _____

PROJECT NO: _____

NAME OF COMPANY: _____

CONTACT PERSON: _____

TELEPHONE: _____

PROJECT TYPE: NEW CONSTRUCTION DEMOLITION
 RENOVATION / ALTERATION PROJECTS

PROJECT SIZE (SQ. FT.): _____

DATE & ESTIMATED PERIOD: _____

(1) Material Type	(2) Tons Estimated Recycle	(3) Tons Estimated Reuse	(4) Tons Estimated Salvage	(5) Tons Estimated Landfill	(6) Proposed Disposal or Recycling Facility (e.g., Onsite, Name of Facility)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					=

Signature	Title	Date
-----------	-------	------

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Instructions regarding Form:

1. General:
 - a. Attach proposed Recycling and Waste Bin Location Plan.
 - b. Attach name and contact data for each recycling or disposal destination to be used.
 2. Column 1: "Material Types" – Enter types of materials targeted for recycling, reuse, and/or salvage, either on or off-site, and include a category for waste materials requiring disposal.
 3. Columns 2 – 4: "Estimated Generation" – Enter estimated quantities (tons) of recyclable, reusable, or salvageable waste materials anticipated to be generated and state number of salvageable items.
 4. Column 5: "Estimated Landfill" – Enter quantities (tons) of materials to be disposed in landfill.
 5. Column 6: "Disposal Location" – Enter end-destination of recycled, salvaged, and disposed materials.
- (DELETE TEXT BOX BEFORE PROVIDING TO DISTRICT REPRESENTATIVE)

CONSTRUCTION WASTE MANAGEMENT PROGRESS REPORT

PROJECT NAME: _____

PROJECT SITE ADDRESS: _____

PROJECT NO: _____

NAME OF COMPANY: _____

CONTACT PERSON: _____

TELEPHONE: _____

PROJECT TYPE: NEW CONSTRUCTION DEMOLITION
 RENOVATION / ALTERATION PROJECTS

PROJECT SIZE (SQ. FT.): _____

PERIOD: _____

(1) Material Type	(2) Tons Actual Recycle	(3) Tons Actual Reuse	(4) Tons Actual Salvage	(5) Tons Actual Landfill	(6) Disposal or Recycling Facility (e.g., Onsite, Name of Facility)
Total					
Diversion Rate: Columns [(2)+(3)+(4)] / [(2)+(3)+(4)+(5)]					=

Signature	Title	Date
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SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Administrative and procedural requirements for submittals required for the Work, including but not limited to; Shop Drawings, Product Data, Samples, material lists, and quality control items as required by the Contract Documents.
- B. Wherever possible, throughout the Contract Documents, the minimum acceptable quality of workmanship and products has been defined by the name and catalog number of a manufacturer and by reference of recognized industry standards.
- C. To ensure that specified products are furnished and installed in accordance with the design intent, Facility Design Standards and procedures have been established for submittal of design data and for its review by District Representative, Architect, and/or others.

1.02 RELATED SECTIONS

- A. Master Facilities Lease.
- B. Section 01 12 16: Phasing of the Work.
- C. Section 01 29 73: Schedule of Values Procedures.
- D. Section 01 29 76: Progress Payment Procedures.
- E. Section 01 31 13: Project Coordination.
- F. Section 01 32 13: Construction Schedule.
- G. Section 01 45 23: Testing and Inspection.
- H. Section 01 50 00: Construction Facilities and Temporary Controls.
- I. Division 2 through Division 33.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS AND PROCEDURES

- A. Contractor shall package each submittal appropriately for transmittal and handling and will then send Architect, and District Representative submittal for review per the Project plans and specifications. Submittals will not be accepted from sources other than from Contractor.
- B. Contractor shall clearly identify any deviations from the Contract Documents on each submittal. Any deviation not so noted, even if stamped reviewed, is not acceptable.
- C. After Architect review, Architect shall transmit submittals to Contractor, District Representative, and Project Inspector. Contractor shall further distribute to Subcontractors and others as required. Work shall not commence, unless otherwise approved by District Representative, and/or Architect until approved submittals are transmitted to Contractor.
- D. Contractor's Review and Approval: Every submittal upon which proper execution of the Work is dependent shall bear the Contractor's review and approval stamp, dated and signed by Contractor. Certifying that Contractor (a) has reviewed, checked, and approved the submittal and has coordinated

the submittal contents with requirements of Work and Contract Documents including related Work, (b) Contractor coordinated with all other shop drawings received to date and this duty of coordination has not been delegated to subcontractors, material suppliers, the Architect, or the engineers on this project, (c) determined and verified quantities, field measurements, construction criteria, materials, equipment, catalog numbers and identifications, and similar data, or will do so, and (d) states the Work illustrated or described in the submittal is recommended by Contractor and the Contractor's warranty will fully apply thereto.

- E. Contractor shall coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities requiring sequential activity.
- F. Timing of Submittals:
1. Submittals shall not delay the construction schedule and shall be submitted in timely manner in accordance with Facilities Lease Agreement.
 2. The Contractor shall submit within fifteen (15) calendar days of the Notice to Proceed, an itemized listing of required submittals with a scheduled date for each submittal in accordance with the Master Facilities Lease Agreement. The schedule of submittals shall provide adequate time between submittals in order to allow for proper review without negative impact to the Construction Schedule.
 3. Schedule of submittals shall be related to Work progress, and shall be so organized as to allow sufficient time for transmitting, reviewing, corrections, resubmission, and re-reviewing.
 4. Contractor shall coordinate submittal of related items and Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received by Architect.
 5. Contractor shall revise, update and submit submittal schedule to District Representative and Architect on the first of each month, or as required by the District Representative.
 6. Contractor shall allow in the Construction Schedule, at least ten (10) business days for Architect review following Architect receipt of submittal. For mechanical, plumbing, electrical, structural, and other submittals requiring joint review with Architect's Consultants, and/or others, Contractor shall allow a minimum of fourteen (14) business days following Architect receipt of submittal. Submittals will be reviewed with reasonable promptness, but Architect reserves the right of additional time where required based on but not limited to submittal size, complexity, etc.
 7. No adjustments to the Contract Time and/or Milestones will be authorized because of a failure to transmit submittals to Architect sufficiently in advance of the Work to permit review and processing.
 8. In case of product substitution, Shop Drawing preparation shall not commence until such time Architect and District Representative reviews said submittal relative to the Facilities Lease.
- G. If required, resubmit submittals in a timely manner. Resubmit as specified for initial submittal but identify as such. Review times for re-submitted items shall be as per the time frames for initial submittal review.
- H. Architect, or authorized agent, will stamp each submittal with a uniform, action stamp. Architect, or authorized agent, will mark the stamp appropriately to indicate the action taken, as follows:
1. Final Unrestricted Release: When Architect, or authorized agent, marks a submittal "REVIEWED" the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
 2. Final-But-Restricted Release: When Architect, or authorized agent, marks a submittal "FURNISHED AS CORRECTED" the Work covered by the submittal may proceed

provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.

3. Returned for Re-submittal: When Architect, or authorized agent, marks a submittal "REJECTED" AND "REVISE AND RESUBMIT" do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat as necessary to obtain different action mark. In case of multiple submittals covering same items of Work, Contractor is responsible for any time delays, schedule disruptions, out of sequence Work, or additional costs due to multiple submissions of the same submittal item. Do not use, or allow others to use, submittals marked "REJECTED" AND "REVISE AND RESUBMIT" at the Project site or elsewhere where Work is in progress.
 4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Architect, or authorized agent, will return the submittal marked "REVIEWED".
- I. Review of Submittals by the Architect: Submittals will be reviewed but only for conformance with the design concept of the Project and with the information indicated on the Drawings and stated in the Specifications. Review of a separate item as such will not indicate approval of the assembly in which the item functions. Review of submittals shall not relieve the Contractor of responsibility for any deviations from requirements of the Contract Documents or any revisions in resubmittals unless Contractor has given written notice of such deviation or revision at the time of submission or resubmission and written approval has been given to the specific deviation or revision, nor shall approval relieve the Contractor of responsibility for error or omissions in the submittals or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, functioning, and completion to the Work.
 - J. All costs for the preparation, correction, delivery, and return of the submittals shall be borne by the Contractor.

3.02 SHOP DRAWINGS

- A. Shop Drawings are original drawings prepared by Contractor, Subcontractor, supplier, or distributor illustrating some portion of Work by showing fabrication, layout, setting, or erection details. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Copies of the Contract Drawing marked to show Shop Drawing information are not acceptable and will be not be reviewed and will be promptly returned to the Contractor.
- B. Produce Shop Drawings to an accurate scale that is large enough to indicate all pertinent features and methods. Submit Shop Drawings in PDF format, and full-size drawing (five copies).
- C. Shop Drawings shall include, at a minimum, fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings. Include the following information:
 1. Dimensions
 2. Identification of products and materials included by sheet and detail number.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
- C. Provide two (2) spaces, approximately 4 by 5 inches, on the label or beside the title block on Shop Drawings to record Contractor and Architect review, and the action taken. Include the following information on the label for processing and recording action taken:
 1. Project name.
 2. Project number.

3. Date.
 4. Name and address of Architect.
 5. Name and address of Contractor.
 6. Name and address of Subcontractor.
 7. Name and address of supplier.
 8. Name and address of manufacturer.
 9. Name and title of appropriate Specification section.
 10. Drawing number and detail references, as appropriate.
- E. Submit a sufficient number to allow for adequate Contractor, Subcontractor, supplier, manufacturer and fabricators distribution plus two (2) sets to be retained by Architect, one (1) set to Project Inspector, one (1) set for Cx Agent, and one (1) set for the District Representative.

3.03 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of Work or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, wiring diagrams, schedules, illustrations, or performance curves.
1. Mark each copy to show or delineate pertinent materials, products, models, applicable choices, or options. Where Product Data includes information on several products that are not required, clearly mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
 - g. Notation of dimensions and required clearances.
 - h. Indicate performance characteristics and capacities.
 - i. Indicate wiring diagrams and controls.
 2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
- C. Required Copies and Distribution: Same as denoted in Section 3.02, E.

3.04 SAMPLES

- A. Submit Samples of sufficient size, quantity (minimum of three), cured and finished and physically identical to the proposed product or material. Samples include partial or full sections or range of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches denoting color, texture, and/or pattern.
1. Mount or display Samples in the manner to facilitate review of qualities indicated. Include the following:
 - a. Specification section number and reference.

SANTA ANA COLLEGE
JOHNSON STUDENT CENTER (INCREMENT 2)

- b. Generic description of the Sample.
 - c. Sampling source.
 - d. Product name or name of manufacturer.
 - e. Compliance with recognized standards.
 - f. Availability and delivery time.
2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
- a. Where variations in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show the approximate limits of the variations.
 - b. Refer to other Specification sections for requirements for Samples that illustrate workmanship, fabrication techniques, assembly details, connections, operation, and similar construction characteristics.
 - c. Refer to other sections for Samples to be returned to Contractor for incorporation into the Work. Such Samples must be undamaged at time of installation. On the transmittal indicate special requests regarding disposition of Sample submittals.
 - d. Samples not incorporated into the Work, or otherwise not designated as Owner property, remain the property of Contractor and shall be removed from the Project site prior to Substantial Completion.
3. Color and Pattern: Whenever a choice of color or pattern is available in a specified product, submit accurate color chips and pattern charts to Architect for review and selection by Architect and District Representative.
4. Required Copies and Distribution: Same as denoted in Section 3.02, E.
- B. When specified, erect field Samples and mock-ups at the Project site to illustrate products, materials, or workmanship and to establish standards by which completed Work shall be judged.
- C. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of the Work. Sample sets may be used to obtain final acceptance of the Work associated with each set.

3.05 DEFERRED SUBMITTAL REQUIREMENTS

- A. Installation of deferred submittal items shall not be started until detailed plans, specifications, and engineering calculations have been: 1) accepted by the Architect or Engineer in general responsible charge of design, 2) signed by a California registered Architect or professional engineer who has been delegated responsibility covering the work shown on a particular plan or specification, and 3) approved by the Division of the State Architect (DSA). Deferred submittal items for this Project are as indicated in the Contract Documents.
- B. Deferred submittal drawings and specifications become part of the approved documents for the Project when they are submitted to and approved by DSA.
- C. Submit material using submittal process as defined above.
- D. Identify and specify all supports, fasteners, spacing, penetrations, etc., for each of the deferred submittal items, including calculations for each and all fasteners.
- E. Submit documents to Architect for review prior to requesting that the Architect forward it to the DSA.

- F. Documents shall bear the stamp and signature of the Structural, Mechanical, or Electrical Engineer licensed in California who is responsible for that work.
- G. Architect and its subconsultants will review the documents only for conformance with design concept. The Architect will then forward the Submittal to DSA for approval.
- H. Contractor shall respond to review comments made by DSA and revise and resubmit submittal to the Architect for re-submittal to DSA for final approval.

3.06 QUALITY CONTROL SUBMITTALS

- A. Submit quality control submittals, including design data, certifications, manufacturer's field reports, and other quality control submittals as required under other sections of the Contract Documents.
- B. When other sections of the Contract Documents require manufacturer's certification of a product, material, and/or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
- C. Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the represented company.
- D. Requirements for submittal of inspection and test reports are specified in other sections of the Contract Documents.

3.07 CERTIFICATES

- A. Submit all certificates in triplicate to Project Inspector, in accordance with requirements of each Specification Section.

END OF SECTION 01 33 00

SECTION 01 35 01 - OWNER'S CONTROLLED INSURANCE PROGRAM (OCIP)

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements governing Insurance requirements.

1.02 RELATED SECTIONS

- A. Master Facilities Lease Agreement.
- B. Section 01 29 73: Schedule of Values Procedures.
- C. Section 01 29 76: Progress Payment Procedures.
- D. Section 01 32 13: Construction Schedule.
- E. Section 01 50 00: Construction Facilities and Temporary Controls.

1.03 OWNER'S CONTROLLED INSURANCE PROGRAM (OCIP)

- A. Insurance. The District will centralize the purchase of insurance for the activities of the Contractor and Subcontractors of every tier for Work performed for the Project. This consolidated purchase of insurance shall be known as Owner Controlled Insurance Program ("OCIP"). Contractor shall comply with the insurance requirements of the Facilities Lease and the terms of the OCIP, attached as Exhibit K to the Facilities Lease, which include the scopes of insurance that are NOT within the OCIP.
- B. Contractor OCIP Obligations.
 - 1. Compliance with OCIP Requirements. Contractor agrees to comply with any and all terms and conditions of the policies of insurance provided by the District and to comply with any and all claims handling procedures, loss prevention programs and other programs required by or related to the District's OCIP as set forth herein. Contractor shall require Subcontractors and Sub-Subcontractor and all others covered by the District's OCIP insurance policies to so comply.
 - 2. Contractor Furnishing of Information. Contractor, its Subcontractor and Sub-Subcontractors shall furnish to the District, the Architect, the OCIP Administrator, its designees or the insurers under the OCIP policies, all information and documentation that such entity may require from time to time in connection with the issuance of policies under this Contract or the administration of the OCIP in such form and substance as such entity may prescribe and promptly comply with the recommendations of the OCIP insurers.
 - 3. No Violation of OCIP Insurance Policy Conditions. Contractor shall not violate, or knowingly permit to be violated; any conditions of the policies of insurance provided by the District hereunder and shall at all times satisfy the requirements of the insurers issuing them. Contractor shall assure that all OCIP requirements imposed upon, assumed and performed by each Subcontractor and Sub-Subcontractor.
 - 4. District Rights. If the Contractor, Subcontractors, Sub-Subcontractors, or Excluded Parties should fail to comply with the Non-OCIP Insurance requirements, the District may withhold payment due to the Contractor or suspend the Work at the Contractors' sole expense and without adjustment of the Contract Price or Contract Time until such time as the Contractor, its Subcontractor, Sub-Subcontractors, and/or Excluded Parties have performed such obligations to the reasonable satisfaction of the District.
 - 5. Withholding of Tenant Improvement Payments and Lease Payments. In addition to the rights of the District to withhold all or portions of Tenant Improvement Payments and

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Lease Payments set forth elsewhere in the Contract Documents, the District may withhold Payments for the failure or refusal of the Contractor to comply with OCIP requirements, including without limitation, the reporting requirements set forth in the OCIP Program description or the OCIP insurance policies. Amounts withheld by the District pursuant to the preceding will be released only after the Contractor and/or Subcontractors' compliance with OCIP requirements, less costs and expenses incurred by the District in securing such compliance.

- C. Contractor/Subcontractor Provided Insurance Requirements. The Contractor and Subcontractors shall obtain and maintain for the duration of the Work each of the Contractor/Subcontractor Provided insurance policies as set forth in the OCIP. Prior to the Contractor or Subcontractor performance of Work at the Site, the Contractor shall deliver Certificates of Insurance to the District evidencing that the Contractor and applicable Subcontractor(s) have obtained the Contractor/Subcontractor Provided insurance policies required by the OCIP.
- D. No Waiver Created through Payments. The making of Tenant Improvement Payments of the GMP to the Contractor shall not be construed as creating an insurable risk interest by or for the District or be construed as relieving the Contractor or his subcontractors of responsibility for loss from any direct physical loss, damage, or destruction occurring prior to completion of the work by the District.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

- A. Refer to “Exhibit K” of the Master Facilities Lease for OCIP requirements.

END OF SECTION 01 35 01

SECTION 01 35 02 - COMMUNITY AND STUDENT WORKFORCE PROJECT AGREEMENT (CSWPA)

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies administrative and procedural requirements governing CSWPA.
- B. Master Facilities Lease Agreement – Exhibit L: Community and Student Workforce Project Agreement

1.02 RELATED SECTIONS

- A. Master Facilities Lease
- B. Section 01 29 73: Schedule of Values Procedures.
- C. Section 01 29 76: Progress Payment Procedures.
- D. Section 01 32 29: Project Forms.

1.03 COMMUNITY AND STUDENT WORKFORE PROJECT AGREEMENT (CSWPA)

- A. The CSWPA applies to this Project that is being funded by the District’s Measure Q bond program.
- B. The Contractor (as defined in the CSWPA, which includes subcontractors of whatever tier) shall comply with the CSWPA attached hereto.
- C. Letter of Assent
 - 1. The Contractor and all entities or persons covered by the CSWPA shall execute and deliver to the District an original of the Letter of Assent (Attachment A of the CSWPA) prior to commencing any work. Any entity or person covered by the CSWPA that fails to execute and provide the Letter of Assent shall not be allowed to work on the Project or allowed onto the Project site. Any delays resulting from providing the Letter of Assent as required shall be the responsibility of the Contractor.
- D. Certified Payroll
 - 1. The Contractor and all subcontractors (of any tier) shall submit, at least monthly, electronic certified payroll records directly to the District’s Labor Compliance Consultant. The submission to the District’s Labor Compliance Consultant shall include the Modified Certified Payroll Form, included in Section 01 32 29 Project Forms.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION

- A. Refer to Exhibit L of the Master Facilities Lease Agreement for a copy of the CSWPA.

END OF SECTION 01 35 02

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SECTION 01 41 00 – CEQA MITIGATION MEASURES

PART 1 – GENERAL

1.01 SECTION INCLUDES:

- A. This Section specifies administrative and procedural requirements governing California Environmental Quality Act (CEQA) Mitigation Measures.

1.02 RELATED SECTIONS:

- A. Facilities Lease Agreement.
- B. Facilities Site Agreement.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 CEQA Mitigation Measure (MM) Requirements for Contractor:

- A. MM 4.4.3: During construction, the Contractor shall comply with the requirements of the State General Construction Activity National Pollutant Discharge Elimination System (NPDES) Permit. The construction site shall be inspected in compliance with permit requirements. A copy of the SWPPP shall be kept at the project site and available for Regional Water Quality Control Board (RWQCB) review.
- B. MM 4.5.5: Contractor shall comply with the District’s Construction Area Traffic Management Plan. Contractor shall keep all haul routes free of debris including, but not limited to, gravel and dirt.
- C. MM 4.6.1: Contractor shall comply with South Coast Air Quality Management District (SCAQMD) Rules 402 and 403 to assist in reducing short-term air pollutant emissions. Rule 402 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Rule 403 requires that fugitive dust be controlled with best available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. Applicable dust suppression techniques from Rule 403 are summarized below.
 - 1. Apply nontoxic chemical soil stabilizers according to manufacturers’ specifications to all inactive construction areas (previously graded areas inactive for 10 days or more).
 - 2. Water active sites at least twice daily. Locations where grading is to occur shall be thoroughly watered prior to earthmoving.
 - 3. Cover or maintain at least two feet of freeboard (vertical space between the top of the load and top of the trailer) on all trucks hauling dirt, sand, soil, or other loose materials in accordance with the requirements of California Vehicle Code (CVC) Section 23114.
 - 4. Reduce traffic speeds on all unpaved roads to 15 mph or less.
- D. MM 4.6.2: Contractor shall follow dust suppression measures required by SCAQMD CEQA Air Quality Handbook during construction. Contractor shall be responsible for the implementation of the following dust suppression measures:
 - 1. Revegetate disturbed areas as quickly as possible.

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2. Suspend excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph.
 3. Sweep streets once per day if visible soil materials are carried to adjacent streets.
 4. Install wheel washers where vehicles enter and exit unpaved roads onto paved roads, or wash trucks and any equipment leaving the site each trip.
 5. Minimize the area disturbed by clearing, grading, earthmoving, or excavation operations at all times.
- E. MM 4.6.3: Contractor shall utilize construction equipment with low-emission factors and high-energy efficiency. All construction equipment shall be tuned and maintained in accordance with the manufacturer's specifications.
- F. MM 4.6.4: Contractor shall time the construction activities to not interfere with peak-hour traffic and minimize obstruction of on campus roads. If necessary, a flagperson shall be retained to maintain vehicle and pedestrian safety on roadways adjacent to project site. Contractor shall also support and encourage ridesharing and transit incentives for the construction crew.
- G. MM 4.6.5: Contractor shall be responsible for compliance with SCAQMD Rule 1113 regarding the use of architectural coatings.
- H. MM 4.7.1: Construction will be limited to the hours of 7:00 a.m. to 8:00 p.m., Monday through Saturday, in accordance with Rancho Santiago Community College District (RSCCD) standards. No noise producing construction activities, including starting or warming up construction equipment, are permitted outside of these hours, or on Sundays. The following measures shall also be implemented to reduce potential construction noise impacts on nearby sensitive receptors:
1. During all site excavation and grading, Contractor shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers consistent with manufacturers' standards.
 2. Contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
 3. Contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

END OF SECTION 01 41 00

SECTION 01 45 23 - TESTING AND INSPECTION

PART 1 - GENERAL

- 1.01 SECTION INCLUDES
- A. Testing and inspection services to meet requirements of California Building Standards Code, Title 24, California Code of Regulations.
 - B. Tests of materials are required by a DSA certified Testing Agency as set forth in Section 4-335 of the California Building Standards Commission's California Administrative Code.
 - C. Appendix A: DSA Form 103, Structural Testing & Inspections
- 1.02 RELATED SECTIONS
- A. Master Facilities Lease Agreement.
 - B. Section 01 31 13: Project Coordination.
 - C. Section 01 32 13: Construction Schedule.
 - D. Section 01 33 00: Submittal Procedures.
 - E. Section 01 50 00: Construction Facilities and Temporary Controls.
 - F. Section 01 73 29: Cutting and Patching.
 - G. Section 01 78 36: Warranty Procedures.
- 1.03 COORDINATION OF TESTS AND INSPECTIONS
- A. Contractor shall establish a protocol for requesting inspections and special inspections so as to not delay the progress of the work. Contractor shall review the Facilities Lease Agreement for additional requirements.
- 1.04 TESTING COSTS
- A. District will pay for special inspections and testing identified in the Statement of Structural Tests and Special Inspections (DSA FORM 103) except Contractor shall reimburse the District Representative for retesting costs caused by failure of materials to pass initial tests. Contractor shall arrange and pay for all other testing that are specified in other specification sections.
 - 1. Reimbursement of Inspection Costs: The Contractor shall reimburse to the District Representative all or any part, as the District Representative may deem just and proper, of the actual excessive inspection costs incurred by the District Representative due to any or all of the following:
 - i. Contractor's failure to complete the Work within the Contract Time stated in the Agreement, and any previously authorized extensions thereof.
 - ii. Claims between separate contractors
 - iii. Covering of any of the Work before the required inspections of tests are performed.
 - iv. Extra inspections required for Contractor's correction of defective Work.
 - v. Overtime costs for acceleration of Work done for Contractor's convenience.
- 1.07 CONTRACTOR-FURNISHED ASSISTANCE

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- A. When requested, Contractor shall furnish access, facilities, and labor assistance as necessary for duties to be performed at the site by Test Laboratory, and Inspector, including ladders, hoisting, man/boom lifts, certified operator for lifting equipment and Safety devices for lift equipment, temporary lighting, water, and like services.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 SCHEDULES FOR TESTING

- A. Establishing Schedule:
 - 1. By advance discussion with the testing laboratory selected by the District Representative, determine the time required for the laboratory to perform its tests and to issue each of its findings.
 - 2. Provide required time within the construction schedule.
- B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate such changes of schedule with the testing laboratory as required.
- C. Adherence to Schedule: When the testing laboratory is ready to test according to the determined schedules, but is prevented from testing or taking specimens due to incompleteness of the work, extra charges for testing attributable to the delay may be back-charged to the Contractor and may be deducted by the District Representative from the contract sum.

3.02 REQUESTING TESTING

- A. Contractor shall request testing and inspection through the Project Inspector. Contractor shall provide Project Inspector a minimum of twenty-four (24) hour notice prior to Project Inspector inspections being required and a minimum of forty-eight (48) hour notice prior to special testing and inspections being required.

3.03 TESTS

- A. District Representative will select and provide an independent DSA certified testing agency (Testing Agency) to conduct tests, sampling, and testing of materials. Selection of material to be tested shall be by the Testing Agency and not by Contractor.
- B. The Contractor shall not incorporate into the work any material shipped from the source of supply prior to having satisfactorily passed the required testing and inspection, or prior to the receipt of notice from Project Inspector that the testing and inspection is not required.
- C. District Representative will select, and directly reimburse, the Testing Agency for costs of all DSA required tests and inspections; however, the District Representative may be reimbursed by Contractor for such costs as specified or noted in related sections of the Contract Documents.
- D. The independent Testing Agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
- E. The Testing Agency shall not perform any duties of Contractor.
- F. Contractor shall provide an insulated curing box with the capacity for twenty (20) concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

3.04 TEST REPORTS

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- A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Drawings. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

3.05 VERIFICATION OF TEST REPORTS

- A. Each Testing Agency shall submit to the Division of the State Architect a verified report covering all tests required to be performed by that Testing Agency during the progress of the Work, in accordance with DSA PR 13-01.

3.06 INSPECTION BY DISTRICT REPRESENTATIVE

- A. District Representative, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. Contractor shall, at all times, maintain proper facilities and provide safe access for such inspection.
- B. District Representative shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of without charge to District Representative. If Contractor does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, District Representative may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.
- C. Contractor is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

3.07 PROJECT INSPECTOR

- A. A Project Inspector shall be employed by District Representative in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein. Additional DSA certified inspectors may be employed and assigned to the Work by District Representative in accordance with the requirements of California Building Standards Commission's, California Administrative Code with their duties as specifically defined in Section 4-333, 4-342, and in DSA IR A-8.
- B. Inspection of Work shall not relieve Contractor from any obligation to fulfill all terms and conditions of the Contract Documents.
- C. Contractor shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

3.08 TESTS AND INSPECTIONS

- A. The following tests and inspections do not limit inspection of the Work but are required by DSA, other agencies, or are required in related Sections of the Contract Documents.
 - 1. Excavations, Foundations and Retaining Walls - CBC, Chapter 18A:
 - a. Inspection:
 - i. Inspection of Driven Pile Installation 1810A.4.12
 - ii. Inspection of Caissons 1810A.4.12
 - 2. Concrete - CBC, Chapter 19A:
 - a. Materials:

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	i.	Test of Materials	1903A.1 – ACI 318
	ii.	Portland Cement Tests	1916A.1 – ASTM C 150
	iii.	Concrete Aggregate	1903A.5 – ACI 318
	iv.	Shotcrete Aggregate	1913A.3
	v.	Reinforcing Bars	1916A.2
	vi.	Prestressing Steel & Anchorage	1916A.3
	vii.	Structural Steel, Steel Pipe or Tubing	1906A.3
	viii.	Admixtures	1904A.4
b.		Quality:	
	i.	Proportions of Concrete	1905A.2
	ii.	Mixing and Placing	1905A.8 to; 1905A.12;
	iii.	Concrete Testing	1905A.6.3 to 1905A.6.5
	iv.	Test of Shotcrete	1913A.5;1913A.10; 1916A.5
	v.	Composite Construction Cores	1916A.4
	vi.	Gypsum Concrete Strength Tests	1916A.6
c.		Inspection:	
	i.	Project Site Inspection	1905A.1
	ii.	Batch Plant or Weigh-master Inspection	1704A.4.2
	iii.	Pre-stressed Concrete Inspection	1704A.4.4
	iv.	Shotcrete Inspection	1704A
	v.	Reinforcing Bar Welding Inspection	1704A.3.1.4
3.		Lightweight Metal - CBC, Chapter 22A:	
	a.	Materials:	
		i. Alloys	2210A.1
		ii. Identification	2210A.1
	b.	Inspection:	
		i. Welding	2211A.2.3
4.		Masonry - CBC, Chapter 21A:	
	a.	Materials:	
		i. Masonry Units	2103A.1,2,3,4,5,6,7
		ii. Portland Cement	2103A.10.1; 2103A.10.2
		iii. Mortar & Grout Aggregates	2103A.12.3
		iv. Reinforcing Bars	2103A.13
	b.	Quality:	
		i. Portland Cement Tests	2105A.2.2
		ii. Mortar & Grout Tests	2105A.2.2.1.4

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	iii.	Masonry Prism Tests	2105A.2.2.2; 2105A.2.2.3
	iv.	Masonry Core Tests	2105A.4
	v.	Reinforcing Bars	2103A.13
	c.	Inspection:	
	i.	Reinforced Masonry	1704A.5
	ii.	Reinforcing Bar Welding Inspection	1704A.3.1.3
5.		Steel - CBC, Chapters 17A & 22A:	
	a.	Materials:	
	i.	Structural Steel	2205A.1
	ii.	Material Identification	2203.A.1
	b.	Inspection and Tests:	
	i.	Test of Structural Steel	1704A.3
	ii.	Tests of High Strength Bolts,	1704A.3.3; 2212.A.1
	iii.	Tests of End Welded Studs	2212A.2
	iv.	Shop Fabrication Inspection	1704A.3.1.4
	v.	Welding Inspection	1704A.3.1.4
	vi.	High Strength Bolt Inspection	1704A.3.3
	vii.	Steel Joist Load Tests	1703A.3.2.1
	viii.	Spray applied fire resistance materials	1704A.12
6.		Wood - CBC, Chapter 23A:	
	a.	Materials:	
	i.	Lumber and Plywood Grading	2303.1
	ii.	Glue - Laminated Members	2303.1.3
	b.	Inspection:	
	iii.	Glue - Laminated Fabrication	2303.1.3 – ASTM D 3737
	iv.	Timber Connectors	2304.9
	v.	Manufactured Trusses	2303.4
7.		Exterior Wall Coverings - CBC, Chapter 14A, 25A:	
	a.	Materials:	
	i.	Portland Cement Plaster	2512
	b.	Inspection:	
	ii.	Veneer Inspection	1409

END OF SECTION 01 45 23

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APPENDIX A – DSA FORM 103 TESTING & INSPECTIONS

SECTION 01 45 24

ENVIRONMENTAL IMPORT/EXPORT MATERIALS TESTING

PART 1 – GENERAL

1.01 SUMMARY

- A. This Section specifies the requirements for the sampling, testing, transportation and certification of imported fill materials or exported fill materials from RSCCD Sites.
- B. This Section defines:
 - 1. Contractor requirements for use of existing, imported or generated materials on RSCCD Sites.
 - 2. Contractor requirements for stockpiling materials for use on school sites.
 - 3. Contractor requirements for exporting materials from a school site including transportation.
 - 4. Testing requirements for all materials imported, exported, stockpiled or generated for use on the school site.
 - 5. Testing and reporting requirements.
 - 6. Contractor submittal requirements.

1.02 RELATED SECTIONS

- A. Master Facilities Lease Agreement
- B. Section 01 11 00: Summary of Work.
- C. Section 01 31 13: Project Coordination.
- D. Section 01 32 13: Construction Schedule.
- E. Section 01 32 29: Project Forms
- F. Section 01 33 00: Submittal Procedures.
- G. Section 31 22 00: Grading.
- H. Section 31 23 13: Excavation and Fill.
- I. Section 31 23 00: Excavation and Fill. (Pavement)
- J. Section 31 23 00: Excavation and Fill (Structures).
- K. Section 31 23 00: Excavation and Fill (Utilities).
- L. Section 32 11 00: Base Course.

1.03 OBJECTIVES

- A. Ensure that fill materials imported to RSCCD Sites are free of known and expected environmental contaminants for students, staff, and visitors.
- B. Ensure that materials exported from RSCCD Sites comply with California Code of Regulations (CCR) Title 22 requirements.
- C. Ensure that representative data be collected so that analytical determinations can be made in regards to the first two objectives.

1.04 SUBMITTALS

- A. Contractor shall submit to District Representative for transmittal to RSCCD Environmental Consultant:

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1. Written notification in the form of a memo or e-mail from the Contractor to the District Representative is required prior to the importing of soils from a school or borrow site. All hauling contracts must specify the use of “clean” trucks. Clean trucks shall be clean of any and all visible contamination or deleterious materials.
2. Written documentation confirming that the trucks traveled directly from the source location to the recipient location with no detours or stops at other locations and that short loads were not augmented by other materials that were not tested as part of the final import/export activities. It is the Contractor’s responsibility to document that no other trips or short load augmentation occurred and submit the documentation within seven (7) calendar days of the completion of the import/export activities. All import/export transportation activities shall be conducted in accordance with all applicable (local, State, Federal) rules and regulations.
3. The District’s third party Environmental Consultant shall have the required tests performed and report results noting if the tested material passed or failed and shall furnish copies to the District Representative, Project Inspector (PI), Architect, Contractor and/or others as required. Report shall state tests were conducted under the responsible charge of a licensed State of California professional engineer or professional geologist and the material was tested in accordance with applicable provisions of the Contract Documents, DSA, and CCR Title 22.
4. Certification, in the form of haul tickets or completed waste manifests, documenting the volume/weight and recipient of all import/export materials and activities. This documentation shall be coordinated through the District Representative and RSCCD Environmental Consultant. Contractor shall provide, track, and maintain a log of all imported and exported materials.
5. Specific Import Requirements:
 - a. Within thirty (30) calendar days of receipt of Notice to Proceed, the contractor shall submit a spreadsheet listing all required import material types including but not limited to backfill soil, sand, gravel, and crushed aggregate base **(NO Crushed Miscellaneous Base (CMB) shall be allowed for use on RSCCD projects)**. The list shall include estimated volumes/weights required by each subcontractor and the intended borrow site locations each contractor intends to procure material from.
 - b. Prior to the import of material, the Contractor must provide a “Request for Import Material Testing” form a minimum of four (4) weeks prior to needing material on site. The “Request for Import Material Testing” form can be found in Specification Section 01 32 29.
 - c. For import to the school project site, haul tickets shall be utilized, and shall contain the following minimum information:
 - 1) Date(s) of haul activity.
 - 2) Address of source site.
 - 3) Address of recipient.
 - 4) Load volume/weight.
 - 5) Day of departure from source.
 - 6) Day of arrival at recipient site.
 - 7) Signature of recipient or recipient’s agent.
 - 8) It is the Contractor’s responsibility to confirm that no other trips or short-load augmentation occurred and submit documentation to the District Representative.

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1.05 APPROVALS

- A. Import of soil, granular base, geotechnical grading or filling materials at RSCCD sites will occur only with prior approval of the District Representative.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Imported:

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

B. Exported/Site Generated:

1. Contractor is responsible for finding an acceptable receiving site or facility including facilities permitted to receive exports deemed unusable or environmentally impacted/contaminated.
2. Contractor shall provide a waste acceptance letter to the District from the designated disposal facility prior to any export from the District's site.
3. Contractor must provide the appropriate waste manifest(s) and provide a copy, signed by the receiving site. A copy of the executed manifest shall be provided to the District Representative.
4. Materials identified as hazardous wastes will need the site US EPA waste generator identification number and hazardous waste manifests prepared with requisite information on generator and receiving facility.
5. Miscellaneous Material. No crushed miscellaneous material containing concrete, asphalt, construction debris, or other potential deleterious materials that is generated onsite may be used as fill or grading material for any RSCCD project. Crushed asphalt shall be segregated and stockpiled separately.

PART 3 – EXECUTION

3.01 GRADING/EXCAVATION

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

3.02 SAMPLING AND TESTING

- A. All import material testing will be performed by a testing laboratory selected by District's Environmental Consultant. Contractor must coordinate with the District per Item 1.04, of this Section, to request testing.
- B. All fill/grading material must be tested at the site of origin. OWNER retains the right to refuse any fill material proposed for use at any RSCCD site.
- C. Import fill materials will be deemed acceptable for import or reuse only when it has been tested and proven clean to the satisfaction of the District's Environmental Consultant.
- D. Import fill material may be deemed defective for use by the RSCCD Environmental Consultant at a RSCCD site should any of the following compounds or chemicals exceed the prescribed volumes:
 - 1. TPH are present at concentrations exceeding 100 milligrams per kilogram (mg/kg) for gasoline and/or 1,000 mg/kg for oil/diesel and long-chain hydrocarbons.
 - 2. Solvents and other VOCs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 3. PCBs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 4. SVOCs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 5. OCPs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 6. OPPs are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 7. Chlorinated herbicides are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 8. California Code of Regulations Title 22 (CAM 17) Metals at concentrations exceeding human health risk levels for unrestricted land use or typical background levels expected in California and/or hazardous waste characterization criteria whichever is lower.
 - 9. Hexavalent chromium is present at concentrations exceeding 17 mg/kg or failing hazardous waste STLC leachate criteria.
- E. All import material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations. For the purpose of this specification, "contaminated" shall mean any soil or geotechnical material with constituent concentrations, which would require disposal at a permitted facility (i.e., California hazardous or RCRA hazardous). District Representative must be notified at least five days prior to the disposal of any hazardous waste or hazardous material.

3.03 TRANSPORTATION

- A. Details of the samples and testing must be submitted to and approved by RSCCD Environmental Consultant before the materials from which the samples were collected undergo transportation.
- B. Haul Routes and Regulations/Restrictions: Contractor must comply with requirements of project environmental disclosure documents (e.g., CEQA EIR) and authorities having jurisdiction over the project area and the proposed activities (e.g. Regional Water Quality Control Board, Orange County Health Care Agency, DTSC, etc.).

3.04 COSTS

- A. The District has pre-test sites for sand, aggregate, and CAB that the Contractor may use without requiring any additional environmental testing. If the Contractor elects to utilize a separate site from the pre-tested sites for these materials, the Contractor shall provide an import inspection request form in accordance with Section 1.04 above.
- B. District will incur the costs of testing both mined (quarry) and borrow sites up to and including four (4) locations within a distance of 70 miles of project location. The costs for the need to test more than four (4) sites shall be incurred by the Contractor through the District's Environmental Consultant.
- C. Contractor shall pay all fees associated with loading, hauling and disposal of exported soil and aggregates. Should contaminated soil be encountered, the district shall pay the fee difference if the soil is determined to be treated as a hazardous material.
- D. Contractor shall pay all fees for loading, hauling, disposal and/or processing of contaminated and/or hazardous fill materials identified in the contract documents.

END OF SECTION 01 45 24

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SECTION 01 50 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 – GENERAL

- 1.01 SECTION INCLUDES
- A. Temporary utilities, construction facilities and controls to be provided, maintained, relocated, and removed by Contractor.
- 1.02 RELATED SECTIONS
- A. Master Facilities Lease Agreement.
 - B. Section 01 11 00: Summary of Work.
 - C. Section 01 29 73: Schedule of Values Procedures.
 - D. Section 01 32 13: Construction Schedule.
 - E. Section 01 45 23: Testing and Inspection.
 - F. Section 01 74 19: Construction and Demolition Waste Management.
 - G. Storm Water Pollution Prevention Plan (SWPPP) Report

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

- 3.01 QUALITY ASSURANCE
- A. Contractor shall comply with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
 - 1. Building Code requirements.
 - 2. Division of State Architect.
 - 3. Health and safety regulations.
 - 4. Utility company regulations.
 - 5. Police, fire department and rescue squad requirements.
 - 6. Environmental protection regulations.
 - B. Contractor shall arrange for the inspection and testing of each temporary utility prior to use. Obtain required certifications and permits and transmit to District Representative.
 - C. Contractor provided facilities are to be in place and available for District Representative use and occupancy within thirty (30) calendar days following the date of issue of the Notice to Proceed and shall remain in place and available for District Representative use and occupancy until Substantial Completion of the Project or an earlier date if agreed upon by the District Representative.
 - D. Contractor shall provide site layout to District Representative for District review and approval prior to installation.
- 3.02 TEMPORARY UTILITIES
- A. Contractor shall submit to District Representative reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

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- B. Contractor shall coordinate with the appropriate utility company to install temporary services. Where the utility company provides only partial service, Contractor shall provide and install the remainder with matching compatible materials and equipment.
- C. Temporary Water:
1. Contractor shall furnish, install and pay for all necessary permits, inspections, move ins/out, temporary water lines, connections and fees, extensions and distribution, metering devices and use charges, deliveries/pick-ups, rentals, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other miscellaneous items for the temporary water system, and upon Substantial Completion of the Work, removal of all such temporary water system devices and appurtenances.
 2. Contractor shall provide and maintain temporary water service, including water distribution piping and outlet devices of the size and required flow rates in order to provide service to all areas of the Project site.
 3. DISTRICT will pay for all water usage. Contractor shall assist the District in obtaining a separate meter for the water source.
 4. Contractor shall at their expense and without limitation, remove, extend and/or relocate temporary water systems as rapidly as required in order to provide for progress of the Work.
- D. Temporary Electric:
1. Contractor shall furnish, install, maintain and pay for all necessary permits, inspections, temporary wiring, metering devices, move ins/out, connections and fees, service, extension and distribution, deliveries/pickups, rentals, storage, transportation, taxes, labor, insurance, bonds, materials, equipment and all other required miscellaneous items for the temporary electric systems and upon Substantial Completion of Work, removal of all such temporary electric systems and appurtenances.
 2. Contractor shall furnish, install, maintain, extend and distribute temporary electric area distribution boxes, so located that individual trades can obtain adequate power and artificial lighting, at all points required for the Work, for inspection and for safety.
 3. Contractor shall provide temporary electric for construction, temporary facilities, and connections for construction equipment requiring power or lighting, at all points required for the Work, for inspection and safety.
 4. Contractor shall provide adequate task lighting and safe exit(s) inside building(s), as per Cal/OSHA guidelines, for safety and security.
 5. Contractor shall ensure welding equipment is supplied by electrical generators.
 6. Contractor shall at their expense and without limitation remove, extend and/or relocate temporary electric systems as rapidly as required in order to provide for progress of the Work.
 7. Contractor to provide temporary power plan indicating source and power pole locations, for District review.
- E. Temporary Gas:
1. Contractor shall furnish, install, maintain and pay for all necessary permits, inspections, metering devices and use charges, move ins/out, extension and distribution, deliveries/pickups, rentals, storage, transportation, equipment and piping, rentals, taxes, labor, material, insurance, bonds, and all other required miscellaneous items for the temporary gas systems necessary to perform the Work, and upon Substantial Completion of the Work, removal of all such temporary gas system devices and appurtenances.

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2. Contractor shall at their expense and without limitation remove, extend and/or relocate temporary gas systems as rapidly as required in order to provide for progress of the Work.

F. Temporary Telephone and Data:

1. Contractor shall furnish, install, maintain and pay for all necessary permits, inspections, move ins/outs, extensions and distribution, devices, connections and fees, use charges, rentals, deliveries/pickups, storage, transportation, taxes, labor, insurance, bonds, material, equipment and all other required miscellaneous items for temporary phone, data service and distribution to Project site temporary offices as required by this Section and Section 3.03.
2. Contractor shall at their expense and without limitation, remove, extend and/or relocate temporary phone service and distribution as rapidly as required in order to provide for progress of the Work.
3. Upon Substantial Completion of the Work, Contractor shall remove all such temporary phone service, distribution, devices and appurtenances.

3.03 CONTRACTOR PROVIDED FACILITIES

- A. Contractor shall provide temporary offices, utilities, storage units, fencing, barricades, chutes, elevators, hoists, scaffolds, railings and other facilities or services as required for its use. Contractor shall be responsible for providing/supplying, installing and maintaining all items indicated under this specification Section 01 50 00.

B. Temporary Offices:

1. In addition to Project site temporary office facilities Contractor provides for use of Contractor, Contractor shall provide and maintain a minimum of one 8' x 28' new (or as approved by District Representative) construction trailer on the Project site for sole use by DISTRICT for the duration of the Work. Construction trailer shall be accessible by District Representative and/or Project Inspector on a 7 day a week 24-hour basis. Contractor shall provide the necessary materials and labor to provide the trailer with disabled access on request by the District Representative. Trailer shall include, at a minimum, the following:
 - a. Minimum one office separated from open work area with lockable interior door.
 - b. An open work area with dividing partitions as required by District Representative to accommodate 2 desks
 - c. An upright standing Plan Table with plan racks supported on the wall
2. Trailer shall be furnished with two exterior entrance doors, one located in a separate offices / work areas. Each door shall be furnished with both a dead bolt and cylinder lock with six keys. Exterior doors and windows shall be provided with exterior mounted burglar bars. Windows shall be provided with operable window shades. Security of trailer and contents is a continuous obligation of Contractor and shall be equipped with monitored security system.
3. Trailer shall have ample headroom, 8-foot minimum, and shall be lighted, heated, ventilated, and air-conditioned. Provide an electrically chilled bottled water fountain of 5-gallon capacity. Purified water shall be supplied in 5-gallon containers, delivered weekly, with four spares on hand after each re-supply visit.
4. The separate offices shall each be approximately 100 square feet in size and shall be furnished with a minimum of four 120 volt single phase convenience outlets with one telephone jack and one data/LAN outlet.
5. Contractor shall coordinate floor plan and location of electrical, telephone, data outlets with District Representative prior to ordering and delivering the trailer.

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6. Contractor will provide furnishings in the following quantities, to be set in rooms and position as directed by District Representative upon delivery:
 - a. 2 rolling mid-back task chairs, with arms, Global or equal. (Similar to Staples Cat. # 396503)
 - b. 2 double pedestal metal desks, 29 by 72 by 36 inches, HON or equal. (Similar to Staples Cat. # 791368)
 - c. 1 metal bookcases, three shelf, 41 by 34 by 12 inches (Similar to Staples Cat. # 793638)
 - d. {1} resin folding tables, 29 by 30 by 72 inches (Similar to Staples Cat. # 392331)
 - e. 4 padded meeting chairs, Global or equal. (Similar to Staples Cat. # 709501)
 - f. 1 four drawer, legal size regular files. HON 320 series or equal. (Similar to Staples Cat. # 904575)
 - g. Provide and install 1 "Plan-Hold" wall-mounted 42-inch wide plan racks with 36 individual plan holders each.

- C. Contractor shall be responsible for maintaining all transmission lines, equipment and related devices. If equipment and/or transmission equipment becomes inoperable and downtime exceeds two days, Contractor shall replace and/or provide equivalent interim equipment.

- C. Furniture, equipment, and related ancillary devices shall remain property of Contractor. Contractor shall remove such property upon Substantial Completion of Work or as otherwise determined in writing by District Representative.

- D. At Contractor's expense and without limitation remove and/or relocate temporary office(s) and related facilities as rapidly as required in order to provide for progress of the Work.

- E. Temporary Storage Units:
 1. Contractor shall provide secure and waterproof storage units for the temporary storage of furniture, equipment and other items requiring protection.
 2. Contractor shall be responsible for delivery charges and will install the storage unit in an appropriate area.
 3. Contractor shall remove the storage unit from the Project site when the storage unit is no longer required for the Work or upon Substantial Completion of the Work.
 4. Contractor shall at their expense and without limitation remove and/ or relocate storage units as rapidly as required in order to provide for progress of the Work.

- F. Temporary Sanitary Facilities:
 1. Contractor shall provide portable chemical toilet facilities, hand wash facilities, and trash receptacles. Quantity of units shall be based on total number of workers and shall be in accordance with Cal/OSHA standards and in compliance with SWPPP.
 2. Portable chemical toilet facilities, hand wash facilities, and trash receptacles shall be maintained with adequate supplies and in a clean and sanitary condition and shall be removed from the Project site upon Substantial Completion of the Work. Contractor shall maintain District Representative trailer restroom clean and operational at all times.
 3. Contractor employees shall not use school toilet facilities.
 4. At Contractor's expense and without limitation remove and/or relocate portable chemical toilet facilities as rapidly as required in order to provide for progress of the Work.

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5. Contractor will contain their breaks and lunch periods to the areas designated by District Representative or any public area outside the Project site. Contractor shall provide a suitable container within the break/lunch area for the placement of trash. Areas used for break/lunch must be maintained clean and orderly. Once finish flooring has been installed in a particular area, no food or beverages will be permitted in that area.
- G. Temporary Security Fence/Barricade:
1. Contractor shall maintain the Project site security barricade(s) installed under the demolition package of the Project and modify the fencing as needed to allow construction of the Work.
 2. At Contractor's expense and without limitation remove or relocate fencing, fabric and barricades or other security and protection facilities as rapidly as required in order to provide for progress of the Work. Contractor shall remove all temporary fencing and barricades and restore area.
- H. Other Temporary Enclosures and Barricades:
1. Provide lockable, temporary weather-tight enclosures at openings in exterior walls to create acceptable working conditions, to allow for temporary heating and for security.
 2. Provide protective barriers around trees, plants and other improvements designated to remain.
 3. Temporary partitions shall be installed at all openings where additions connect to existing buildings, and where to protect areas, spaces, property, personnel, students and faculty and to separate and control dust, debris, noise, access, sight, fire areas, safety and security. Temporary partitions shall be as designated on the Drawings or as specified by Architect. At Contractor's expense and without limitation remove and/or relocate enclosures, barriers and temporary partitions as rapidly as required in order to provide for progress of the Work.
 4. Since the Work of this Project may be immediately adjacent to existing occupied structures and vehicular and pedestrian right of ways, Contractor shall, in accordance with applicable safety standards, provide temporary facilities, additional barricades, protection and care to protect existing structures, occupants, property, pedestrians and vehicular traffic. Contractor is responsible for any damage, which may occur to the property and occupants of the property of District Representative or adjacent private or public properties which in any way results from the acts or neglect of Contractor.
 5. Contractor shall be responsible for cleaning up all areas adjacent to the construction site which have been affected by the construction; and for restoring them to at least their original condition- including landscaping; planting of trees, sod, and shrubs damaged by construction; and raking and disposal of debris such as roofing shingles, paper, nails, glass sheet metal, bricks, and waste concrete. Construction debris shall be removed and properly disposed of. Culverts and drainage ditches with sediment from the construction area shall be cleared routinely to maintain proper drainage and re-cleaned prior to completion of the contract.
 6. Contractor shall ensure sediment does not block storm drains. Contractor shall be responsible for cleaning storm drains blocked due to erosion or sediment from the work area.
 7. Contractor shall provide temporary shade for all break areas as required by Cal/OSHA's Heat Safety Regulations.
- I. Temporary Storage Yards:
1. Contractor shall fence and maintain storage yards in an orderly manner.
 2. Provide storage units for materials that cannot be stored outside.

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3. At Contractor's expense and without limitation remove and/or relocate storage yards and units as rapidly as required in order to provide for progress of the Work.
- J. Temporary De-watering Facilities and Drainage:
1. Contractor shall be responsible for, but not limited to, de-watering of excavations, trenches and below grade areas of buildings, structures, the Project site and related areas.
- K. Temporary Protection Facilities Installation:
1. Contractor shall not change over from using temporary facilities and controls to permanent facilities, except as permitted by District Representative
 2. Until permanent fire protection needs are supplied and approved by authorities having jurisdiction, Contractor shall provide, install and maintain temporary fire protection facilities of the types needed in order to adequately protect against fire loss. Contractor shall adequately supervise welding operations, combustion type temporary heating and similar sources of fire ignition.
 3. Contractor shall provide, install and maintain substantial temporary enclosures of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. Where materials, tools and equipment are stored within the Work area, Contractor shall provide secure lock up to protect against vandalism, theft and similar violations of security. District Representative accepts no financial responsibility for loss, damage, vandalism or theft.
 4. Contractor operations shall not block, hinder, impede or otherwise inhibit the use of required exits and/or emergency exits to the public way, except as approved by District Representative. CONTRACTOR shall maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for firefighting equipment and/or personnel.
- L. Temporary Security and Safety Measures:
1. During performance of the Work in existing facilities and/or on a Project Site occupied by students, Contractor shall provide, install and maintain substantial temporary barriers and/or partitions separating all Work areas from areas occupied by students, faculty and/or administrative staff.
 2. During performance of the Work, Contractor shall provide an employee meeting the requirements of Education Code Section 45125.2.(2) to continually supervise and monitor all employees of Contractor and Subcontractor. For the purposes of this Section, Contractor employee shall be someone whom the Department of Justice has ascertained has not been convicted of a violent or serious felony as listed in Penal Code Section 667.5(c) and/or Penal Code Section 1192.7(c). To comply with this Section, Contractor shall have his employee submit his or her fingerprints to the Department of Justice pursuant to Education Code Section 45125.1(a).
 3. Penal Code Sections 290 and 290.4 commonly known as "Megan's Law", require, among other things, individuals convicted of sexually oriented crimes, to register with the chief of police where the convicted individual resides or with a county sheriff or other law enforcement officials. Contractor shall check its own employees and require each Subcontractor to check its employees and report to Contractor if any such employees are registered sex offenders. Contractor shall check monthly during the life of the Contract to ascertain this information and report same to District Representative. Before starting the Work, and monthly thereafter during the life of Contract, Contractor shall notify District Representative in writing if any of its employees and/or if any Subcontractor's employees is a registered sex offender. If so, the DISTRICT may elect and request to have such individuals removed from project and replaced.

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4. Contractor shall employ and maintain sufficient security and safety measures to effectively prevent vandalism, vagrancy, theft, arson, and all other such negative impacts to the Work. Any impacts to the progress of the Work of Contractor, District Representative, or District Representative's forces, due to loss from inadequate security, will be the responsibility of Contractor.

M. Temporary Access Roads and Staging Areas:

1. Due to the limited amount of on and off Project site space for the parking of staff and campus visitor vehicles there will be no parking of Contractor vehicles in areas designated for campus use only. Contractor shall provide legal access to and maintain Contractor designated areas for the legal parking, loading, off-loading and delivery of all vehicles associated with the Work. Contractor shall be solely responsible for providing and maintaining these requirements whether on or off the Project site. Contractor shall provide and maintain ample on-site parking spaces designated for the exclusive use of District Representative. Contractor shall erect signs as required by District Representative each of these spaces and prevent all unauthorized vehicles from parking in the District Representative-reserved spaces.
2. Temporary access roads are to be installed and maintained by Contractor to all areas of the Project site.
3. Contractor will be permitted to utilize existing facility campus roads as designated by District Representative. Contractor shall only utilize those entrances and exits as designated by District Representative and Contractor shall observe all traffic regulations of District Representative.
4. Contractor shall maintain roads and walkways in a clean condition including removal of debris and/or other deleterious material on a daily basis.

3.04 PROJECT SIGNAGE

- A. No signs shall be displayed without approval of District Representative. At Contractor's expense and without limitation remove and/or relocate Project signage and related facilities as rapidly as required in order to provide for progress of the Work.
- B. Contractor shall remove any approved signage at Substantial Completion of the Work.
- C. Contractor shall employ appropriate means to remove all graffiti from buildings, equipment, fences and all other temporary and/or permanent improvements on the Project site within twenty-four (24) hours from the date of report or forty-eight (48) hours of each occurrence.
- D. Contractor shall provide and install signage to provide directional identification, safety, and contact information to construction personnel and visitors as follows and as reviewed by District Representative.
 1. For construction traffic control/flow at entrances/exits, and as designated by District Representative.
 2. To direct visitors.
 3. For construction parking.
 4. To direct deliveries.
 5. For Warning Signs as required.
 6. For trailer identification and Project site address.
 7. For "No Smoking" safe work site at designated locations.
 8. Emergency contact information and phone number of Contractor.
 9. Emergency contact information and phone number of local police, fire, and emergency personnel.

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10. For Labor Compliance Program (LCP) as required by the DIR (Prevailing wage rates and Notice of LCP).
11. Employee benefits payments paid to trust funds are required under the Facilities Agreement.

3.05 TRENCHES

- A. All open trenches for installation of utility lines (water, gas, electrical and similar utilities) and open pits shall be barricaded at all times in a legal manner, as required by Cal/OSHA and determined by Contractor. Trenches shall be backfilled and patch-paved within twenty-four (24) hours after approval of installation by authorities having jurisdiction or shall have "trench plates" installed. Required access to buildings shall be provided and maintained. Contractor shall comply with all applicable statutes, codes and regulations regarding trenching and trenching operations.

3.06 DUST CONTROL

- A. Contractor is responsible for dust control on and off the Project site. When Work operations produce dust the Project site and/or streets shall be sprinkled with water to minimize the generation of dust. Contractor shall clean all soils and debris from construction vehicles and cover both earth and debris loads prior to leaving the Project site. Contractor shall, on a daily basis, clean all streets and/or public improvements within the right of way of any and all debris, dirt, mud and/or other materials attributable to operations of Contractor.

3.07 WASH OUT

- A. Contractor shall provide and maintain wash out boxes of sufficient size and strength to provide for concrete mixer wash out. Contractor shall locate and relocate both the wash out boxes and wash out areas in order to accommodate the progression of the Work. Contractor shall legally dispose of the contents of the wash out boxes and area on an as needed basis or as required by District Representative.

3.08 WASTE DISPOSAL

- A. Contractor shall provide and maintain trash bins on the Project site and in compliance with SWPPP requirements. Trash bins shall be serviced on an as needed basis and Contractor is responsible for the transportation of and the legal disposal of all contents.

3.09 ADVERSE WEATHER CONDITIONS

- A. Should warnings of adverse weather conditions such as heavy rain and/or high winds be forecasted, Contractor shall provide every practical precaution to prevent damage to the Work, Project site and adjacent property. Contractor precautions shall include, but not be limited to, enclosing all openings, removing and/or securing loose materials, tools, equipment and scaffolding.
- B. Contractor shall provide and maintain drainage away from buildings and structures.
- C. Contractor shall implement all required storm water mitigation measures as required under related Sections.

3.10 DAILY AND MONTHLY REPORTS

- A.. By the end of each workday, Contractor shall submit to District Representative and Project Inspector a daily construction report denoting the daily manpower counts and a brief description/location of the workday activities. Manpower shall be broken down by trade classification such as foreman, journeyman or apprentice. The report shall also note the date, day of the week, weather conditions, deliveries, equipment on the Project site whether active and/or idle, visitors, inspections, accidents and unusual events, meetings, stoppages, losses, delays, shortages, strikes, orders and requests of governing agencies, Construction Directive and/or

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Change Orders received and implemented, services disconnected and/or connected, equipment start up or tests and partial use and/or occupancies. Contractor shall also include on the daily construction report the above information for all Subcontractors at whatever tier.

END OF SECTION 01 50 00

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SECTION 01 71 23

FIELD ENGINEERING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Layout of the work.
- B. Verification of work.

1.02 RELATED SECTIONS

- A. Facilities Lease Agreement.
- B. Section 01 11 00: Summary of Work.
- C. Section 01 31 13: Project Coordination.
- D. Section 01 32 13: Construction Schedule.
- E. Section 01 33 00: Submittal Procedures.
- F. Section 01 77 00: Contract Closeout.

1.03 SURVEY CONTROLS

- A. Vertical and horizontal control shall use same benchmark used in the preparation of topographic survey. When Work consists of both on-site and off-site and benchmarks differ, an equation shall be indicated on Drawings.

1.04 LAYOUT OF WORK

- A. All work related to staking shall be by a Land Surveyor or Civil engineer registered with the State of California to perform land surveying and employed by Contractor.
- B. Before commencement of Work, Land Surveyor shall locate all reference points and benchmarks to be used for vertical and horizontal control.
- C. Land Surveyor shall lay out entire Work, set grades, lines, levels, control points, elevations, grids and positions.

1.05 VERIFICATION OF WORK

- A. All curb and gutter, sidewalks, pavers, ramps, concrete flatwork, and asphalt will be subject to line and grade certification. This task shall be performed by a licensed Land Surveyor in the State of California, employed by the Contractor, and shall certify that:
 - 1. The forms for all curb and gutter, sidewalks, pavers, ramps, concrete flatwork, and asphalt are within conformance of the Contract Documents and that no rates of grade are in excess of the rates of grade shown on the approved precise grading plan. These certifications shall be signed by the Land Surveyor and submitted to the District Representative, Architect, and Project Inspector forty-eight (48) hours prior to concrete pour or product placement.
 - 2. The as-built conditions for all curb and gutter, sidewalks, pavers, ramps, concrete flatwork, and asphalt are within conformance of the Contract Documents and that no rates of grade are in excess of the rates of grade shown on the approved precise

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grading plan. These certifications shall be signed by the Land Surveyor and submitted and approved by the District prior to the finalization of the project.

- B. All of the above certifications shall be performed at the contractor's expense and the District reserves the right to use an outside consultant to verify any work that the Project Inspector deems necessary in order to ensure compliance with the above specifications.

1.06 SUBMITTALS

- A. Land Surveyor: Shall submit name, address and license number to District Representative, including any changes as they occur.
- B. Field notes: Upon request by District Representative, submit copies of cut sheets, coordinate plots, data collector printouts, marked-up construction staking plans and other documentation as available to verify accuracy of field engineering work during and at completion of project. Submittals to District Representative must be signed and sealed by Surveyor and counter-signed by Contractor
- C. Statement of Compliance: Contractor shall submit a statement of certification signed and sealed by Land Surveyor, counter-signed by Contractor indicating compliance with grades and alignment of construction plans at rough grade, fine grade, and top of rock stages. Project Inspector shall review survey submittals for each stage of construction prior to proceeding with Work.
- D. Upon Substantial Completion, Contractor shall obtain and pay for reproducible survey drawings (or "As Built").
- E. Completed record drawings shall be signed and certified as correct and within specified tolerances by licensed Land Surveyor. Originals and two sets of blueprints shall be submitted to District Representative.

1.07 RECORD DOCUMENTS

- A. Maintain complete and accurate log of all control and survey documentation as work progresses.
- B. Record, by coordinates, all new underground utilities outside building perimeter with top of pipe and conduit elevations, at major grade and alignment changes, rim, grate or top of curb and flow line elevations of all drainage structures and sewer manholes. For groups of conduits consolidated in an encased ductbank, provide coordinates and elevations of ductbank encasement.
- C. Indicate reference and control points on record drawings. The basis of elevation shall be one of the established benchmarks.
- D. Upon Substantial Completion, obtain and pay for reproducible plans and provide to District Representative. Clearly indicate all differences between original drawings and completed work within specified tolerances. In addition, provide AutoCAD files of each survey performed for District records.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 PREPARATION

- A. Pre-mark areas of excavation in accordance with the requirements of "Dig-Alert". Request locators two (2) days before commencing excavation.

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- B. Before commencing Work, establish all horizontal and vertical reference points used in Contract Documents according to existing field conditions.
- C. Preserve established reference lines and benchmarks.
- D. Differentiate school and city datum as applicable.
- E. Relocate bench marks that may interfere with Work.
- F. Reset and re-establish reference marks damaged or lost during construction.

3.02 SURVEY REQUIREMENTS GENERAL

- A. Establish a minimum of two permanent horizontal and vertical control points on Project site, remote from construction area, referenced to data established by control points.
- B. Indicate reference points, relative to benchmark elevation, on record drawings.
- C. Provide grade stakes and elevations to construct over excavation and re-compaction, rough and final grades, paved areas, curbs, gutters, sidewalks, building pads, landscaped areas, and other areas as required.
- D. Calculate and layout proposed finished elevations and intermediate controls, as required, to provide smooth transitions between spot elevations indicated on Drawings.
- E. Provide stakes and elevations for grading, fill, and topsoil placement.
- F. Provide adequate horizontal and vertical control to locate utility lines, including but not limited to, storm, sewers, water mains, gas, electric and signal and provide vertical control in proportion to the slope of the line as required for accurate construction. Dry utilities will be based upon adequate horizontal and vertical control layout. Prior to trench closure, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished concrete or asphaltic concrete (AC) surfaces at key locations such as beginning-of-curve (BC), end-of-curve (EC), grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.
- G. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.
- H. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within the building pad perimeter adequate to control both over excavation and re-compaction and the final sub-grade elevation of the building pad.
- I. Submit a certification signed by the Land Surveyor confirming the elevations and locations of improvements are in conformance with the Contract Documents. The statement shall include survey notes for the finish floor and building pad, showing the actual measured elevations on the completed sub-grade, recorded to the nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.
- J. Mark boundaries for rights-of-way dedications and easements for utilities prior to making location of buildings and utilities.
- K. Layout all lines, elevations, and measurements needed for construction or installation of buildings, grading, paving utilities according to the following:
 - 1. Identify site boundary, property lines.
 - 2. Provide working benchmarks.
 - 3. Set stakes for Bottom of Excavated Plane (B.E.P.).
 - 4. Set gridlines, radii, working points etcetera, for foundation.
 - 5. Set and verify building pad elevations.

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6. Set finish floor elevations.
7. Stake location and elevations for exterior ramps and stairs.
8. Set gridlines, radii, working points, etc, for all floors of multi-story buildings.
9. Set storm drain and sanitary sewer inverts and other utilities as needed at 5-foot offset from building lines.
10. For new facilities, establish permanent onsite Benchmark with 2-inch diameter brass disk. Location of Benchmark to be determined by District Representative.

3.03 SURVEY REQUIREMENTS FOR GRADING

- A. Provide grade stakes and elevations as follows:
1. Removal limits (cut lines).
 2. Rough grade staking: 60-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.
 3. Fine grade for top of dirt: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.
 4. Verify fine grade for top of rock: 30-foot maximum grid plus additional stakes at grade changes and pertinent locations. Flag all grade changes including ridges, flow lines and grade breaks.
 5. Finish grade marks on all buildings, structures and at pertinent locations.
 6. Finish grades and offsets for all concrete work, flatwork, sidewalks, pavers, curbs and gutters, asphalt, utilities, landscape areas, and structures.
 7. Provide controls and baselines for playground striping.
 8. Offsite improvements: set grades and provide grade sheets as required by local authorities.
- B. Provide a minimum of two permanent horizontal and vertical control points onsite, remote from building area, referenced to data established by survey control points.

3.04 SURVEY REQUIREMENTS FOR UTILITIES

- A. Locate "wet" utility lines and provide vertical control proportionate to slope of line as required for accurate construction. "Dry" utilities shall have adequate horizontal and vertical control layout supplied by others.
- B. Prior to back-filling trench, survey and record invert and flow line elevations. Survey and record top of curb and flow line elevations on finished surfaces at key locations (such as Back of Curbs, grade breaks, corners or angle points) in sufficient number to demonstrate Work complies with intent of Contract Documents.
- C. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.
1. Set grades for vaults one inch higher than adjacent surrounding design grades, unless noted otherwise.
- D. Leave all trenches open until required inspection is completed.

3.05 SURVEY REQUIREMENTS FOR STRUCTURES

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- A. Furnish building corner offsets as required to adequately locate building pads. Provide cut and fill stakes within building pad perimeter adequate to control both over excavation and re-compaction and final sub-grade elevation of building pad.
- B. Submit a certification signed by Land Surveyor confirming elevations and locations of improvements are in conformance with Contract Documents. Statement shall include survey notes for finish floor and building pad, showing actual measured elevations on completed sub-grade, recorded to nearest 0.01 of a foot. Building pad tolerance will be plus or minus 0.1 of a foot.

END OF SECTION 01 71 23

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SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section specifies procedural requirements for cutting and patching.

1.02 RELATED SECTIONS

- A. Master Facilities Lease Agreement.
- B. Section 01 29 73: Schedule of Values Procedures.
- C. Section 01 31 13: Project Coordination.
- D. Section 01 31 19: Project Meetings.
- E. Section 01 32 13: Construction Schedule.
- F. Section 01 33 00: Submittal Procedures.
- G. Section 01 78 36: Warranty Procedures.

1.03 SUBMITTALS

- A. The word “cutting” as used in the Contract Documents includes, but is not limited to, cutting, drilling, chopping, and other similar operations and the word “patching” includes, but is not limited to, patching, rebuilding, reinforcing, repairing, refurbishing, restoring, replacing, or other similar operations.
- B. Cutting and Patching Proposal: Contractor shall submit a work plan describing procedures well in advance of the time cutting and patching will be performed if the Contract Documents requires approval of these procedures before proceeding. Include the following information, as applicable, in the work plan:
 - 1. Describe the extent of cutting and patching required. Denote how it will be performed and indicate why it cannot be avoided.
 - 2. Describe anticipated results in terms of changes to existing construction. Include changes to structural elements and operating components as well as changes in the building’s appearance or other significant visual elements.
 - 3. List products to be used and firms or entities that will perform this Work.
 - 4. Indicate dates when cutting and patching will be performed.
 - 5. Utilities: List utilities that cutting and patching operations will disturb or affect. List utilities to be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
 - 6. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the original structure.
 - 7. Review by Architect and DSA prior to proceeding with cutting and patching does not waive Architect right to later require complete removal and replacement of defective Work.

1.04 QUALITY ASSURANCE

- A. Requirements for structural Work: Do not cut and patch structural elements in a manner that would change their load-carrying capacity or load-deflection ratio.

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1. Obtain approval from Architect and DSA of the cutting and patching work plan before cutting and patching the following structural elements:
 - a. Foundation construction.
 - b. Bearing and retaining walls.
 - c. Structural concrete.
 - d. Structural steel.
 - e. Lintels.
 - f. Timber and primary wood framing.
 - g. Structural decking.
 - h. Stair systems.
 - i. Miscellaneous structural metals.
 - j. Exterior curtain-wall construction.
 - k. Equipment supports.
 - l. Piping, ductwork, vessels, and equipment.
 - m. Any other structural systems not listed above.
- B. Operational Limitations: Do not cut and patch operating elements or related components in a manner that would result in reducing their capacity to perform as intended. Do not cut and patch operating elements or related components in a manner that would result in increased maintenance or decreased operational life or safety.
 1. Obtain review of the cutting and patching work plan before cutting and patching the following operating elements or safety related systems:
 - a. Primary operational systems and equipment.
 - c. Water, moisture, or vapor barriers.
 - d. Membranes and flashings.
 - e. Fire protection systems.
 - g. Control systems.
 - h. Communication and/or data systems.
 - j. Electrical wiring systems.
 - k. Any other operating systems not listed above.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in the opinion of Architect, reduce the building's aesthetic qualities. Do not cut and patch construction in a manner that would result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

1.05 WARRANTY

- A. Existing Warranties: Replace, patch, and repair material and surfaces cut or damaged by methods and with materials in such a manner as not to void any warranties required or existing.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION

3.01 INSPECTION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. If unsafe or unsatisfactory conditions are encountered, take corrective action before proceeding.
 - 1. Before proceeding, meet at the Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

3.02 PREPARATION

- A. Temporary support: Provide adequate temporary support of existing improvements or Work to be cut.
- B. Protection: Protect existing improvements and Work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of existing improvements or Work that might be exposed during cutting and patching operations.
- C. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Where the Work requires sandblasting of existing surfaces in order to receive new materials secured by cementitious, adhesive or chemical bond, completely remove existing finishes, stains, oil, grease, bitumen, mastic and adhesives or other substances deleterious to the new bonding or fastening of new Work. Utilize wet sand blasting for interior surfaces and for exterior surfaces where necessary to prevent objectionable production of dust.

3.03 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay. Carefully remove existing Work to be salvaged and/or reinstalled. Protect and store for reuse into the Work. Verify compatibility and suitability of existing substrates before starting the Work.
- B. Cutting: Cut existing construction using methods least likely to damage elements retained or adjoining Work. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
 - 1. In general, where cutting, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Cut through concrete and masonry using a cutting machine, such as a carborundum saw or a diamond-core drill. Saw cut reinforcing bars and paint ends per approved submittal except where bonded into new concrete or masonry.
 - 4. Comply with requirements of applicable Sections of Divisions 31, 32, and 33 where cutting and patching requires excavating, backfill, and recompaction.
 - 5. Sheet Metal: Remove back to joint, lap, or connection. Secure loose or unfastened ends or edges and seal watertight.
 - 6. Glass: Remove cracked, broken, or damaged glass and clean rebates and stops of setting materials.
 - 7. Plaster: Cut back to sound plaster on straight lines, and back bevel edges of remaining plaster. Trim existing lath and prepare for new lath.

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8. Gypsum: Cut back on straight lines to undamaged surfaces with at least two opposite cut edges centered on supports.
 9. Acoustical ceilings: Remove hanger wires and related appurtenances where ceilings are not scheduled to be installed.
 10. Tile: Cut back to sound tile and backing on joint lines.
 11. Curb, gutters, and flat work: Saw cut joint to nearest joint.
- C. Patching: Patch with durable seams that are as invisible as possible. Comply with required tolerances.
1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation. Verify conditions of existing substrates prior to executing Work.
 2. Restore exposed finishes of patched areas and extend finish restoration into retaining adjoining construction in a manner that will eliminate all evidence of patching and refinishing.
 3. Non-Structural Concrete Flatwork: Finish placed concrete to match existing unless noted otherwise. Concrete shall have a compressive strength of 3,000 psi where installed to repair and match existing improvements, unless noted otherwise.
 4. Metal Fabrications: Items to remain exposed shall have their edges cut and ground smooth and rounded.
 5. Sheet Metal: Replace removed or damaged sheet metal items for new Work.
 6. Glass: Install matching glass and re-seal exterior window assemblies.
 7. Lath and Plaster: Install new lath materials to match existing and fasten to supports at 6-inch centers. Provide a 6-inch lap where new lath adjoins existing lath. Fasten new lath as required for new Work. Restore paper backings as required. Apply a bonding agent on cut edges of existing plaster. Apply three coat plaster of the type, thickness, finish, texture, and color to match existing.
 8. Gypsum: Fasten cut edges of wallboard. Install patches with at least two opposite edges centered on supports and secure at 6-inch centers. Tape and finish joints and fastener heads. Patching shall be non-apparent when painted or finished.
 9. Acoustical Ceilings: Comply with the requirements for new Work specified in related sections of the Contract Documents.
 10. Resilient Flooring: Completely remove flooring and prepare substrate for new material.
 11. Painting: Prepare areas to be patched, patch and paint as specified under related sections of the Contract Documents.

3.04 CLEANING

- A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar items. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged coverings to their original condition.

END OF SECTION 01 73 29

SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including the Master Facilities Lease Agreement and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.
- B. Related Requirements:
 - 1. Division 2 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Construction Waste:

- a. Masonry and CMU.
- b. Lumber.
- c. Wood sheet materials.
- d. Wood trim.
- e. Metals.
- f. Roofing.
- g. Insulation.
- h. Carpet and pad.
- i. Gypsum board.
- j. Piping.
- k. Electrical conduit.
- l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates and palletes.
 - 7) Plastic pails.
 - 8) Glass, aluminum, and plastic beverage containers.
- m. Concrete, plaster, and grout.
- n. Asphalt concrete paving
- o. Paint.
- p. Metal ductwork.

1.5 SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for commencement of the Work. A sample is provided in Appendix A of this Section.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. A sample report is provided in Appendix B of this Section. Include the following information:
1. Material category.
 2. Generation point of waste.
 3. Total quantity of waste in tons.

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4. Quantity of waste salvaged, both estimated and actual in tons.
 5. Quantity of waste recycled, both estimated and actual in tons.
 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.6 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a waste management coordinator.
- 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 in Division 1 Section "Coordination." 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.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification and waste reduction work plan. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use Form generated by Contractor and approved by the College. 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. Use Form generated by Contractor and approved by the College. 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 where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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 operation, termination, and removal requirements in Division 1 Section "Construction Facilities and Temporary Controls."
- 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.

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- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to everyone concerned within three 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 on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Division 1 Section "Construction Facilities and Temporary Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- 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 Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - 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 from Owner's property and transport to recycling receiver or processor.

3.3 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: Remove waste materials and dispose of at designated spoil areas on Owner's property.
- D. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 7419

**Santa Ana College Johnson Student Center
Construction Waste Management Plan**

Introduction

The Rancho Santiago Community Colleges District is beginning construction of a new student center facility in Santa Ana, California. This building has been chosen by the owner as a candidate for LEED Silver equivalence under the US Green Building Council's LEED program. Credit 2.1 of the Materials and Resources Credit section require a Construction and Demolition Waste Management Plan be established for the construction phase of the project. It is the intent of this document to establish the requirements to be implemented during construction to divert construction and demolition waste materials from disposal in a landfill.

Objectives

The purpose of this Construction and Demolition Waste Management Plan is primarily to define practices for the reduction of construction waste, and secondly for the diversion of non-hazardous construction waste from disposal in a landfill, with a goal of diverting a minimum of 75% by weight. To implement these objectives, this report describes five requirements as follows:

1. Training and Communication
2. Enforcement and Progress Reports
3. Waste Minimization
4. Sorting and Collecting
5. Scheduling

This Plan will also designate persons responsible for communication and implementation of the plan to ensure that all tradesmen involved in the construction are aware of the plan and are cognizant of their responsibilities and the benefits received by proper implementation.

1. Training and Communication

GOAL:

To educate all workers on the jobsite about the Plan and expectations of compliance with it.

MEASURES:

- 1.1. This Plan will be displayed at the jobsite trailer at all times.
- 1.2. A copy of this Plan will be provided to all workers on the jobsite, in both English and Spanish.
- 1.3. Compliance requirements will be presented to all project personnel at Monday morning jobsite safety meetings.

2. Enforcement and Progress Reports

GOAL:

To monitor progress towards meeting the goals of the Plan and to encourage compliance.

MEASURES:

- 2.1. Construction waste reports will be provided by the waste hauler updated as dumpsters are hauled offsite, weighed, and documented. These reports will be displayed at the jobsite trailer.

3. Waste Minimization

GOAL:

To reduce the amount of construction waste by reducing the amount of material entering the jobsite requiring eventual disposal.

MEASURES:

- 3.1. Contractors shall limit material quantities to only those necessary for the project. If material overruns occur, deliver excess material back to the manufacturer for credit, or donate materials to the Habitat for Humanity of Orange County (714-434-6200). Provide Construction Manager with the estimated weight and type of donated materials.
- 3.2. Limit the use of excessive disposable packaging.
- 3.3. Wooden pallets shall be reclaimed by a local pallet remanufacturer.
- 3.4. Formwork shall be reused to the maximum extent possible.

4. Sorting and Collecting

GOAL:

To separate recoverable material from general construction waste, and to prevent contamination of recoverable material.

MEASURES:

- 4.1. The construction and demolition waste hauler will accept co-mingled construction and demolition waste for hauling to an approved Material Recovery Facility (MRF). Materials will be floor sorted, weighed, and documented. Documentation of diversion rates will be provided back to the Contractor. The following materials will be diverted from landfill, at minimum:
 - a. **Land clearing debris.**
 - b. **Soil.**
 - c. **Wood material.** Includes formwork, pallettes, temporary blocking, scraps.
 - d. **Concrete.** Includes concrete washout, demolished concrete, scrap, loose materials, plaster rebound, grout.
 - e. **Masonry.**
 - f. **Asphalt concrete paving.**
 - g. **Paper.** Includes bond, newsprint, cardboard, and other packaging materials.

- h. Metals.** Includes steel, aluminum, copper, brass, lead, stainless.
- i. Paint.**
- j. Rigid foam.**
- k. Glass.**
- l. Plastics.**
- m. Carpet and flooring materials.**
- n. Beverage containers.**
- o. Insulation.**
- p. Ceiling tile.**
- q. Gypsum board.**
- r. Electrical fixtures.**
- s. Mechanical fixtures and ductwork.**
- t. Porcelain plumbing fixtures.**
- u. General waste.** All other materials.

5. Scheduling

GOAL:

To sequence construction waste management activities.

MEASURES:

- 5.1. Co-mingled construction and demolition waste dumpsters will be located on site for the duration of the project.
- 5.2. Pick-up will occur on a monthly basis, or more frequently, if needed.
- 5.3. Documentation of waste diversion rates will be provided by the waste hauler for each load.

Construction and Demolition Waste Management Personnel:

CDWM Coordinator _____

Summary

The following items will be submitted to the Ecotype Consulting prior to final occupancy.

- A letter declaring that this Construction and Demolition Waste Management Plan has been implemented for the project.
- A Pre-Construction Waste Estimate describing anticipated waste materials, estimated quantities, and anticipated diversion rates.

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- Construction and Demolition Waste Reports describing waste materials, weighed quantities, and diversion rates. This report will be updated as dumpsters are hauled offsite.

All questions and comments regarding this plan should be forwarded to the Construction and Demolition Waste Management Coordinator above.

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SECTION 01 77 00

CONTRACT CLOSEOUT

PART 1 – GENERAL

- 1.01 SECTION INCLUDES
- A. This Section includes administrative and procedural requirements for Contract Closeout, including but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Project record documents submittal.
 - 3. Operation and maintenance manual submittal.
 - 4. Owner orientation and instruction.
 - 5. Final cleaning.
- 1.02 RELATED SECTIONS
- A. Section 01 29 76: Progress Payment Procedures.
 - B. Section 01 32 13: Construction Schedule.
 - C. Section 01 32 29: Project Forms.
 - D. Section 01 33 00: Submittal Procedures.
 - E. Section 01 50 00: Construction Facilities and Temporary Controls.
 - F. Section 01 74 19: Construction Demolition and Waste Management.
 - G. Section 01 78 36: Warranties.
 - H. Section 01 91 13: General Commissioning Requirements
- 1.03 REQUIREMENTS FOR PREPARATORY FINAL INSPECTION
- A. All contract work completed.
 - B. Remove temporary facilities from the Project site.
 - C. Thoroughly clean the Buildings and Project site.
 - D. All mechanical equipment shall operate quietly and free from vibrations. Properly adjust, repair, balance, or replace equipment producing objectionable noise or vibration in the occupied areas of the buildings. Provide additional brackets, bracing, or other methods to prevent objectionable noise or vibration. All systems shall operate without humming, surging, or rapid cycling.
 - E. Properly mount all operation instructions for equipment and post as specified in their respective Sections.
 - F. Job Record specifications and prints “as built” shall be completed, signed, and submitted to the District Representative as specified in respective Specification Sections.
 - G. Submit to the District Representative, the material and equipment maintenance instructions, as specified in the body of the Specification Sections.

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- H. Submit to the District Representative, all warranties, guarantees, and bonds, as specified in the body of the Specification Sections.
- I. When requested, submit certificates indicating payment of all debts and Claims arising from the Work.
- J. Deliver all tools which are a permanent part of equipment installed in the Work to the District Representative.
- K. Deliver all keys, construction and permanent, properly identified, to the District Representative.
- L. Deliver all extra stock items, as directed by the District Representative, to a location within the District.
- M. Contractor determined the Work has been completed. All life safety items are completed and in working order.
- N. Electrical circuits scheduled in panels and disconnect switches labeled.
- O. Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.
- P. Work cleaned, free of stains, scratches, marks, dirt, superfluous labels, and other foreign matter, replacement of damaged and broken material.
- Q. Finished and decorative work shall have marks, dirt and superfluous labels removed.
- R. Final cleanup complete.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION

3.01 SUBSTANTIAL COMPLETION

- A. Inspection Procedures: After all requirements preparatory to the final inspection have been completed, as herein specified in the Specification Sections, the Contractor will notify the District Representative, Architect, and Project Inspector to perform the final inspection.
 - 1. If after inspection of the Work, District Representative does not consider the Work complete, District Representative will notify Contractor.
 - 2. If after inspection, District Representative considers the Work complete, Architect shall prepare a Punch List of items to be corrected.
- B. Re-inspection Procedures: Project Inspector, District Representative, Contractor and Architect will inspect the Work upon notice the Work, including final inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to District Representative.
 - 1. Upon completion of inspection, District Representative will recommend Final Completion. If the Work is incomplete, District Representative will advise Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for Final Completion.
 - 2. If necessary, re-inspection will be repeated, but may be assessed against Contractor if Owner is subject to additional professional service and or additional costs of inspection.

3.02 PROJECT RECORD DOCUMENT SUBMITTAL

- A. General: Do not use project record documents for construction purposes. Protect record documents from deterioration and loss. Provide access to record documents for Architect, Project Inspector, and District Representative reference during normal working hours. Project record document shall

be updated on a daily basis prior to work being concealed. Prior to submitting each application for payment, secure Project Inspector approval of project record documents.

- B. Record Drawings: Maintain a clean, undamaged set of prints of Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies from the Work as originally shown. Mark the Drawing that is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Drawings. Provide detailed and accurate field dimensions for concealed elements that would be difficult to measure and record at a later date.
1. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work. Date and number entries in the same format as submitted. Call attention to entry by a "cloud" around the affected areas.
 2. Mark new information important to Owner but was not shown on Drawings or Shop Drawings.
 3. Utility mainlines and duct-banks within the building footprint shall be indicated by location and depth below finished grade. All utilities and above ceilings and attic spaces shall be fully dimensioned and indicated on record drawings. Dimensions shall be measured from building lines or permanent landmarks and shall be triangulated to those features.
 4. Note related Change Order or Construction Directive numbers where applicable. RFI submissions shall be referenced on each affected sheet, Drawing and Shop Drawing.
 5. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
 6. Prior to Contract Completion of the Work, review of the project record drawings by Architect; prepare a final set of project record drawings and submit to Architect.
- C. Record Specifications: Maintain one (1) complete copy of the Specifications, including Addenda. Include with the Specifications two copies of other written Contract Documents, such as Change Orders or Construction Directives issued during construction.
1. Mark these record documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
 2. Give particular attention to substitutions and selection of options and information on concealed Work that cannot otherwise be readily discerned later by direct observation.
 3. Note related record document information with Product Data.
 4. Prior to Contract Completion of the Work, submit record Specifications to Architect for Owner records.
- D.
- E. Miscellaneous Records: Refer to other Specification sections for requirements of miscellaneous record keeping and submittals in connection with actual performance of the Work. Prior to the date of Contract Completion, complete and compile miscellaneous records and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to Architect for Owner records.
- F. Maintenance Manuals: Shall be submitted and approved by the Architect prior to commissioning and startup of the corresponding system/product. Organize operation and maintenance data into suitable three (3) sets of manageable size. Bind properly, indexed data in individual, heavy-duty, three-inch 3-ring, vinyl-covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Provide a table of contents in front and all items shall be indexed with tabs. Each manual shall also contain a list of subcontractors, with their scope of work, addresses, phone numbers, email, and the names of persons to contact in cases

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of emergency. Identifying labels shall provide names of manufactures, their addresses, ratings, and capacities of equipment and machinery. Submit to Architect for Owner records. Include the following types of information.

1. Table of Contents (in each binder)
 2. Emergency instructions.
 3. Spare parts list.
 4. Copies of warranties.
 5. Wiring diagrams.
 6. Recommended "turn-around" cycles.
 7. Inspection procedures.
 8. Shop Drawings and Product Data.
 9. Fixture lamping schedule.
 10. Note which items also have video training.
- G. Provide one (1) electronic version of all documents listed above on one (1) flash drive to the District Representative.

3.03 OPERATION AND MAINTENANCE:

- A. Operation and Maintenance Instructions: Prior to Substantial Completion, arrange for each installer of equipment that requires regular operation and maintenance to meet with designated Owner personnel to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
1. Maintenance manuals.
 2. Spare parts and materials.
 3. Tools.
 4. Lubricants.
 5. Fuels.
 6. Identification systems.
 7. Control sequences.
 8. Hazards.
 9. Cleaning.
 10. Warranties and bonds.
 11. Maintenance agreements and similar continuing commitments.
- B. As part of instruction for operating equipment, demonstrate the following procedures:
1. Start-up.
 2. Shutdown.
 3. Emergency operations.
 4. Noise and vibration adjustments.
 5. Safety procedures.
 6. Economy and efficiency adjustments.

- 7. Effective energy utilization.
 - C. Notice of Termination: Contractor shall submit a Notice of Termination (NOT) to the District for District issuance to the local Regional Water Quality Control Board (RWQCB). Provide a copy of NOT to District Representative.
- 3.04 FINAL CLEANING
- A. General: The Contractor shall be solely responsible for all cleaning operations during the Project.
 - B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturer's instructions.
 - 1. Complete the following cleaning operations before requesting inspection for a certificate of Substantial Completion.
 - a. Remove labels that are not permanent labels.
 - b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
 - c. Clean exposed exterior and interior hard-surfaced finished to a dust-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.
 - d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
 - e. Clean the Project site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.
 - f. Complete the final filter change replacing all HVAC filters.

END OF SECTION 01 77 00

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SECTION 01 78 36 – WARRANTY PROCEDURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. This Section includes procedural requirements for warranties, including manufacturers and installer’s standard warranties on products and special product warranties.

1.02 RELATED SECTIONS

- A. Master Facilities Lease Agreement.
- B. Section 01 32 29: Project Forms
- C. Section 01 73 29: Cutting and Patching.
- D. Section 01 17 700 Closeout Procedures
- E. Division 2 through Division 33.

1.03 SUBMITTALS

- A. Form of Submittal: In accordance with the Master Facilities Lease, compile two (2) copies of each required final warranty properly executed by Contractor, or by Contractor and Subcontractor, installer, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Specifications and provide a table of contents.
- B. Bind warranties and bonds in heavy-duty, commercial-quality, durable three ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½ by 11 paper.
 - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the item or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
 - 2. Identify each binder on the front and spine with the typed or printed title “WARRANTIES,” Project title and/or name, and name of Contractor.
 - 3. When warranted Work requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.
- C. Provide one (1) electronic version of all documents listed above on one (1) flash drive to the District Representative.
- D. Provide a Warranty Guarantee Form on the District’s form provided in Section 01 32 29 as part of the Closeout documentation.

PART 2 – PRODUCTS (Not applicable)

PART 3 – EXECUTION (Not applicable)

END OF SECTION 01 78 36

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SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Master Facilities Lease Agreement and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver equivalence based on USGBC's "LEED 2009 for New Construction & Major Renovations."
 - 1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 - 2. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract.
 - 3. A copy of the LEED Project checklist is attached as Appendix A of this Section.
 - 4. Specific requirements for LEED are included in greater detail in other Sections.

1.3 DEFINITIONS

- A. Forest Stewardship Council (FSC): Certifying body that ensures wood products come from responsibly managed forests that provide environmental, social, and economic benefits. Certified wood products are referred to as "FSC Certified".
- B. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
- C. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.
- D. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.

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1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the project's LEED certification application. Document responses as informational submittals.

1.5 SUBMITTALS

- A. General: Submit additional LEED submittals required by other Specification Sections.
- B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
- C. Qualification Data: For LEED coordinator.
- D. LEED Documentation Submittal Format:
 1. All LEED documentation submittals for credits MR 2, MR 4, MR 5, MR 7, IEQ 4 shall be submitted under a fully completed LEED Product Submittal Cover Sheet. A blank cover sheet is provided as Appendix B of this Section.
- E. LEED Documentation Submittals:
 1. Credit EA 5: Product data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy-consumption performance over a period of time of not less than one year of post-construction occupancy.
 2. Credit MR 2: Comply with Section 01 7419 "Construction Waste Management and Disposal."
 3. Credit MR 4: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content.
 4. Credit MR 5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material, the fraction by weight that is considered regional, and the straight line distance from point of manufacture to job site and from point of extraction, harvest, or recovery to jobsite.
 5. Credit MR 7: Product data and chain-of-custody certificates for products containing certified wood. Include invoice indicating cost for each wood product, both certified and non-certified.

6. Credit IEQ 3.1:
 - a. Construction indoor-air-quality management plan.
 - b. Product data for temporary filtration media.
 - c. Product data for filtration media used during occupancy.
 - d. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
 7. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used.
 8. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used.
 9. Credit IEQ 4.3: Product data for carpet and flooring systems used inside the weatherproofing system indicating compliance with specified product certifications.
 10. Credit IEQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin.
- F. Project Materials Cost Data:
1. Provide statement indicating total cost for materials used for Project. Materials costs include expenses to deliver the material to the construction site, taxes, and transportation costs incurred. Costs exclude labor, equipment, overhead, and profit.
 2. If the requested material cost represents part of a larger assembly such that the actual material cost cannot be isolated from the total assembly cost, determine material cost using this formula: $\text{cost of material} = \text{weight of material} \div \text{weight of total assembly} \times \text{cost of total assembly}$
 3. Include breakout of costs for the following categories of items:
 - a. Furniture
 - b. Plumbing.
 - c. Mechanical.
 - d. Electrical.
 - e. Specialty items such as elevators and equipment.
 - f. Non-recycled wood-based construction materials.
- G. LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

2.2 RECYCLED CONTENT OF MATERIALS

- A. Credit MR 4: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 10 percent of cost of materials used for Project.
1. Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
 2. Do not include furniture, plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

2.3 REGIONAL MATERIALS

- A. Credit MR 5: Not less than 10 percent of building materials (by cost) shall be regional materials.

2.4 CERTIFIED WOOD

- A. Credit MR 7: Not less than 50 percent (by cost) of non-recycled wood-based materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
1. Wood-based materials include, but are not limited to, the following materials when made from wood, engineered wood products, or wood-based panel products:
 - a. Rough carpentry.
 - b. Miscellaneous carpentry.
 - c. Heavy timber construction.
 - d. Wood decking.
 - e. Metal-plate-connected wood trusses.
 - f. Structural glued-laminated timber.
 - g. Finish carpentry.
 - h. Architectural woodwork.
 - i. Wood paneling.
 - j. Wood veneer wall covering.
 - k. Wood flooring.
 - l. Wood lockers.
 - m. Wood cabinets.
 2. Wood-based materials may be labeled FSC Pure, FSC Mixed, or FSC Mixed (XX)% to qualify for compliance with this requirement.
 3. Sustainable forestry certifications other than FSC (such as Sustainable Forestry Initiative [SFI]) will not qualify for compliance with this requirement.

2.5 LOW-EMITTING MATERIALS

A. Credit IEQ 4.1: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Metal-to-Metal Adhesives: 30 g/L.
3. Adhesives for Porous Materials (Except Wood): 50 g/L.
4. Subfloor Adhesives: 50 g/L.
5. Plastic Foam Adhesives: 50 g/L.
6. Carpet Adhesives: 50 g/L.
7. Carpet Pad Adhesives: 50 g/L.
8. VCT and Asphalt Tile Adhesives: 50 g/L.
9. Cove Base Adhesives: 50 g/L.
10. Gypsum Board and Panel Adhesives: 50 g/L.
11. Rubber Floor Adhesives: 60 g/L.
12. Ceramic Tile Adhesives: 65 g/L.
13. Multipurpose Construction Adhesives: 70 g/L.
14. Fiberglass Adhesives: 80 g/L.
15. Contact Adhesive: 80 g/L.
16. Structural Glazing Adhesives: 100 g/L.
17. Wood Flooring Adhesive: 100 g/L.
18. Structural Wood Member Adhesive: 140 g/L.
19. Single-Ply Roof Membrane Adhesive: 250 g/L.
20. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine-covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
21. Top and Trim Adhesive: 250 g/L.
22. Plastic Cement Welding Compounds: 250 g/L.
23. ABS Welding Compounds: 325 g/L.
24. CPVC Welding Compounds: 490 g/L.
25. PVC Welding Compounds: 510 g/L.
26. Adhesive Primer for Plastic: 550 g/L.
27. Sheet-Applied Rubber Lining Adhesive: 850 g/L.
28. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent by weight.
29. Aerosol Adhesive, General-Purpose Web Spray: 55 percent by weight.
30. Special-Purpose Aerosol Adhesive (All Types): 70 percent by weight.
31. Other Adhesives: 250 g/L.
32. Architectural Sealants: 250 g/L.
33. Non-membrane Roof Sealants: 300 g/L.
34. Single-Ply Roof Membrane Sealants: 450 g/L.
35. Other Sealants: 420 g/L.
36. Sealant Primers for Nonporous Substrates: 250 g/L.
37. Sealant Primers for Porous Substrates: 775 g/L.
38. Modified Bituminous Sealant Primers: 500 g/L.
39. Other Sealant Primers: 750 g/L.

B. Credit IEQ 4.2: For field applications that are inside the weatherproofing system, paints and coatings shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

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1. Flat Paints and Coatings: VOC not more than 50 g/L.
 2. Nonflat Paints and Coatings: VOC not more than 150 g/L.
 3. Dry-Fog Coatings: VOC not more than 150 g/L.
 4. Primers, Sealers, and Undercoaters: VOC not more than 100 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: VOC not more than 100 g/L.
 7. Pretreatment Wash Primers: VOC not more than 420 g/L.
 8. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 9. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
 10. Floor Coatings: VOC not more than 100 g/L.
 11. Shellacs, Clear: VOC not more than 730 g/L.
 12. Shellacs, Pigmented: VOC not more than 550 g/L.
 13. Stains: VOC not more than 100 g/L.
- C. Credit IEQ 4.3: Carpet and carpet systems shall meet the testing and product requirements of the Carpet and Rug Institute's Green Label Plus program. Resilient flooring and wall base shall meet the testing and product requirements of either the Resilient Floor Covering Institute's FloorScore program or the Greenguard Children and Schools program.
- D. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives shall not contain urea-formaldehyde resin.

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR 2: Comply with Section 01 7419 "Construction Waste Management."

3.2 CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT

- A. Credit IEQ 3: Comply with Section 01 8119 "Indoor Air Quality Requirements."
- B. Credit IEQ 3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Section 01500 "Construction Facilities and Temporary Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
 2. Replace all air filters immediately prior to occupancy.

END OF SECTION 01 8113

LEED PRODUCT SUBMITTAL COVER SHEET
PLEASE USE SEPARATE SHEET FOR EACH PRODUCT

If you need assistance completing this form in full, please call Ecotype Consulting at (909) 307-8987.

Material: _____ Spec Section: _____ Date: _____	<p>Cost of Material: _____</p> <p>(Cost equals materials, delivery charges, and taxes, but does not include labor.)</p>
---	--

Submittal will not be accepted as complete without Cost of Material indicated. (excluding IEQ 4 submittals) Contractors must return this cover sheet, along with required attachments, completed for each LEED product as required by specification sections. Attach documentation backing up all claims made below. Check specific product requirements below as required by specification sections.

Contractor	Company: _____ Name: _____ Address: _____ Phone, Fax, Email: _____
Product Vendor	Company: _____ Name: _____ Address: _____ Phone, Fax, Email: _____

MR 4: RECYCLED CONTENT (All percentages are by weight. Steel may use the LEED default)

% virgin:	% pre-cons:	% post-cons:	Total: 100%
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MR 5: REGIONAL MATERIALS (Distances to jobsite in miles (straight line).)

Dist from final assembly:	Dist from mat'l source:
---------------------------	-------------------------

MR 7: CERTIFIED WOOD (Percentage by weight. Include invoice with FSC COC # clearly identified.)

% FSC certified wood:	FSC COC No:
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IEQ 4: LOW-EMITTING MATERIALS

<input type="checkbox"/>	Attached Proof of Compliance: <input type="checkbox"/> MSDS <input type="checkbox"/> Cut Sheet <input type="checkbox"/> Letter <input type="checkbox"/> Other
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<input type="checkbox"/>	IEQ 4.1: Interior adhesives and sealants, VOC content in g/L:
--------------------------	---

<input type="checkbox"/>	IEQ 4.2: Interior paints and coatings, VOC content in g/L:
--------------------------	--

<input type="checkbox"/>	IEQ 4.3: Flooring systems complies with one of the following: <input type="checkbox"/> Floorscore <input type="checkbox"/> Green Label Plus <input type="checkbox"/> Green Label <input type="checkbox"/> CA Dept. of Health Standard
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<input type="checkbox"/>	IEQ 4.4: Interior composite wood products are free of added urea-formaldehyde resins Y/N:
--------------------------	---

END OF SUBMITTAL FORM

LEED 2009 for New Construction and Major Renovations
Project Checklist



Santa Ana Johnson Student Center

Y	?	N	Possible Points: 26
1	1	7	Sustainable Sites
			Construction Activity Pollution Prevention
			Site Selection
			Development Density and Community Connectivity
			Brownfield Redevelopment
			Alternative Transportation—Public Transportation Access
			Alternative Transportation—Bicycle Storage and Changing Rooms
			Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles
			Alternative Transportation—Parking Capacity
			Site Development—Protect or Restore Habitat
			Site Development—Maximize Open Space
			Stormwater Design—Quantity Control
			Stormwater Design—Quality Control
			Heat Island Effect—Non-roof
			Heat Island Effect—Roof
			Light Pollution Reduction
			Possible Points: 10
			Water Efficiency
			Water Use Reduction—20% Reduction
			Water Efficient Landscaping
			Innovative Wastewater Technologies
			Water Use Reduction
			Possible Points: 35
			Energy and Atmosphere
			Fundamental Commissioning of Building Energy Systems
			Minimum Energy Performance
			Fundamental Refrigerant Management
			Optimize Energy Performance
			On-Site Renewable Energy
			Enhanced Commissioning
			Enhanced Refrigerant Management
			Measurement and Verification
			Green Power
			Possible Points: 14
			Materials and Resources
			Storage and Collection of Recyclables
			Building Reuse—Maintain Existing Walls, Floors, and Roof
			Building Reuse—Maintain 50% of Interior Non-Structural Elements
			Construction Waste Management
			Materials Reuse

Y	?	N	Possible Points: 15
1	1	7	Materials and Resources, Continued
			Recycled Content
			Regional Materials
			Rapidly Renewable Materials
			Certified Wood
			Possible Points: 15
			Indoor Environmental Quality
			Minimum Indoor Air Quality Performance
			Environmental Tobacco Smoke (ETS) Control
			Outdoor Air Delivery Monitoring
			Increased Ventilation
			Construction IAQ Management Plan—During Construction
			Construction IAQ Management Plan—Before Occupancy
			Low-Emitting Materials—Adhesives and Sealants
			Low-Emitting Materials—Paints and Coatings
			Low-Emitting Materials—Flooring Systems
			Low-Emitting Materials—Composite Wood and Agrifiber Products
			Indoor Chemical and Pollutant Source Control
			Controllability of Systems—Lighting
			Controllability of Systems—Thermal Comfort
			Thermal Comfort—Design
			Thermal Comfort—Verification
			Daylight and Views—Daylight
			Daylight and Views—Views

Y	?	N	Possible Points: 4
2	4	4	Innovation and Design Process
			Exemplary Performance: Construction Waste Management - 95%
			Exemplary Performance: Green Power - 70% for 2 years
			Innovation in Design: Reduced Mercury in Lighting
			Innovation in Design: TBD
			Innovation in Design: TBD
			LEED Accredited Professional
			Possible Points: 4
			Regional Priority Credits
			Regional Priority: WEC3 Water Use Reduction - 40%
			Regional Priority: EAC2 On-Site Renewable Energy - 1%
			Regional Priority: EQc8.1 Daylight and Views - Daylight
			Regional Priority: MRc1.1 Materials Reuse
			Total
			44 22 44 Possible Points: 110

Y	?	N	Possible Points: 10
2	4	4	Water Efficiency
			Water Use Reduction—20% Reduction
			Water Efficient Landscaping
			Innovative Wastewater Technologies
			Water Use Reduction
			Possible Points: 35
			Energy and Atmosphere
			Fundamental Commissioning of Building Energy Systems
			Minimum Energy Performance
			Fundamental Refrigerant Management
			Optimize Energy Performance
			On-Site Renewable Energy
			Enhanced Commissioning
			Enhanced Refrigerant Management
			Measurement and Verification
			Green Power
			Possible Points: 14
			Materials and Resources
			Storage and Collection of Recyclables
			Building Reuse—Maintain Existing Walls, Floors, and Roof
			Building Reuse—Maintain 50% of Interior Non-Structural Elements
			Construction Waste Management
			Materials Reuse

Y	?	N	Possible Points: 110
44	22	44	Total

Y	?	N	Possible Points: 110
44	22	44	Total

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

SECTION 01 8119 - INDOOR AIR QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Control measures to maintain indoor air quality during construction
2. Protection of the ventilation system components during construction
3. Cleanup of contaminated components after construction is complete.
4. Final green cleaning.

1.2 REFERENCES

- A. SMACNA Indoor Air Quality (IAQ) Guidelines for Occupied Buildings Under Construction, 2nd edition 2007, ANSI/SMACNA 008-2008 (Chapter 3) including Control Measures for:
1. HVAC protection
 2. Source control
 3. Pathway interruption
 4. Housekeeping
 5. Scheduling
- B. ASHRAE Standard 52.2-1999 – Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size (ANSI approved).

1.3. SUBMITTALS

- A. Construction Indoor Air Quality (CIAQ) Plan (sample provided in Appendix A of this Section): Within ten (10) calendar days after issuance of Notice to Proceed and prior to any work on site, submit to the Architect for review and approval.
- B. Construction Indoor Air Quality (CIAQ) Plan Acceptance Form (sample provided in Appendix B of this Section): At least ten (10) calendar days before subcontractor start of work, submit to the Architect for review and approval.
- C. Upon start of CIAQ Plan, along with pay applications, submit photographs documenting compliance with this Specification and with the Construction Indoor Air Quality Plan.

1.4. QUALITY ASSURANCE

- A. Include construction-related Indoor Air Quality procedures in pre-construction and construction progress meeting agendas.
- B. Require temporary ventilation training for Contractor employees, subcontractor employees, and vendors to ensure that participants in the construction process understand Indoor Air Quality

procedures and requirements. Ensure understanding and participation in achieving the goals of the Indoor Air Quality Management Plan.

- C. Inspection: Contractors shall conduct inspections to confirm that construction IAQ measures required by the Construction Indoor Air Quality Plan are being followed, and be prepared to report compliance with the Plan at progress meetings.

PART 2 - PRODUCTS

2.1 FILTERS

- A. Return side filters: MERV 8 filter performance complying with ASHRAE 52.2: 35 percent dust spot and 90 percent efficiency or better.
- B. Central filtration (at air handling units) shall be no less than MERV 8 during construction and replaced with not less than MERV 13 filter performance (ASHRAE 52.2: 85 percent dust spot and greater than 96 percent arrestance) or better post construction and pre-occupancy.

PART 3 - EXECUTION

3.1 CONSTRUCTION VENTILATION

- A. Maintain continuous temporary ventilation of areas during installation of VOC-emitting materials. Construction ventilation shall be provided for post-occupancy touch-up work involving VOC-emitting materials. It is not required during building flush-out.
 - 1. Ventilation shall be supplied via open windows and doors, temporary ducts, and temporary fans, sufficient to provide no less than three (3) air changes per hour.
 - 2. When continuous ventilation is not practical via temporary fans and exhaust to outside, then ventilation shall be supplied via the building's HVAC system and shall comply with the following requirements:
 - a. Provide temporary air filters at return air grilles.
 - b. Provide 100% outside air. Relative humidity not to exceed 60%.
 - c. Provide a minimum of three (3) air changes per hour.
 - 3. Maintain continuous ventilation for a minimum period of 72 hours after installation of VOC-emitting materials, unless otherwise indicated elsewhere in these Specifications.
 - 4. Ventilate areas directly to outside; ventilation to other enclosed areas is not acceptable.

3.2 HVAC PROTECTION

- A. Protect HVAC equipment from collecting dust and odors during the construction process. The following measures shall be utilized to protect the HVAC equipment and air distribution systems. These measures are described in *SMACNA IAQ Guidelines for Occupied Buildings Under Construction*, 2007. Any modifications to or substitutions of requirements described in this Section must comply with the abovementioned SMACNA guideline.
- B. Return Side:

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1. The return side of the HVAC system, under negative pressure, shall be shut down whenever possible during construction or demolition activities which generate dust, fumes, particulates, or pollution.
2. Isolate return side from the surrounding environment to greatest extent possible when operating.
3. Repair duct and air handler leaks.
4. Provide temporary MERV 8 filters during construction.
5. Provide dampers to close-off return side while work is performed in adjacent areas.
6. Seal return system openings with minimum 6 mil polyethylene plastic sheeting and tape.

C. Central Filtration:

1. Replace filter media in-place during construction with new MERV 13 filter media prior to Substantial Completion.

D. Supply Side:

1. Provide dampers and otherwise seal supply system components or branch serving the construction area.
2. Seal supply diffusers with plastic sheeting to prevent infiltration of dust or dirt.
3. At Substantial Completion, clean discharge diffusers. Remove dust and restore supply side branch operation to as-new condition.

E. Equipment Protection:

1. Protect HVAC equipment and components such as air handlers and return fan units from dust contamination.
2. Prior to installation, protect entire units to greatest extent possible. Protect stored inlet and discharge openings with plastic sheet. Store units in areas not contaminated by construction odor and dust.
3. During dust-producing activities (e.g. sanding, cutting, or grinding), or when VOC-emitting materials are being installed, implement the following measures:
 - a. If possible, damper off the return (negative pressure) side of HVAC air distribution system and seal return system openings with polyethylene sheet.
 - b. If HVAC system must be operated during dust-producing activities, provide temporary construction air filters with a minimum MERV rating of 8 at all return air grilles.
 - c. If HVAC supply air is off, protect diffusers and openings with polyethylene sheet.

F. Duct Cleaning:

1. Thoroughly clean components, ducts, HVAC units and associated equipment exposed to construction and dust including motors contaminated due to improper protection during construction.

3.3 SOURCE POLLUTION CONTROLS

- A. Coordinate and control dust-producing activities such as cutting, drilling, sawing, sanding, and rasping to prevent contamination of HVAC equipment and ductwork.
- B. When conducting construction activities that cause possible exposure of building interiors to volatile organic compounds (VOC's), such as painting, cleaning with solvents, or applying

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coatings, varnishes, or adhesives, provide source control and pathway interruption and isolation strategies to isolate, minimize, and reduce introduction of particulates and odors.

- C. Whenever possible, conduct cutting, drilling, sawing, and sanding outdoors or in areas where HVAC systems cannot be compromised.
- D. When welding or when using internal combustion powered tools, perform construction activities in areas where dust and emissions can be captured and exhausted using temporary exhaust systems.
- E. When performing activities that generate VOCs, isolate work areas and exhaust fumes, odors, and emissions using local or temporary exhaust systems.
- F. Porous or fibrous materials with visible microbial growth shall not be installed.
- G. Non-porous materials with visible microbial growth shall be decontaminated.

3.4 PATHWAY INTERRUPTION

- A. During construction, isolate areas of work to prevent contamination of clean or occupied spaces. Use 100 percent outside air ventilation, unless otherwise required due to climate conditions, with air exhausted directly to the outside when installing finishes, using Volatile Organic Compounds (VOC) emitting materials, or performing activities that generate dust or odor.
 - 1. Utilize pressure differential to prevent unwanted airflow from dirty to clean areas; include erection of barriers between work areas or between the inside and outside of the building.
 - 2. Erect barriers such as dust curtains or plastic sheets between work areas to prevent unwanted air flow from dirty to clean areas.

3.5 HOUSEKEEPING

- A. Reduce construction contaminants in the building prior to occupancy through regular space cleaning activities.
- B. Store building materials and equipment to be installed in weathertight, clean areas prior to unpacking for installation.
- C. Check for damages resulting from high humidity.
- D. Clean coils, air filters, and fans before testing and balancing procedures and before baseline air quality tests are conducted.
- E. Clean construction areas on regular intervals.
- F. Suppress and control the distribution of contaminants generated during the construction process.
- G. Remove spills of construction materials

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- H. Remove accumulated water immediately and clean and disinfect areas where sanding water occurs.

3.6 SCHEDULING

- A. Schedule and sequence construction activities to reduce absorption of Volatile Organic Compounds or contamination by construction dust or emissions by materials that act as sinks or contaminant sources. Complete application of wet and odor-emitting materials such as paints, sealants, and coatings before installing sink materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered products. Maintain continuous ventilation for a period of 72 hours before between installation of emitting materials and installation of sink materials.
- B. Materials that are susceptible to microbial growth shall be protected from exposed to moisture through precipitation, plumbing leaks, or condensation from the HVAC system contamination.

END OF SECTION 01 8119

**Santa Ana Johnson Student Center
Construction Indoor Air Quality Management Plan
(Sample)**

Introduction

Rancho Santiago Community Colleges District is beginning construction of a new student center facility; a new 63,642 square foot building, located in Santa Ana, CA. The Community Colleges District is requiring that this building meet Silver equivalence certification standards under the US Green Building Council's LEED program. Credits 3.1 and 3.2 of the Indoor Environmental Quality Credit section require an Indoor Air Quality Management Plan be established for the construction and pre-occupancy phases of the project. It is the intent of this document to establish the requirements to be implemented during construction to prevent air quality problems resulting from the construction process in order to help sustain the comfort and well being of construction workers and building occupants.

Objectives

The purpose of this Indoor Air Quality Management Plan is to implement and document the following three objectives:

- I. Implement the five requirements of the SMACNA IAQ *Guideline for Occupied Buildings under Construction*, Chapter 3. These five requirements will help to minimize contamination of the building from construction activities. The requirements are as follows:
 1. HVAC Protection
 2. Source Control
 3. Pathway Interruption
 4. Housekeeping
 5. Scheduling
- II. Provide a pre-occupancy building flush-out to purge post-construction VOCs from the building.
- III. Provide a final cleaning that adheres to green cleaning practices.

This Plan will also designate persons responsible for communication and implementation of the plan to ensure that all tradesmen involved in the construction are aware of the plan and are cognizant of their responsibilities and the benefits received by proper implementation.

Definitions

Absorptive or Porous Materials: materials that readily absorb moisture or volatile organic compounds. Materials include thermal insulation, acoustical panel ceilings, carpeting, and sound absorptive panels.

Dust Producing Activities: activities that create fine airborne dust. These activities are of concern only when applied on the interior of the building, near stored materials, or near openings and active air intakes. Activities include sweeping, spraying, sawing, sanding, drilling, and grinding.

EcoLogo: an independent, third-party non-profit organization that provides environmental certification standards for a variety of products, including building materials and cleaning products.

Green Seal: an independent, third-party non-profit organization that provides environmental certification standards for a variety of products, including building materials and cleaning products.

MERV: minimum efficiency reporting value. This is a rating of an air filter's ability to trap particulates. It is defined by ASHRAE 52.2-1999.

VOCs: volatile organic compounds. VOCs are chemicals that readily vaporize at room temperature. Many VOCs are unhealthful. When in doubt, check the product's Material Safety Data Sheet (MSDS).

VOC Emitting Materials: materials that emit volatile organic compounds during application, installation, or curing. These materials are of concern only when applied on the interior of the building, near stored materials, or near openings and active air intakes. Materials include all adhesives, applied fireproofing, joint sealants, sealers, paint, and high performance coatings.

Strategies

1. HVAC Protection

GOAL:

To protect and ensure the quality and integrity of the HVAC system during construction and additionally clean-up contaminated components after construction is complete.

CONTROL MEASURES

- 1.1. Isolate the return side from the surrounding environment whenever possible. Use of the HVAC for construction ventilation shall be avoided until necessary for the health, safety, and well-being of workers. All duct system openings will be protected with 6-mil plastic prior to HVAC system start-up.
- 1.2. While HVAC system is operational during construction, return air system openings shall be temporarily protected with air filters. These temporary filters will have a minimum MERV rating of 6. Temporary filters will be visually inspected every week and replaced when visible build-up of dust is apparent.
- 1.3. While the HVAC system is operational during construction, the system shall be dampered off or otherwise blocked during heavy dust producing activities (i.e. sanding, grinding). If the temporary imbalance of the return air system creates a problem, the HVAC system shall be shut down and temporary construction ventilation will be provided.
- 1.4. While the HVAC system is operation during construction, MERV 8 filters shall be provided at all air handlers.
- 1.5. In areas where the ceiling plenum will be used for air return, all ceiling tiles will be in place prior to start up of HVAC system.
- 1.6. Mechanical rooms shall not be used to store construction or waste materials.

- 1.7. The project team does not anticipate excessive build-up of dust of debris under the diffusers as this is new construction; however the mechanical IAQ coordinator will inspect the equipment prior to substantial completion.
- 1.8. Inspect the supply side system upon completion of the work for the amount of deposited particulate and clean if necessary.
- 1.9. Duct components shall be sealed on both ends before transportation and arrival at jobsite. One end may be unsealed at time of installation. In addition, all stockpiled duct and HVAC components shall stored under cover, away from sources of dust contamination. If storage indoors is not possible, store components in a well-drained area; on temporary wood blocking; away from sources of dust contamination, vehicular traffic, and debris; and protected from rain and other moisture.

2. Source Control

GOAL:

To reduce emissions by controlling pollutants at their source.

CONTROL MEASURES:

- 2.1. The project specifications have specified low-emitting materials for adhesives, sealants, paints and carpet as per the LEED Indoor Environmental Quality Credit 4 (EQc4). Documentation of compliance with LEED EQc4 is required for all adhesives, sealants, paints, coatings, composite wood, and carpet products installed on the interior of the building.
- 2.2. Provide local exhaust either through the building system or with portable fan and flex duct for areas of work where materials have high emissions.
- 2.3. Gasoline and diesel fueled equipment shall not be used inside the building after HVAC start up. If use of such equipment is unavoidable after start up, shut down the HVAC zones, provide temporary construction ventilation, cover absorptive surfaces with 6-mil plastic, and isolate the HVAC zone from the rest of the building.
- 2.4. Outside areas for smoking have been designated to prevent exposure to entryways, windows and the HVAC system of the building.
- 2.5. Outside areas for eating and drinking have been designated. No food or drink will be allowed inside the building during construction.

3. Interrupt Contamination Pathways

GOAL:

To prevent contamination of clean spaces.

CONTROL MEASURES:

- 3.1. If applicable, barriers may be erected to protect clean areas from neighboring contaminated areas. Pressure differentials may also be used to protect clean areas.
- 3.2. Relocate pollutant sources from mechanical intakes (i.e. keep roofing material away from HVAC intakes)
- 3.3. Special care will be taken to protect mechanical rooms with air handling equipment and the prevention of unauthorized access.
- 3.4. Depending on the climate, the project will ventilate using 100% outside air, fans and hoses to exhaust contaminated air directly to the outside during installation of VOC emitting materials or the presence of significant dust.
- 3.5. If necessary, the project team will construct cutting rooms to contain air-borne particles from cutting operations.

4. Housekeeping

GOAL:

Institute cleaning activities concentrating on HVAC and building spaces to remove contaminants from the building prior to occupancy.

CONTROL MEASURES:

- 4.1. Suppress dust with wetting agents or sweeping compounds.
- 4.2. Increase the cleaning frequency for dust based on visual inspection.
- 4.3. For cleaning purposes, use an efficient dust collection method (e.g. a damp rag, wet mop, or vacuum equipped with a high efficiency particulate filter or a wet scrubber that will discharge less material than conventional vacuuming, sweeping or dusting).
- 4.4. Ensure that all surfaces (including higher ledges, behind furniture, and inside mechanical equipment) are kept clean. Insure that the ceiling plenum is clean prior to installation of ceiling tiles.
- 4.5. Remove spills or excess application of solvent-containing products as soon as possible. Keep volatile liquids out of the building when not in use.
- 4.6. Remove accumulated water and keep work areas as dry as possible.
- 4.7. Protect porous materials such as insulation from exposure to moisture, dust, and VOCs.
- 4.8. Building material should be protected from weather and stored in a cleaned area prior to unpacking for installation. Ceiling tile and carpet shall not be installed until the building is watertight, to avoid the absorption of moist air into the material.
- 4.9. All coils, air filters and fans should be cleaned before performing testing and balancing procedures and before conducting baseline air quality tests.

- 4.10. Materials directly exposed to moisture through precipitation, plumbing leaks, or condensation from the HVAC system is susceptible to microbial contamination. Any material that has been wet will be thoroughly examined for contamination and will be replaced.
- 4.11. Inspect and clean if necessary all concealed spaces prior to enclosing them (i.e. shafts, hard lids, plenums, etc.)
- 4.12. Cleaning frequency shall be daily. A clean jobsite is a healthy jobsite.
- 4.13. The project team will require that the final clean subcontractor use cleaning supplies with low VOCs. Subcontractor shall submit all cleaning supplies for approval prior to use inside the building.

5. Scheduling

GOAL:

Sequence construction activities so that materials are kept dry and those that absorb contaminants are installed after other materials have had the opportunity to off-gas.

CONTROL MEASURES:

- 5.1. Complete application of VOC-emitting materials such as paint, sealants and coatings before installing porous or absorptive materials such as ceiling tiles, carpets and fabric covered furnishings.

NOTE: Touch up painting will most likely occur after the ceiling tiles and carpets have been installed, but because low VOC paints will be used, this will cause minimal IAQ concerns.

- 5.2. Do not install porous or absorptive materials until building envelope is watertight.
- 5.3. Just prior to Substantial Completion, but following Test and Balance, flush out building continuously (i.e. 24 hours per day, seven (7) days a week), maintaining a minimum temperature of 60° F and maximum 60% relative humidity. Use the following method:
 - a. Replace construction air filters with MERV 13 air filters.
 - b. Using the HVAC system, provide 14,000 ft³ of outside air per ft² of floor area.
 - c. Occupancy may occur following the delivery of 3,500 ft³ of outside air per square foot of floor area, provided that the space is ventilated at a minimum rate of 0.30 cfm/ft² of outside air (or the design minimum outside air rate, whichever is greater), for a minimum of 3 hours prior to occupancy and continuously during occupancy, until the total 14,000 ft³/ft² of outside air has been delivered to the space.
 - d. During building flush-out, when Contractor is required to perform touch-up work involving VOC-Emitting Materials as described in paragraph 1.03 of this Specification, extend Building Flush-Out by a minimum of 2,000 ft³/ft² of outside air or four (4) days

after touch-up installation with maximum tempered outside air for 24 hr per day in the space where the touch-up work occurred.

- e. Installation of furniture and equipment may occur during Building Flush-Out.
 - f. Return ventilation system to normal operation following flush-out period to minimize energy consumptions. Replace air filters used during flush-out with new MERV 13 air filters.
- 5.4. If schedule or other circumstances prevent the implementation of the building flush-out, a baseline indoor air quality test will be provided. Testing protocols will be consistent with US EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

6. Final Green Cleaning

GOAL:

To implement a green cleaning program reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants.

CONTROL MEASURES:

- 6.1. Use green cleaning materials and products that meet the following requirements:
- a. Cleaning products shall comply with one or more of the following requirements.
 - i. Green Seal GS-37 for general purpose, bathroom, glass, and carpet cleaners.
 - ii. EcoLogo CCD-110 for cleaning and degreasing compounds.
 - iii. EcoLogo CCD- 146 for hard surface cleaners.
 - iv. EcoLogo CCD-148 for carpet and upholstery care.
 - b. Disinfectants, metal polish, floor finishes, strippers, or other products not addressed by the above standards shall comply with one or more of the following requirements.
 - i. Green Seal GS-40 for industrial and institutional floor care products.
 - ii. EcoLogo CCD-112 for digestion additives for cleaning and odor control.
 - iii. EcoLogo CCD-113 for drain or grease trap additives.
 - iv. EcoLogo CCD-115 for odor control additives.
 - v. EcoLogo CCD-147 for hard floor care.
 - c. Disposable janitorial paper products and trash bags shall meet the minimum requirements of one or more of the following programs for the applicable product category.
 - i. Environmental Protection Agency (EPA) Comprehensive Procurement Guidelines for Janitorial Paper and Plastic Trash Can Liners.
 - ii. Green Seal GS-09 for paper towels and napkins.
 - iii. Green Seal GS-01 for tissue paper.
 - iv. EcoLogo CCD-082 for toilet tissue.
 - v. EcoLogo CCD-086 for hand towels.
 - vi. Products derived from rapidly renewable resources or made from tree-free fibers.
 - d. Hand soaps shall meet one or more of the following standards.
 - i. No antimicrobial agents, except where required by health code or other regulation.
 - ii. Green Seal GS-41 for industrial and institutional hand cleaners.
 - iii. EcoLogo CCD-104 for hand cleaners and hand soaps.

- 6.2. Use chemical concentrates with appropriate dilution systems to minimize chemical use wherever possible.
- 6.3. Train post-occupancy maintenance personnel in the following topics:
 - a. Appropriate use and dilution of green cleaning products.
 - b. Hazards of use, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.
 - c. Approved and prohibited chemicals and practices.

Communication**Communication Plan:**

During the appropriate stages of the Project the IAQ coordinator (superintendent) will communicate all IAQ control measures to all project personnel during the Monday morning safety meeting to assure that everyone understands the importance of the goals of the Construction Indoor Air Quality Management Plan. The Construction Manager will also conduct a pre-job meeting with key Contractors, such as the mechanical contractor.

Indoor Air Quality Management Personnel:

Indoor Air Quality (IAQ) Coordinator _____

IAQ Assistant _____

Mechanical Subcontractor IAQ Coordinator _____

Summary

The following items will be submitted to the Owner and the Green Building Certification Institute prior to final occupancy.

- LEED letter template, signed by the Construction Manager declaring that this Construction Indoor Air Quality Management Plan has been implemented for the project.
- A list of each air filter used during construction (MERV of 8) and at this end of construction (MERV 13). Each air filter shall include the MERV value, manufacturer name and model number.
- A brief description of the five construction approaches that were used during building construction, as noted above and applicable photographs to support the implementation of these five construction approaches.

All questions and comments regarding this plan should be forwarded to the Indoor Air Quality Coordinator above.

**Santa Ana Johnson Student Center
Construction Indoor Air Quality Plan Acceptance Form**

Subcontractor: _____ **Representative:** _____
Address: _____ **Trade:** _____
Scheduled Dates on Site: _____
Telephone: _____ **From:** _____ **To:** _____

Task Requiring CIAQ Plan Compliance	Scheduled Start Date	Scheduled End Date	Anticipated CIAQ Control Measures (refer by CIAQ Plan number)

Use additional copies as needed.

 Representative's Signature _____ Date

**SECTION 019113
GENERAL COMMISSIONING REQUIREMENTS**

Part 1 - GENERAL

1.01 SUMMARY

- A. Commissioning is a systematic process of verifying that the building systems perform interactively according to the construction documents and the Owner's operational needs. The commissioning process shall encompass and coordinate the system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training. Commissioning during the construction and post-occupancy phases is intended to achieve the following specific objectives according to the contract documents:
1. Verify that the applicable equipment and systems are installed in accordance with the contract documents and according to the manufacturer's recommendations.
 2. Verify and document proper integrated performance of equipment and systems.
 3. Verify that Operations & Maintenance documentation is complete.
 4. Verify that all components requiring servicing can be accessed, serviced and removed without disturbing nearby components including ducts, piping, cabling or wiring.
 5. Verify that the Owner's operating personnel are adequately trained to enable them to operate, monitor, adjust, maintain, and repair building systems in an effective and energy-efficient manner.
 6. Document the successful achievement of the commissioning objectives listed above.
- B. Various sections of the project specifications require equipment startup, testing, and adjusting services. Requirements for startup, testing, and adjusting services specified in the technical sections of these specifications are intended to be provided in coordination with the commissioning services and are not intended to duplicate services. The Contractor shall coordinate the work required by individual specification sections with the commissioning services requirements specified herein.
- C. The commissioning process does not take away from or reduce the responsibility of the Contractor to provide a finished and fully functioning product.

1.02 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division Specification Sections, apply to this Section.
- B. Owner's Project Requirements and Basis of Design Documentation.
- C. Related Divisions and sections include the following:
1. Division 1 – General Requirements
 2. Division 3 - Concrete
 3. Division 7 – Thermal and Moisture Protection
 4. Division 8 – Openings
 5. Division 10 – Specialties
 6. Division 11 – Equipment
 7. Division 21 – Fire Suppression
 8. Division 22 - Plumbing
 9. Division 23 – Heating, Ventilating and Air Conditioning (HVAC)
 10. Division 26 – Electrical
 11. Division 27 - Communications
 12. Division 28 – Electronic Safety and Security
 13. Section 32 84 00 – Irrigation Systems

1.03 DEFINITIONS

- A. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the contract documents.
- B. Basis of Design (BoD) document: A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- C. Building Envelope: All parts for the exterior shell of a building that provide insulation and air and water resistance such as roofing, windows, doors, flashing, exterior water proofing, ground contact water proofing, etc.
- D. Building Envelope Commissioning: A systematic process of ensuring that all building envelope systems perform interactively according to the Designer's Basis of Design (BOD) and Owner's Project Requirements (OPR).
- E. Commissioning Plan: An overall plan developed by the CxA that provides the structure, schedule and coordination for the commissioning process.
- F. Commissioning Observation: An issue identified by the Commissioning Agent or other member of the Commissioning Team that does not conform to the project OPR, contract documents or standard industry best practices. (See also Deficiency or Commissioning Issue)
- G. Commissioning Process: A quality-focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, tested, operated and maintained to meet the Owner's Project Requirements.
 - 1. Commissioning shall:
 - 2. Verify that the applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations and industry accepted standards and they receive adequate operational checkout by installing contractors.
 - 3. Verify and document proper performance of equipment and systems.
 - 4. Verify O&M documentation is complete.
 - 5. Verify that Owner's operations and maintenance personnel are adequately trained.
- H. Construction Checklist: A form used by the contractor to verify that appropriate components are on-site, ready for installation, correctly installed and functional. Also see pre-functional and functional checklists.
- I. Control System: A component of environmental, HVAC, security and fire systems for reporting, monitoring and issuing of commands.
- J. CxA: Commissioning Authority. The entity identified by the Owner who leads, plans, and schedules and coordinates the commissioning team to implement the commissioning process.
- K. Deficiency or Commissioning Issue: A condition identified by the Commissioning Agent or other member of the Commissioning Team that adversely affects the commissionability, operability, maintainability, or functionality of a system, equipment, or component. A condition that is in conflict with the Contract Documents and/or performance requirements of the installed systems and components.
- L. Factory Testing: Testing of equipment on-site or at the factory by factory personnel with or without owner's representative present.
- M. Functional Performance Testing (FPT): Generally refers to testing of a complete system and demonstrates control of equipment and the interaction of equipment or systems. Performed by the contractor and witnessed by the CxA.
- N. Installation Verification: Observations or inspections that confirm the system or component has been installed in accordance with the contract documents and to industry accepted best practices.

- O. Integrated System Testing: Integrated Systems Testing procedures entail testing of multiple integrated systems performance to verify proper functional interface between systems. Typical Integrated Systems Testing includes verifying that building systems respond properly to loss of utility, transfer to emergency power sources, re-transfer from emergency power source to normal utility source; interface between HVAC controls and Fire Alarm systems for equipment shutdown, interface between Fire Alarm system and elevator control systems for elevator recall and shutdown; interface between Fire Alarm System and Security Access Control Systems to control access to spaces during fire alarm conditions; and other similar tests as determined for each specific project.
- P. Master Issues Log: A formal and ongoing record of problems or concerns and their resolution that have been raised by members of the commissioning team during the course of the commissioning process. Maintained by the CxA.
- Q. Owner's Project Requirements (OPR): A collection of documents that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.
- R. Owner: Project Owner or designated representative.
- S. Pre-functional Checklists (PFC): Refers to checklists prepared by the CxA and provided to the contractor to document the complete installation of equipment or systems. Pre-functional checklists are completed by the contractors prior to start-up.
- T. Pre-Functional Test (PFT): An inspection or test that is done before functional testing. PFT's include installation verification and system and component start up tests.
- U. Sampling: Functionally testing only a fraction of the total number of identical or near identical pieces of equipment.
- V. Seasonal Performance Tests: Functional Tests that are deferred until the system(s) will experience conditions closer to their design conditions.
- W. Site Observation Visit: On-site inspections and observations made by the Commissioning Agent for the purpose of verifying component, equipment, and system installation, to observe contractor testing, equipment start-up procedures, or other purposes.
- X. Site Observation Reports (SO): Reports of site inspections and observations made by the Commissioning Agent. Observation reports are intended to provide early indication of an installation issue which will need correction or analysis.
- Y. Start-up: The initial starting or activating of dynamic equipment.
- Z. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.
- AA. TAB: A systematic process or service applied to heating, ventilating and air-conditioning (HVAC) systems and other environmental systems to achieve and document air and hydronic flow rates. The standards and procedures for providing these services are referred to as "Testing, Adjusting, and Balancing" and are described in the Procedural Standards for the Testing, Adjusting and Balancing of Environmental Systems, published by NEBB or AABC.
- BB. Training Plan: A written document that details the expectations, schedule and deliverables of commissioning process activities related to training of project operating and maintenance personnel, users and occupants.
- CC. Trending: The monitoring by a building management system or other electronic data gathering equipment and analyzing of the data gathered over a period of time to verify proper equipment or systems sequence of operations.
- DD. Verification: The process by which specific documents, components, equipment, assemblies, systems and interfaces among systems are confirmed to comply with the criteria described in the contract documents. Verification testing is performed by the contractor and witnessed by the CxA.
- EE. Warranty Phase Commissioning: Commissioning efforts executed after a project has been completed and accepted by the Owner. Warranty Phase Commissioning includes

follow-up on verification of seasonal system performance, assistance in identifying warranty issues and enforcing warranty provisions of the construction contract.

- FF. Warranty Visit: A commissioning meeting and site review where all outstanding warranty issues and deferred testing is reviewed and discussed.

1.04 COMMISSIONING TEAM

- A. Building Commissioning is a process that relies upon frequent and direct communications, as well as collaboration between all parties to the construction process. By its nature, a high level of communication and cooperation between the Commissioning Agent and all other parties (Architects, Engineers, Construction Managers, General Contractor, Subcontractors, Vendors, third party testing agencies, etc.) is essential to the success of the Commissioning effort.
- B. The members of the commissioning team consist of the contracted commissioning agent (CxA), the owner's representative/construction manager (PM/CM), the general contractor (GC), the general contractor's commissioning coordinator (CMG), the architect and design engineers (AE), the mechanical contractor (MC), the electrical contractor (EC), the controls contractor (CC), the testing and balancing contractor (TAB), the facility operating staff and any other installing subcontractors, suppliers of equipment or specialists. The contracted CxA is hired by the owner directly. The CxA directs and coordinates the project commissioning activities and the reports to the owner. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- C. The prime contractor shall in addition to their representative also appoint a representative from each subcontractor involved in commissioned systems including mechanical, electrical, controls, test and balance and plumbing.
- D. With these fundamental practices in mind, the commissioning process described herein has been developed to recognize that, in the execution of the Commissioning Process, the Commissioning Agent must develop effective methods to communicate with every member of the construction team involved in delivering commissioned systems while simultaneously respecting the exclusive contract authority of the Construction Project Manager (CM). Thus, the procedures outlined in this specification must be executed within the following limitations:
 - 1. No communications (verbal or written) from the Commissioning Agent shall be deemed to constitute direction that modifies the terms of any contract between the District (South Orange County Community College District) and the Contractor.
 - 2. Commissioning Issues identified by the Commissioning Agent will be delivered to the Construction Manager and copied to the designated Commissioning Representatives for the Contractor and subcontractors on the Commissioning Team for information only in order to expedite the communication process. These issues must be understood as the professional opinion of the Commissioning Agent and as suggestions for resolution.
 - 3. In the event that any Commissioning Issues and suggested resolutions are deemed by the Construction Manager to require either an official interpretation of the construction documents or require a modification of the contract documents, the Construction Manager will issue an official directive to this effect.
 - 4. All parties to the Commissioning Process shall be individually responsible for alerting the Construction Manager of any issues that they deem to constitute a potential contract change prior to acting on these issues.
 - 5. Authority for resolution or modification of design and construction issues rests solely with the Construction Manager, with appropriate technical guidance from the Architect/Engineer and/or Commissioning Agent.

1.05 OWNER'S RESPONSIBILITIES

- A. Participate in resolution of issues that may occur as a result of the commissioning process.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
 - 1. Coordination meetings.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Testing meetings.
 - 4. Demonstration of operation of systems, subsystems, and equipment.

1.06 CONTRACTOR'S AND SUBCONTRACTOR'S RESPONSIBILITIES

- A. Provide utility services required for the commissioning process.
- B. Contractor is responsible for construction means, methods, job safety, or management function related to commissioning on the job site.
- C. Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
 - 1. Attend a commissioning kick-off/scoping meeting and other necessary meetings scheduled by the CxA to facilitate the Cx process.
 - 2. Participate in construction-phase commissioning meetings including controls coordination meeting to review and resolve any issues with the sequence of operations.
 - 3. Provide detailed start-up procedures.
 - 4. Participate in maintenance orientation and inspection.
 - 5. Participate in operation and maintenance training sessions.
 - 6. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
 - 7. Perform quality control of all work and certify it is complete prior to request for inspection.
 - 8. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
- D. The GC will be required to maintain a commissioning schedule that is updated periodically during the commissioning process and is presented and discussed at the commissioning meetings.
- E. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
 - 1. Participate in construction-phase coordination meetings.
 - 2. Participate in maintenance orientation and inspection.
 - 3. Complete pre-functional checklists for all equipment. Submit completed forms with start-up reports immediately after start up. The CxA may request further documentation necessary for the commissioning process.
 - 4. Participate in procedures meeting for testing.
 - 5. Participate in final review at acceptance meeting.
 - 6. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
 - 7. Provide a copy of the O&M manual submittals of commissioned equipment, through normal channels, to the CxA for review and approval. O&Ms are required to be submitted and approved at least one month prior to training.
 - 8. Provide information to the CxA for developing construction-phase commissioning plan.

9. Participate in training sessions for operation and maintenance personnel.
10. Verify that all systems function correctly by testing each mode of operation, alarm and system function.
11. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified.
12. Perform quality control of all work and certify it is complete prior to request for inspection.
13. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.
14. Provide updated Project Record Documents or Shop Drawings to the CxA.

1.07 MECHANICAL CONTRACTOR'S RESPONSIBILITIES

- A. Responsibilities listed in Section 1.06 above.
- B. Completely install and thoroughly inspect, startup, test, adjust, balance, and document all systems and equipment.
- C. Assist CxA in verification and performance testing. Assistance will generally include the following:
 1. Review CxA provided pre-functional and functional performance test documents and provide written comments.
 2. Demonstrate system operation.
 3. Manipulate systems and equipment to facilitate testing.
 4. Provide specialized instrumentation necessary for verification and performance testing.
- D. Perform seasonal testing, at the direction of the CxA, to prove functional performance of the HVAC and controls in the opposite season.
- E. Schedule and perform duct air leakage testing as specified in the technical specification sections with CxA as witness.
- F. Provide flushing plans, disinfection reports and water treatment reports to the CxA for review.
- G. Participate in pre-TAB meeting and jobsite inspections to verify TAB readiness.
- H. Provide draft completed TAB report to CxA for review. CxA will identify up to 20% of TAB report for TAB contractor to demonstrate compliance to the completed TAB report.
- I. Provide a copy of the O&M manual submittals of commissioned equipment, through normal channels, to the CxA for review and approval. O&Ms are required to be submitted and approved at least one month prior to training.

1.08 CONTROLS CONTRACTOR'S RESPONSIBILITIES

- A. Responsibilities listed in Section 1.06 above.
- B. Completely install and thoroughly inspect, startup, test, adjust, balance, and document all systems and equipment.
- C. Assist CxA in verification and performance testing. Assistance will generally include the following:
 1. Establish trend logs of system operation as specified herein.
 2. Demonstrate system operation.
 3. Manipulate systems and equipment to facilitate testing.
 4. Provide specialized instrumentation necessary for verification and performance testing.
 5. Manipulate control systems to facilitate verification and performance testing.
 6. Provide trend reports of all points designated by the CxA for 1 week following successful performance testing at 15 minute maximum intervals.

- D. Software Optimization Assistance: Provide a Control technician to work at the direction of Commissioning Authority for software optimization assistance for a minimum of 80 hrs. Refer to Part 3 for a description of the software optimization.
- E. Sequences of Operation and Control Logic Submittals: The Controls Contractor's submittals of control drawings shall include complete detailed sequences of operation for each piece of equipment, regardless of the completeness and clarity of the sequences in the Specifications. They shall include:
1. An overview narrative of the system (1 or 2 paragraphs) generally describing its purpose, components and function.
 2. All interactions and interlocks with other systems.
 3. Detailed delineation of control between any packaged controls and the Building Automation System (BAS), listing what points the BAS monitors only and what BAS points are control points and are adjustable.
 4. Written sequences of control for packaged controlled equipment. (Equipment manufacturers' stock sequences may be included, but will generally require additional narrative).
 5. Start-up sequences.
 6. Warm-up mode sequences.
 7. Normal operating mode sequences.
 8. Unoccupied mode sequences.
 9. Shutdown sequences.
 10. Capacity control sequences and equipment staging.
 11. Temperature and pressure control: setbacks, setups, resets, etc.
 12. Detailed sequences for all control strategies, e.g., economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
 13. Effects of power or equipment failure with all standby component functions.
 14. Sequences for all alarms and emergency shut downs.
 15. Seasonal operational differences and recommendations.
 16. Initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
 17. Schedules.
 18. To facilitate referencing in testing procedures, all sequences shall be written in small statements, each with a number for reference. For a given system, numbers will not repeat for different sequence sections, unless the sections are numbered
 19. Provide documentation of all site specific programming as well as programming manual to CxA for review. Logic shall include all line code, function block templates with associated logic, graphical logic diagrams, etc. as applicable to the control system
- F. Control Drawings Submittal
1. The control drawings shall have a key to all abbreviations.
 2. The control drawings shall contain graphic schematic depictions of the systems and each component.
 3. The schematics will include the system and component layout of any equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 4. Provide a full points list with at least the following included for each point:
 - a. Controlled system
 - b. Point abbreviation
 - c. Point description DB temp, airflow, etc
 - d. Display unit

- e. Control point or Setpoint: Point that controls equipment and can have its setpoint changed (OSA, SAT, etc.).
 - f. Monitoring point: Point that does not control or contribute to the control of equipment, but is used for operation, maintenance, or performance verification.
 - g. Intermediate point: Point whose value is used to make a calculation which then controls equipment (space temperatures that are averaged to a virtual point to control reset).
 - h. Calculated point: "Virtual" point generated from calculations of other point values.
- G. The Controls Contractor shall keep the CxA informed of all changes to this list during programming and setup.
- H. An updated as-built version of the control drawings and sequences of operation shall be included in the final controls O&M manual submittal.
- I. Controls point to point checkout will require documentation of specific set up and calibration parameters for each point and controller such as measured value versus displayed value at various ranges, stroke and range adjustments, adjusted and actual trip points of switches, alarm thresholds, etc. A simple binary indication that a point-to-point checkout has been accomplished is not acceptable to document the point checkout.
- J. Assist and cooperate with the TAB contractor in the following manner:
- 1. Meet with the TAB contractor prior to beginning TAB and review the TAB plan to determine the capabilities of the control system toward completing TAB. Provide the TAB any needed unique instruments for setting terminal unit boxes and instruct TAB in their use (handheld control system interface for use around the building during TAB, etc.).
 - 2. For a given area, have all required pre-functional checklists, calibrations, start-up and selected functional tests of the system completed and approved by the CxA prior to TAB.
 - 3. Provide a qualified technician to operate the controls to assist the TAB contractor in performing TAB, or provide sufficient training for TAB to operate the system without assistance.
- K. The Controls Contractor shall expand on the pre-functional and functional testing plans to incorporate a comprehensive checkout of the control system.
- L. Provide a signed and dated certification to the CxA and CM/CMG upon completion of the checkout of each controlled device, equipment and system prior to functional testing for each piece of equipment or system, that all system programming is complete as to all respects of the Contract Documents, except functional testing requirements.
- M. List and clearly identify on the as-built duct and piping drawings the locations of all static and differential pressure sensors (air, water and building pressure).
- N. Provide building automation systems controls trend reports as requested by the CxA as part of functional testing.
- O. Warranty Period
- 1. Execute seasonal or deferred functional performance testing, witnessed by the CxA, according to these specifications.
 - 2. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.
- 1.09 ELECTRICAL CONTRACTOR'S RESPONSIBILITIES
- A. Responsibilities listed in Section 1.06 above.
- B. Construction and Acceptance Phases
- 1. Contractors shall provide normal cut sheets and shop drawing submittals to the CxA of commissioned equipment.

2. Provide additional requested documentation, prior to normal O&M manual submittals, to the CxA for development of start-up and functional testing procedures.
 - a. Typically this will include detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, full details of any Owner-contracted tests, full factory testing reports, if any, and full warranty information, including all responsibilities of the Owner to keep the warranty in force clearly identified. In addition, the installation, start-up, and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CxA.
 - b. The CxA may request further documentation necessary for the commissioning process.
 - c. This data request may be made prior to normal submittals.
3. Contractors shall assist (along with the design engineers) in clarifying the operation and control of commissioned equipment in areas where the Specifications, control drawings or equipment documentation are not sufficient for writing detailed testing procedures.
4. Provide assistance to the CxA in preparation of the specific functional performance test procedures. Subs shall review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
5. Develop a full start-up and initial checkout plan using manufacturer's start-up procedures and the pre-functional checklists from the CxA. Submit manufacturer's detailed start-up procedures and the full start-up plan and procedures and other requested equipment documentation to CxA for review.
6. During the start-up and initial checkout process, execute and document the electrical-related portions of the pre-functional checklists provided by the CxA for all commissioned equipment.
7. Perform and clearly document all completed start-up and system operational checkout procedures, providing a copy to the CxA.
8. Address current A/E punch list and Cx Issues Log items before performing functional performance testing.
9. Provide skilled technicians to execute starting of systems and equipment and to assist in the functional performance tests. Ensure that they are available and present during the agreed-upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem solving.
10. Correct deficiencies (differences between specified and observed performance) as interpreted by the CxA, CMG and A/E and retest the equipment.
11. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
12. During construction, maintain as-built red-line drawings for all drawings and final CAD as-builts for contractor-generated coordination drawings. Update after completion of commissioning (include deferred testing).
13. Provide training of the Owner's operating personnel as specified.
14. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

1.10 EQUIPMENT SUPPLIER'S RESPONSIBILITIES

- A. The equipment suppliers shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
 1. Assist in equipment testing per agreements with Subcontractors.

2. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
3. Review test procedures for equipment installed by factory representatives.
4. Attend commissioning kickoff meetings and additional meetings as necessary.
5. Contracted to General or Subcontractor.

1.11 ARCHITECT AND DESIGN ENGINEER'S RESPONSIBILITIES

- A. Responsible for developing the construction contract documents and clarifying the design intent during the construction phase of the project.
- B. Provides the Basis of Design document.
- C. Performs construction observation.
- D. Contracted directly to OWNER.

1.12 CxA's RESPONSIBILITIES

- A. Organize and lead the commissioning team.
- B. Prepare a Commissioning Plan. Collaborate with design team, owner, contractor and subcontractors to develop test procedures. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.
- C. Work with the Contractor to schedule commissioning activities. The Contractor shall integrate all commissioning activities into the master construction schedule. All parties will address scheduling issues in a timely manner in order to expedite the commissioning process.
- D. Review and comment on submittals for compliance with the approved project documents and identify any potential conflicts.
- E. Conduct commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. The CxA shall prepare and distribute minutes to commissioning team members and attendees within five (5) workdays of the commissioning meeting.
- F. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for permanent power; operation and maintenance data submittals; operation and maintenance training sessions; TAB Work; and Project completion.
- G. Develop an enhanced start-up and initial systems checkout plan with contractors.
- H. Periodically observe and inspect construction and report progress and deficiencies. In addition to compliance with the Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.
- I. Prepare Project-specific pre-functional checklists and functional test procedures checklists.
- J. Witness HVAC piping pressure testing and flushing, ductwork pressure testing and final cleaning and major systems start-up.
- K. Witness and document functional performance testing.
- L. Compile test data, inspection reports, and certificates and include them in the Systems Manual and Commissioning Report.
- M. Review and comment on operation and maintenance documentation for compliance with the Contract Documents and adequacy for Owner training.
- N. Review Contractor's operation and maintenance training program.
- O. Prepare commissioning status reports.
- P. Assemble the final commissioning documentation, including the Commissioning Report and Systems Manual including applicable Project Record Documents.

1.13 COMMISSIONING DOCUMENTATION

- A. Commissioning Plan: A document, prepared by CxA, that outlines the process, schedule, allocation of resources, and documentation requirements of the commissioning effort, and shall include, but is not limited to the following:
1. Description of the organization, layout, and content of commissioning documentation to be provided along with identification of responsible parties.
 2. Identification of systems and equipment to be commissioned.
 3. Description of the level of commissioning for each system
 4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
 5. Identification of items that must be completed before the next operation can proceed.
 6. Description of responsibilities of commissioning team members.
 7. Description of observations to be made.
 8. Description of requirements for operation and maintenance training, including required training materials.
 9. Provide a schedule for key commissioning activities with specific dates coordinated with overall construction schedule.
 10. Define the process for completing pre-functional and startup checklists for systems, subsystems, and list of specific equipment requiring these checklists.
 11. Include Step-by-step procedures for Functional testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.
- B. Pre-Functional Checklists: The Commissioning Agent will prepare Pre-Functional Checklists. Pre-Functional Checklists shall be completed and signed by the Contractor, verifying that systems, subsystems, equipment, and associated controls are ready for testing. The Commissioning Agent will review Pre-Functional Checklists to verify accuracy and readiness for testing. Inaccurate or incomplete Pre-Functional Checklists shall be returned to the Contractor for correction and resubmission.
- C. Start-Up Reports: Contractor/Manufacture created forms that document that factory start-up procedures have been followed for all equipment and systems to be commissioned. Provided by sub-contractors and included as part of the Cx Plan.
- D. Functional Performance Testing: CxA shall develop functional performance test procedures for all equipment and systems to be commissioned with input from installing contractors.
- E. Site Visit Reports: CxA shall record test data, observations, and measurements on site visit forms. Photographs and other means appropriate for the application shall be included with data.
- F. Test and Inspection Reports: CxA shall compile relevant test and inspection reports and test and inspection certificates and include them in Systems Manual and Commissioning Report.
- G. Commissioning Schedule: CxA shall review and provide input to the master project and construction schedules for commissioning activities. Contractor shall incorporate all commissioning activities into the construction schedule.
- H. Cx Issues Log: CxA shall prepare and maintain an issues log that describes installation, and performance issues that are at variance with the Contract Documents. CxA will identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.
1. Creating a Cx Issues Log Entry:
 - a. Identify the issue with a unique numeric identifier by which the issue may be tracked.
 - b. Assign a descriptive title of the issue.
 - c. Identify issue date and author

- d. Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.
 - e. Identify system, subsystem, and equipment to which the issue applies.
 - f. Identify location of system, subsystem, and equipment.
 - g. Include information that may be helpful in diagnosing or evaluating the issue.
 - h. Note recommended corrective action.
 - i. Identify commissioning team member responsible for corrective action.
 - j. Identify persons responding to the issue.
2. Documenting Issue Resolution:
- a. Log date issue is closed; issue may be closed and unresolved.
 - b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
 - c. Identify changes to the Contract Documents that may require action, if any.
 - d. State that correction was completed and system, subsystem, and equipment are ready for retest, if applicable.
 - e. Identify person(s) who corrected or resolved the issue.
 - f. Identify person(s) documenting the issue resolution.
- I. Commissioning Report: CxA shall document results of the commissioning process including performance of systems, subsystems, equipment and issues. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the Owner's Design Intent and Contract Documents. The commissioning report shall include, but is not limited to, the following:
- 1. Discussion of performance of commissioned systems including any variance from the design intent and the Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.
 - 2. Test plans and reports.
 - 3. Submittal Review Comments
 - 4. Cx Issues log.
 - 5. Completed pre-functional and functional test checklists.
 - 6. Completed start-up reports
 - 7. Listing of off-season test(s) not performed and a schedule for their completion.
 - 8. Training Records
 - 9. Trend Report Analysis
- J. Systems Manual: CxA shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:
- 1. Owner's Project Requirements
 - 2. Basis of Design or Design Narrative
 - 3. As-built system narratives, schematics, and list of installed equipment.
 - 4. Operation and maintenance data.
 - 5. Re-commissioning forms and schedule for each Cx system.

1.14 SUBMITTALS

- A. Commissioning Plan: CxA shall submit a draft commissioning plan. Deliver one copy to Contractor and one to Owner. Present submittal in sufficient detail to evaluate data collection and arrangement process. One copy, with review comments, will be returned to the CxA for preparation of the final commissioning plan.

- B. Pre-functional Checklists: CxA shall submit sample checklists and forms to Contractor and subcontractors for review and comment.
- C. Construction Checklists for Enclosure Commissioning: CxA shall submit sample Construction Checklists to Contractor for review. Contractor will complete the Construction Checklists prior to requesting CxA witnessing of Contractor provided tests.
- D. Start-Up Forms: Contractor shall submit start up forms to be used during construction for all equipment and systems to be commissioned for CMG and CxA Review.
- E. Functional Test Plan: CxA shall submit draft Functional Test Plan for comment by the installing contractors. The final Functional Test Plan will be submitted and used for functional testing.
- F. Site Observation Reports: CxA shall submit site visit reports within two days of the site visit documenting areas observed and any deficiencies noted.
- G. Final Commissioning Report: CxA shall submit the draft commissioning report. One copy, with review comments, will be returned to the CxA for preparation of final submittal. The final report submittal must address previous review comments.
- H. The CxA will provide appropriate contractors with a specific request for the type of submittal documentation the CxA requires facilitating the commissioning work. These requests will be integrated into the normal submittal process and protocol of the construction team. At minimum the request will include the manufacturer and model number, the manufacturer printed installation and detailed start-up procedures, sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details. In addition, the factory checkout sheets or field technicians shall be submitted for review.
- I. The CxA will review submittals related to the commissioned equipment and systems for conformance with the contract documents as it relates to commissioning process, to the performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of performance procedures. The CxA will notify the Owner/CM of items missing or areas that are not in conformance with contract documents and which require resubmission.
- J. BAS Trend Reports: The controls subcontractor shall submit 1 week of trend reports with the control system in "auto" without alarms after functional performance testing to demonstrate stability and proper control sequences. Trended points and time intervals to be determined by the CxA.
- K. Test and Inspection Reports: Contractor shall submit test and inspection reports and start-up reports for review by the CxA. This includes, but is not limited to, controls calibration report, point to point report and checkout reports.

1.15 QUALITY ASSURANCE

- A. Training Instructor Qualifications: Factory-authorized service representatives experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.
- B. Test Equipment Calibration:
 - 1. Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.
 - 2. All test equipment required to perform start-up and initial checkout and required performance testing shall be provided by the contractor for the equipment being tested.
 - 3. The following minimum requirements apply if not noted in the specifications: temperature sensors and digital thermometers shall carry a current certified calibration to an accuracy of .5 degrees F and resolution of +/- .1 degree F; pressure sensors shall have an accuracy of +/- 2% of the value range being measured and have been calibrated within the last year. All equipment shall be

calibrated per the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.

- C. TAB Verification: TAB contractor shall use same equipment used to perform testing, adjusting and balancing for demonstrating up to 20% of the TAB report for CxA verification. Calibration certificates will be reviewed for each piece of test equipment.

1.16 COORDINATION

- A. Scheduling: The Contractor shall work with the Commissioning Agent and the CMG to incorporate the commissioning activities into the construction schedule. The Commissioning Agent will provide sufficient information (including, but not limited to, tasks, durations and predecessors) on commissioning activities to allow the Contractor and the CM to schedule commissioning activities. All parties shall address scheduling issues and make necessary notifications in a timely manner in order to expedite the project and the commissioning process. The Contractor shall update the Master Construction schedule as directed by the CM.
- B. Coordinating Meetings: CxA shall conduct coordination meetings with the commissioning team as needed to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- C. Pretesting Meetings: CxA shall conduct pretest meetings with the commissioning team to review startup reports, coordinate controls sequence of operations, review pretest inspection results, review testing and balancing procedures, review testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.
- D. Testing Coordination: CxA shall coordinate with the Owner and Contractor to plan the sequence of testing activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Contractor shall schedule times for tests, inspections, obtaining samples, and similar activities.

Part 2 - PRODUCTS

2.01 INSTRUMENTATION AND TEST EQUIPMENT

- A. Instrumentation required to verify readings and test system and equipment performance shall be provided by Contractor and made available to Commissioning Authority. Generally, no testing equipment will be required beyond that required to perform Contractors work under these Contract Documents. All equipment used for testing and calibration shall be NIST/NBS traceable and calibrated within the preceding 1 year period. Certificates of calibration shall be submitted to CxA for review.

2.02 TAB & Cx OPERATORS TERMINAL AND SOFTWARE

- A. Contractor shall provide a portable operators terminal or hand held device and all software required to facilitate TAB and calibration and functional testing to TAB contractor. This device shall support all functions and allow querying and editing of all parameters required for proper calibration and start up, viewing real time point information, set up and view trends, view program logic, etc..
- B. BAS Temporary Graphical User Interfaces for Commissioning: Provide fully featured graphical user interfaces in all major mechanical rooms to facilitate Cx. Interfaces to eventually be relocated may be used. Contractor shall secure hardware from damage and theft as applicable. CxA shall be provided required hardware and software access.
 - 1. BAS shall ensure that all real time point information for HVAC zones, including those that include multiple controllers (such as tracking zones) can be accessed by provided tools within the zone through one communication port in that zone.

2. The system shall be capable of recording and storing historical trend data at the time of functional testing for use in evaluating performance of the system.

Part 3 - EXECUTION

3.01 COMMISSIONED SYSTEMS

System	Equipment	Note
HVAC	Air Handling Units	5
	Heating Hot Water Pumps	5
	Hot Water Boilers	5
	Exhaust Fans	5
	Variable Frequency Drives	5
	Split System Heat Pumps	5
	Chilled Water Piping System & BTU Meter	5
	Ductwork – Leakage Testing	3
	Variable Air Volume Boxes	3
	Test and Balance Report	3
	Factory Controls	5
	Stand Alone Controls	3
	Building Pressure Control	5
	Demand Control Ventilation & CO2 sensors	5
Building Enclosure	Foundations/Slabs	3
	Wall Systems	3
	Roof Systems	3
Plumbing	Domestic Hot Water Heaters	5
	Domestic Hot Water Recirculation Pump & Controls	5
	Temperature Mixing Valves	5
	Domestic Water Pumps and Controls	5
	Plumbing Fixtures	3
	Emergency Plumbing Fixtures	5
Electrical	Sweep and Schedule Lighting Controls	5
	Daylighting Controls	4
	Dimming Controls and Occupancy Sensors	3
	Uninterruptible Power Supplies	5
	Power Distribution	3

System	Equipment	Note
	Metering and Sub-metering	3
Communications	Integrated Audio-Video	4
Electronic Safety and Security	Video Surveillance	4
	Access Control	4
	Fire and Smoke Alarm	3
	Fire Suppression	3
Building Automation System	Controllers	5
	I/O Settings	5
	Graphical User Interface	5
	Programming / Schedules / Set Points	5
	All EMS/DDC Monitoring & Misc Systems Interfaces	5
Landscaping Systems	Irrigation Control System	5
	Irrigation Zones	3

Level 1 The CxA will periodically observe and inspect the installation of building systems and may review project documentation to verify operational requirements meet the design intent.

Level 2 The CxA will perform Level 1 activities and inspect, test or operate portions of the system to verify operational requirements are met. These activities may be performed independently of the contractor.

Level 3 The CxA will perform Level 2 activities and will witness contractor performance testing of up to 20% of the system to prove operational requirements are met. The test sections shall be chosen at random by the CxA to ensure uniformity of system. Failure of any test section shall require retesting of that section and an additional test section equivalent in scope.

Level 4 The CxA will perform Level 2 activities and will witness contractor performance testing of up to 50% of the system to prove operational requirements are met. The test sections shall be chosen at random by the CxA to ensure uniformity of system. Failure of any test section shall require retesting of that section and an additional test section equivalent in scope.

Level 5 The CxA will perform Level 2 activities and will witness contractor performance testing of up to 100% of the system to prove operational requirements are met. Failure of any test section shall require retesting of that section.

3.02 STARTUP, INITIAL CHECKOUT, AND PRE-FUNCTIONAL CHECKLISTS

- A. The following procedures apply to all equipment and systems to be commissioned.
- B. Pre-functional Checklists are developed by the CxA and completed by the appropriate installing contractors for all major equipment and systems being commissioned before functional testing can begin. The checklist captures equipment nameplate and characteristics data, location & service areas, and confirms the as-built status of the equipment or system. These checklists also ensure that the systems are complete and operational, so that the functional performance testing can be scheduled. The Contractor

and vendors shall execute factory startup and provide the CxA with a copy of the signed and dated completed start-up checklists which will be submitted with the Pre-functional checklists.

- C. Startup and Initial Checkout Plan: The Contractor shall develop detailed startup plans for all equipment. The primary role of the Contractor in this process is to ensure that there is written documentation that each of the manufacturer recommended procedures have been completed. Parties responsible for startup shall be identified in the Startup Plan and in the checklist forms.
- D. The Contractor shall develop the full startup plan by combining (or adding to) the checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual data and the field checkout sheets normally used by the Contractor. The plan shall include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
 - 1. The full startup plan shall at a minimum consist of the following items:
 - a. The Pre-Functional Checklists.
 - b. The manufacturer's standard written startup procedures copied from the installation manuals with check boxes by each procedure and a signature block added by hand at the end.
 - c. The manufacturer's normally used field checkout sheets.
- E. The Commissioning Agent will review/approve the full start-up plan.
- F. The Contractor shall review and evaluate the procedures and the format for documenting them, noting any procedures that need to be revised or added.
- G. Execution of Pre-functional Checklists and Startup.
 - 1. 2 weeks prior to start-up, sub-contractors and vendors schedule startup and checkout with the CM, CxC, and CxA. The performance of the startup and checkout shall be directed and executed by the CxC.
 - 2. The contractor shall maintain a master copy of signed checklists.
 - 3. The installing contractors shall update the checklists as work is completed. Only individuals that have direct knowledge and witnessed that a line item task on the pre-functional checklist was actually performed shall initial or check that item off.
 - 4. The CxA shall observe, at minimum, the procedures for each piece of primary equipment, unless there are repetitive multiple units, (in which case a sampling strategy may be used as approved by the Owner).
 - 5. The CxA will periodically review the checklists for completeness and report on progress at the Cx meetings.
- H. BAS (and other similar control systems) Startup Testing, Adjusting, and Calibration
 - 1. Work and/or systems installed under this Division shall be fully functioning prior to Demonstration and Acceptance Phase. Contractor shall start, test, adjust, and calibrate all work and/or systems under this Contract, as described below:
 - a. Inspect the installation of all devices. Review the manufacturer's installation instructions and validate that the device is installed in accordance.
 - b. Verify proper electrical voltages and amperages, and verify that all circuits are free from faults.
 - c. Verify integrity/safety of all electrical connections.
 - d. Coordinate with TAB subcontractor to obtain and CxA to fine tune control settings that are determined from balancing and testing procedures. Record the following control settings as obtained from TAB contractor, and note any TAB deficiencies in the BAS, Pre-functional checklists and initiate an associated Action Item:

- 1 Optimum duct static pressure setpoints for VAV air handling units.
 - 2 Minimum outside air damper settings for air handling units.
 - 3 Optimum differential pressure setpoints for variable speed pumping systems.
 - 4 Calibration parameters for flow control devices such as VAV boxes and flow measuring stations.
 - 5 BAS contractor shall provide hand held device as a minimum to the TAB and CxA to facilitate calibration. Connection for any given device shall local to it (i.e: at the VAV box or at the thermostat). HHD or portable operator's terminal shall allow querying and editing of parameters required for proper calibration and start up.
- e. Test, calibrate, and set all digital and analog sensing, and actuating devices. Calibrate each instrumentation device by making a comparison between the BAS display and the reading at the device, using an instrument traceable to the National Bureau of Standards, which shall be at least twice as accurate as the device to be calibrated (e.g., if field device is +/-0.5% accurate, test equipment shall be +/-0.25% accurate over same range). Record the measured value and displayed value for each device in the BAS Pre-functional Report.
- f. Check and set zero and span adjustments for all transducers and transmitters.
- g. For dampers and valves:
- 1 Check for adequate installation including free travel throughout range and adequate seal
 - 2 Where loops are sequenced, check for proper control without overlap
- h. For actuators:
- 1 Check to insure that device seals tightly when the appropriate signal is applied to the operator.
 - 2 Check for appropriate fail position, and that the stroke and range is as required at operating pressures/conditions.
 - 3 For sequenced electronic actuators, calibrate per manufacturer's instructions to required ranges.
- i. Check each digital control point by making a comparison between the control command at the controller and the status of the controlled device. Check each digital input point by making a comparison of the state of the sensing device and the OI display. Record the results for each device in the BAS Pre-functional checklists.
- j. For outputs to reset other manufacturers devices (VFDs) and feedback from them, calibrate ranges to establish proper parameters. Coordinate with representative of the respective manufacturer and obtain their approval of the installation.
- k. Verify proper sequences by using the approved checklists to record results and submit with BAS Pre-functional checklists. Verify proper sequence and operation of all specified functions. There is inherent duplication between the functional performance testing of the Testing Contractor, and the thorough checking testing of the sequences by the BAS. Generally the sequence checkouts indicated as the responsibility of the Testing Contractor under functional testing, must first be tested by the BAS under pre-functional testing.

- l. Verify proper systems operation under emergency power. Cooperate and coordinate with Testing Contractor and CxA for comprehensive building power outage tests.
- m. Verify all safety devices trip at appropriate conditions. Adjust setpoints accordingly.
- n. Verify that all alarm thresholds for all analog devices are entered. Request direction from Owner as to alarm threshold parameters
- o. Tune all control loops to obtain the fastest stable response without hunting, offset or overshoot. Record tuning parameters and response test results for each control loop in the BAS Pre-functional Report. Except from a startup, maximum allowable variance from set point for controlled variables under normal load fluctuations shall be as follows. Within 2 minutes of any upset (for which the system has the capability to respond to) in the control loop, tolerances shall be maintained (exceptions noted):
 - 1 Duct air temperature: $\pm 1^{\circ}\text{F}$.
 - 2 Space Temperature: $\pm 2^{\circ}\text{F}$
 - 3 Chilled Water: $\pm 1^{\circ}\text{F}$
 - 4 Hot water temperature: $\pm 2^{\circ}\text{F}$.
 - 5 Duct pressure: $\pm 0.25''$ w.g.
 - 6 Water pressure: ± 1 psid
 - 7 Duct or space Humidity: $\pm 5\%$
 - 8 Air flow control: $\pm 5\%$ of setpoint velocity. For min OA flow loops being reset from CO₂, response to upset max time is one hour
 - 9 Space Pressurization (on active control systems): $\pm 0.02''$ wg with no door or window movements
- p. For interface and DDC control panels:
 - 1 Ensure devices are properly installed with adequate clearance for maintenance and clearly labeled in accordance with the record drawings
 - 2 Ensure terminations are safe, secure and labeled in accordance with the record drawings
 - 3 Check power supplies for proper voltage ranges and loading.
 - 4 Ensure wiring and tubing are run in a neat and workman-like manner, either bound or enclosed in trough.
 - 5 Check for adequate signal strength on communication networks.
 - 6 Check for stand-alone performance of controllers by disconnecting the controller from the LAN. Verify the event is enunciated at OIs. Verify that the controlling LAN reconfigures as specified in the event of a LAN disconnection.
 - 7 Ensure that controller memory and control network through-put are adequate to support the extensive trending requirements. Reconfigure the system to provide a reliable and robust system as necessary.
 - 8 Ensure all outputs and devices fail to their proper positions/states.
 - 9 Ensure buffered and/ or volatile information is held through power outage.
 - 10 With all system and communications operating normally, sample and record update/enunciation times for critical alarms fed from the panel to the OI.
 - 11 Check for adequate grounding of all DDC panels and devices.
- q. For Operator Interfaces:

- 1 Verify all elements on the graphics are functional and properly bound to physical devices and/or virtual points and that hot links or page jumps are functional and logical.
 - 2 Output all specified system reports for review and approval.
 - 3 Verify the alarm printing and logging is functional and per requirements
 - 4 Verify trend archiving to disk and provide a sample to the CxA for review.
 - 5 Verify paging/dial out alarm enunciation is functional.
 - 6 Verify functionality of remote OIs and that a robust connection can be established consistently.
 - 7 Verify that required third party software applications required with the bid are installed and functional.
 - 8 Start up and check out control air compressors and air drying and filtering systems in accordance with the appropriate section and manufacturer's instructions.
 - 9 Verify proper interface with fire alarm system.
- r. Submit Start-Up Test Report. Report shall be completed, submitted and approved prior to functional testing.
- I. Sensor and Actuator Calibration. All field-installed temperature, relative humidity, CO, CO2, refrigerant, O2, and/or pressure sensors and gages, and all actuators (dampers and valves) on all equipment shall be calibrated. Verify that all locations are appropriate and away from causes of erratic operation. Submit to the CxA through the CM the calibration methods and results. All test instruments shall have had a current certified calibration record. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated. Contractor to field verify all installed sensors.
1. Sensor Calibration Methods
 - a. All Sensors: Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable, are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within specifications of each other for temperature and for pressure. Tolerances for critical applications may be tighter.
 - b. Sensors without Transmitters: Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.
 - c. Sensors with Transmitters: Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.
 2. Valve and Damper Stroke Setup and Check BAS Readout: For all valve and damper actuator positions checked, verify the actual position against the BAS readout. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, repair or replace actuator.
 3. Closure for heating coil valves (NO): Set heating setpoint 20°F above room temperature. Observe valve open. Remove control air or power from the valve

and verify that the valve stem and actuator position are as specified. Restore to normal. Set heating setpoint to 20°F below room temperature. Observe the valve close. Restore setpoints to normal.

4. Closure for cooling coil valves (NC): Set cooling setpoint 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position are as specified. Restore to normal. Set cooling setpoint to 20°F below room temperature. Observe valve open. Restore setpoints to normal.

J. Loop Tuning

1. For all control loops, contractor shall tune the loops to ensure the fastest stable response without hunting, offset or overshoot within tolerances specified above. Contractor shall introduce upsets to the load when possible to affect response. Otherwise, setpoints can be changed to affect the response.
2. Generally tune loops during periods of high gain.
3. Document all parameters either by capturing text, short interval trends, or screen shots of trend graph documenting the final response.

K. Valve Stroke Setup and Check

1. For all valve and actuator positions checked, verify the actual position against the OI readout.
2. Set pumps or fans to normal operating mode. Command valve or damper closed, verify that device is closed and adjust output zero signal as required. Command device open, verify position is full open and adjust output signal as required. Command valve to a few intermediate positions. If actual valve position doesn't reasonably correspond, adjust spring tension, replace actuator or add pilot positioner (for pneumatics).

L. Coil Valve Leak Check

1. Verify proper close off of the valves. Ensure the valve seats properly by simulating the maximum anticipated pressure difference across the circuit. Calibrate air temperature sensors on each side of coil to be within 0.5°F of each other. Via the OI, command the valve to close. Energize fans. After 5 minutes observe air temperature difference across coil. If a temperature difference is indicated, and the piping surface temperature entering the coil is within 3°F of the water supply temp, leakage is probably occurring. If it appears that it is occurring, close the isolation valves to the coil to ensure the conditions change. If they do, this validates the valve is not closing. Remedy the condition by adjusting the stroke and range, increasing the actuator size/torque, replacing the seat or replacing the valve as applicable.

M. Deficiencies, Non-Conformance and Approval in Checklists and Startup.

1. The Contractor shall clearly list any outstanding items of the initial start-up and pre-functional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.
2. The Commissioning Agent will review the report and submit comments to the CM. The Commissioning Agent will work with the Contractor to correct and verify deficiencies or uncompleted items. The Commissioning Agent will involve the CM and others as necessary. The Contractor shall correct all areas that are noncompliant or incomplete in the checklists in a timely manner, and shall notify the CM and Commissioning Agent as soon as outstanding items have been corrected. The Contractor shall submit an updated startup report and a Statement of Correction on the original noncompliance report. When satisfactorily

completed, the Commissioning Agent will recommend approval of the checklists and startup of each system to the CM.

3. The Contractor shall be responsible for resolution of deficiencies as directed the CM.

3.03 TEST AND BALANCE VERIFICATION

- A. Objective & Scope: The objective of TAB verification is to verify that air and water testing and balancing has been completed and all issues have been resolved prior to functional performance testing. A TAB report is required to be submitted to the CxA for review prior to scheduling verification. The CxA and the TAB contractor will meet on-site to discuss the report and walk the building to verify 20% of the total amount tested using a random sample, utilizing the same equipment that was used to perform the test and balance. Any portions that fail the testing require an additional test. Acceptable results include those that are within specified tolerance of the design values (5-10%). If more than 20% fail the testing, the report is rejected and additional balancing must be completed and a revised report submitted before this portion of functional testing is considered complete.

3.04 BAS SYSTEM TRENDING FOR COMMISSIONING

- A. Trending is a method of testing as a standalone method or to augment manual testing. The Contractor shall trend any and all points of the system or systems at intervals specified below.
- B. Alarms are a means to notify the system operator that abnormal conditions are present in the system. Alarms shall be structured into three tiers – Critical, Priority, and Maintenance.
 1. Critical alarms are intended to be alarms that require the immediate attention of and action by the Operator. These alarms shall be displayed on the Operator Workstation in a popup style window that is graphically linked to the associated unit's graphical display. The popup style window shall be displayed on top of any active window within the screen, including non DDC system software.
 2. Priority level alarms are to be printed to a printer which is connected to the Operator's Work Station located within the engineer's office. Additionally Priority level alarms shall be able to be monitored and viewed through an active alarm application. Priority level alarms are alarms which shall require reaction from the operator or maintenance personnel within a normal work shift, and not immediate action.
 3. Maintenance alarms are intended to be minor issues which would require examination by maintenance personnel within the following shift. These alarms shall be generated in a scheduled report automatically by the DDC system at the start of each shift. The generated maintenance report will be printed to a printer located within the engineer's office.
- C. The Contractor shall provide a wireless internet network in the building for use during controls programming, checkout, and commissioning. This network will allow project team members to more effectively program, view, manipulate and test control devices while being in the same room as the controlled device.
- D. The Contractor shall provide graphical trending through the DDC control system of systems being commissioned. Trending requirements are indicated below and included with the Systems Functional Performance Test Procedures. Trending shall occur before, during and after Systems Functional Performance Testing. The Contractor shall be responsible for producing graphical representations of the trended DDC points that show each system operating properly during steady state conditions as well as during the System Functional Testing. These graphical reports shall be submitted to the Commissioning Agent for review and analysis before, during dynamic operation, and after Systems Functional Performance Testing. The Contractor shall provide, but be not limited to, the following trend requirements and trend submissions:

1. Pre-testing, Testing, and Post-testing – Trend reports of trend logs and graphical trend plots are required as defined by the Commissioning Agent. The trend log points, sampling rate, graphical plot configuration, and duration will be dictated by the Commissioning Agent. At any time during the Commissioning Process the Commissioning Agent may recommend changes to aspects of trending as deemed necessary for proper system analysis. The Contractor shall implement any changes as directed by the CxA. Any pre-test trend analysis comments generated by the Commissioning Team should be addressed and resolved by the Contractor, as directed by the CM, prior to the execution of Systems Functional Performance Testing.
 2. Dynamic plotting – The Contractor shall also provide dynamic plotting during Systems Functional Performance testing at frequent intervals for points determined by the Systems Functional Performance Test Procedure. The graphical plots will be formatted and plotted at durations listed in the Systems Functional Performance Test Procedure.
 3. Graphical plotting - The graphical plots shall be provided with a dual y-axis allowing 15 or more trend points (series) plotted simultaneously on the graph with each series in distinct color. The plots will further require title, axis naming, legend etc. all described by the Systems Functional Performance Test Procedure. If this cannot be sufficiently accomplished directly in the Direct Digital Control System then it is the responsibility of the Contractor to plot these trend logs in Microsoft Excel.
 4. The points to be trended are identified in the Functional Test Checklist by equipment or system.
- E. The Contractor shall provide the following information prior to Systems Functional Performance Testing. Any documentation that is modified after submission shall be recorded and resubmitted to the CM and Commissioning Agent.
1. Point-to-Point checkout documentation;
 2. Sensor field calibration documentation including system name, sensor/point name, measured value, DDC value, and Correction Factor.
 3. A sensor calibration table listing the referencing the location of procedures to following in the O&M manuals, and the frequency at which calibration should be performed for all sensors, separated by system, subsystem, and type. The calibration requirements shall be submitted both in the O&M manuals and separately in a standalone document containing all sensors for inclusion in the commissioning documentation. The following table is a sample that can be used as a template for submission.

Sensor	Calibration Frequency	O&M Calibration Procedure Reference
Discharge air temperature	Once a year	Volume I Section D.3.aa
Discharge static pressure	Every 6 months	Volume II Section A.1.c

4. Loop tuning documentation and constants for each loop of the building systems. The documentation shall be submitted in outline or table separated by system, control type (e.g. heating valve temperature control); proportional, integral and derivative constants, interval (and bias if used) for each loop. The following table is a sample that can be used as a template for submission.
- 5.

AIR HANDLING UNIT AHU-1				
Control Reference	Proportional Constant	Integral Constant	Derivative Constant	Interval
Heating Valve Output	1000	20	10	2 sec.

3.05 FUNCTIONAL PERFORMANCE TESTING

- A. Objectives and Scope. The objective of functional performance testing is to demonstrate that each system is operating according to the Contract Documents. Each system will be tested to verify that the system response is as designed. Commissioned systems will be checked for conformance to the design sequences of operation and stable control. Proper system responses to such conditions as power failure, out of limit condition, equipment failure, etc. shall also be tested.
- B. Development of Test Procedures: Before Systems Functional Performance Test procedures are written, the Contractor shall submit all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. The test procedures are written by the CxA based upon the final operational sequences from available project documentation. The CxA shall develop specific test procedures and forms to verify and document proper operation of each system. Prior to execution, the CxA shall provide a copy of the test procedures to the Contractor who shall review the tests for feasibility, safety, equipment and warranty protection. The test procedure checklists developed by the CxA shall include the following information:
1. System and equipment or component name(s).
 2. Equipment location and ID number.
 3. Date.
 4. Project name.
 5. Participating parties.
 6. Reference to the specification section describing the test requirements, if applicable.
 7. Identification of control points
 8. Identification of specific control points to be trended as part of the testing
 9. A summary of the specific sequence of operations.
 10. Prerequisites for the test.
 11. Special cautions, alarm limits, etc.
 12. Specific step-by-step procedures to execute the test.
 13. Acceptance criteria of proper performance with a Yes / No/NA check box.
 14. A section for comments.
- C. Test Methods.
1. Systems Functional Performance Testing shall be achieved by manual testing (i.e. persons manipulate the equipment and observe performance) and/or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by standalone data loggers. The Contractor and Commissioning Agent shall determine which method is most appropriate for tests that do not have a method specified.
 - a. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, although timing the testing to experience actual conditions is encouraged wherever practical.
 - b. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods

often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a hair blower rather than overwriting the value or by altering the appropriate setpoint to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.

- c. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
 - d. Altering Setpoints: Rather than overwriting sensor values, and when simulating conditions is difficult, altering setpoints to test a sequence is acceptable. For example, to see the Air Conditioning compressor lockout initiate at an outside air temperature below 12 C (54 F), when the outside air temperature is above 12 C (54 F), temporarily change the lockout setpoint to be 2 C (4 F) above the current outside air temperature.
 - e. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual conditions and responses. Much of this verification shall be completed during systems startup and initial checkout.
- D. Setup: Each function and test shall be performed under conditions that simulate actual conditions as closely as is practically possible. The Contractor shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Contractor shall return all affected building equipment and systems, due to these temporary modifications, to their pretest condition.
- E. Sampling: No sampling is allowed in completing Pre-Functional Checklists. Sampling is allowed for Systems Functional Performance Test Procedures execution. The sampling rate is specified in Section 3.01. If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the Commissioning Agent may stop the testing and require the Contractor to perform and document a checkout of the remaining units, prior to continuing with Systems Functional Performance Testing of the remaining units.
- F. Cost of Retesting: The cost associated with expanded sample System Functional Performance Tests shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- G. Coordination and Scheduling: The Contractor shall provide a minimum of 7 days' notice to the Commissioning Agent and the CM regarding the completion schedule for the Pre-Functional Checklists and startup of all equipment and systems. The Commissioning Agent will schedule Systems Functional Performance Tests with the Contractor and CM. The Commissioning Agent will witness and document the Systems Functional Performance Testing of systems. The Contractor shall execute the tests in accordance with the Systems Functional Performance Test Procedure.
- H. Testing Prerequisites: In general, Systems Functional Performance Testing will be conducted only after Pre-Functional Checklists have been satisfactorily completed. The control system shall be sufficiently tested and approved by the Commissioning Agent and the CMG before it is used to verify performance of other components or systems. The air balancing and water balancing shall be completed before Systems Functional Performance Testing of air-related or water-related equipment or systems are scheduled. Systems Functional Performance Testing will proceed from components to subsystems

to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems will be checked.

- I. Problem Solving: The Commissioning Agent will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the Contractor.

3.06 Common Elements For All Systems

- A. Have the required submitted documentation convenient to testing area. Validate that all required documentation has been submitted and is per the contract requirements (very cursory review). CxA shall review the content of the documentation and validate that it is per contract documents
- B. CxA shall review the startup documentation at the start of functional performance testing. Review the startup tests and checklist documentation. CxA shall validate that startup is acceptably executed and complete. CxA shall ensure that any items indicated as outstanding in the checklists is entered as an Action Item and enter one if it is not. The checklists and start up tests/measurements shall be spot checked at the beginning of FPT to ensure accuracy. CxA shall complete a test that indicates he has reviewed the pre-functional checklists and finds them acceptable and note any outstanding items
- C. CxA shall check for and as applicable direct Contractor to demonstrate that access is sufficient to perform required maintenance.
- D. CxA shall validate that all prerequisite work is complete and confirm via a test record that he feels it is.
- E. Specifically check labeling and ensure conformance to contract requirements.
- F. Check proof indication, alarming on failure and restart/acknowledgement as applicable.
- G. CxA shall observe operating conditions encountered at the start of FPT. CxA shall examine for normal functionality and record parameters as a test.
- H. All dynamic systems powered by electricity shall be tested to simulate a power outage to ensure proper sequencing. Those on emergency power or uninterruptible power shall be tested on all sources.
- I. CxA shall inspect the installation and compare it to contract requirements. Record the inspection as a test.
- J. Capacities and adjusted and balanced conditions as applicable will generally be checked.
- K. Verify all sequence modes and sequences of operation. CxA must initiate all modes and may not refer to or rely on a pre-functional test done by the BAS. Some examples of generic modes that apply to most systems include:
 - 1. Off Mode
 - 2. Failed Mode: Proof, safeties, power outage etc. See below for crash testing.
 - 3. Start Sequence in various modes
 - 4. Stop sequences in various modes
- L. All adjusted, balanced, controlled systems shall be assessed to determine the optimal setting for the system as applicable. The optimal settings should be determined to establish reliable, efficient, safe and stable operation. CxA is responsible for placing systems in optimal condition for occupancy and not simply relying on initial design estimated settings.
- M. Dynamic Graphics: The graphic for all components, systems, and areas sampled and required to be represented by a graphic shall be checked for adequacy and accuracy. Furthermore, when setpoints are required to be adjustable, verify that they can be adjusted directly from the graphic screen.
- N. All interfaces between two systems or equipment of different manufacturers must be checked for accuracy and functionality.
- O. CxA shall to the extent possible, load the heating and cooling systems during initial FPT to check the capacity of the building central systems and initially optimize system settings. This will typically be done using the preheat system to false load the cooling system. This test will incorporate varying the load to check central systems response.

- P. “Crash Testing”: CxA shall analyze systems to identify possible conditions where functionality may be compromised. CxA shall design non-destructive tests that will demonstrate either the automated response to the conditions or so that team can identify the best method for responding or fixing the condition. All tests and finding shall be documented.
- Q. Building Enclosure Systems Functional Performance Tests
1. Participants shall include CxA, GC and water-proofing subcontractors.
 2. Sample 20%; failure 0%.
 3. CxA shall review construction checklists and perform site inspections during installation to verify completeness per construction documents.
 4. The CxA may witness testing performed by contractor and will review all test reports.
 5. Foundation: Upon completion of the under-slab vapor retarder installation the contractor will perform a field inspection to ensure that the installation was performed in accordance with manufacturer’s instructions, construction documents, ASTM E1745-11 and ASTM E1643-11. CxA will observe and inspect the installation of the under-slab vapor retarders.
 6. Walls:
 - a. Upon completion of the wall insulation installation and prior to installation of interior wall sheathing, e.g. gypsum board, the contractor will field verify to ensure that the insulation installation was performed in accordance with the construction documents.
 - b. The contractor will notify CxA to perform a site observation to review installed wall insulation installation.
 7. Windows and Wall Systems:
 - a. Upon completion of exterior windows and wall systems and prior to installation of insulation and wall sheathing the contractor will perform a field water spray test. A test plan will be provided by the CxA indicating tests locations. The approved test plan will outline up to 20% of the exterior windows and wall systems to be tested.
 - b. Field water spray testing will be performed in accordance with AAMA 501.2. This test uses a hand held spray assemble employing a Type B2 #6.030 nozzle, pressure gauge, control valve and a ¾” garden hose apply water to the windows at 30 psi. Direct the water at joints and perpendicular to the face of the window frame. Slowly move the nozzle back and forth above the window joints at a distance of 1’-0” for a period of five minutes for each 5’-0” of joint. At the same time have an observer on the inside of the building to check for water leakage. The contractor will be responsible to repair any identified leaks and retest repaired joints.
 - c. The contractor will coordinate spray testing schedule in advance with the CxA allowing adequate time for the CxA to witness field water spray testing.
 8. Doors: The contractor will perform visual inspections of all exterior doors with weather-stripping. The contractor will be responsible to adjust doors for proper operation and weather seal. CxA will inspect, test or operate a random sampling of exterior doors to verify proper seal.
 9. Roof:
 - a. Upon completion of the roof systems and prior to installation of interior ceiling systems the contractor will perform a roof flood test. A test plan will be provided by the CxA indicating tests locations. The structural engineer will review the roof flood test plan and approve prior to any roof

flood testing. The approved test plan will outline up to 20% of the roof area to be tested.

- b. Roof flood testing will be performed in accordance with ASTM D 5957.
- c. The contractor will coordinate roof flood testing schedule in advance with the CxA allowing adequate time for the CxA to witness roof flood testing.

R. Domestic Water Systems Functional Performance Tests

1. Participants shall include CxA, PC
2. Sample 100% of equipment and 50% of fixtures; failure 10%
3. CxA shall review pre-functional checklists, chlorination report and any factory start-up reports to verify pre-functional testing is completed.
4. Contractor to demonstrate settings and sequences of water heaters, circulation and booster pumps, temperature mixing valves and controls, reverse osmosis and water softener systems.
5. Domestic hot water will be tested by the CxA by measuring the hot water temperature at all fixtures along with the time it takes to reach that temperature.
6. Plumbing fixtures will be checked for proper operation and water saving features.
7. Equipment alarm outputs to the BAS will be checked for proper communication.

S. HVAC System Pumps Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS (where pumps are automatically controlled).
2. Sample 100%
3. CxA shall review pre-functional checklists, start-up reports, and TAB report for pumps and variable frequency drives as applicable.
4. CxA shall check that construction strainers have been removed to validate that the system is clean.
5. Pumps shall be manually started individually. Pressure differential, KW (or slip on the motor), and flow shall be checked at shut-off, wide open, and balanced (or controlled) condition. Generally the reading from the instrumentation provided with the pump (thermometers and pressure gages and flow meters as applicable) will be acceptable if used to validate an action as opposed to checking balancing. Listen to pump to ensure no excessive noise or vibration
6. For pumps designed with automatic starting of back up pump on primary pump failure:
 - a. Enable automatic controls.
 - b. Start primary pump.
 - c. Throw disconnect switch of primary pump, and validate that standby is energized. Perform this test on all pumps.
 - d. Change lead and retest.
7. Check proof indication and alarm. Generally affect failure by turning off electrical feed at each available dedicated location (i.e.: breaker feeding drive or starter (when dedicated), throwing disconnect on starter or drive and/or turning HOA to off, and disconnecting local motor disconnect (coordinate with drive manufacturer where applicable particularly when reconnecting).
8. For staged pumping systems:
 - a. Vary load by opening and closing valves to affect a stage up and stage down.
 - b. Fail pumps throughout the process to ensure staging logic responds correctly.
 - c. Ensure minimum run and off times of stages. Consider criticality of the system.
 - d. Change pump priority and perform the same process with another priority.

9. For multiple pump systems, affect or observe a normal rotation of lead or priority sequence.
 10. Simulate peak and minimum operating pressure conditions on the systems and check stroke and ranges on valves to ensure adequate close off and ranging.
 11. For variable speed pumps:
 - a. Manipulate control valves to change flow conditions (increase and decrease) and observe control response.
 - b. Ensure stable control response to step change in flow conditions in both directions.
 - c. Check for the applicable acceleration and deceleration of the pumps.
 - d. Spot check for critical frequencies by manually ramping pump speed from min. to max. to ensure stable operation of pumps and record/defeat any critical frequencies.
 - e. Record representative part load output from the drive (using VFD read out).
 - f. Check calibration of control input. Check drive bypass operation if applicable.
 - g. Specifically check for status indication at minimum pump speed and ensure reliability of status signal
 12. Simulate power outage and ensure orderly and automatic restart.
- T. Heating Hot Water System Functional Performance Test
1. Participants shall include CxA, MC, TAB, and BAS.
 2. Sample 100%, max failure limit 10%
 3. CxA shall review pre-functional checklists, start-up check-lists, chemical treatment report and TAB report.
 4. Verify automatic start/stop of boiler.
 5. Start heating system and manipulate control devices to obtain maximum heating call. Measure temperatures and pressures to determine capacity.
 6. Weather permitting cause all applicable modes of operation using false loading where practical. Check proper sequence for primary pump, isolation valves, lead/lag and staging modes and proper operations within a mode.
 7. Verify setpoints are properly programmed and system is controlling to setpoints.
 8. Check calibration of control devices and for stable control response and component performance including heating water coils, economizer cycles, etc. Ensure proper coordination of control loops and that no hunting or energy is wasted.
 9. Check for free and adequate flow of condensate.
 10. Seasonal test may be required depending on time of year completion.
- U. Split Systems Functional Performance Test
1. Participants shall include CxA, MC, TAB, and BAS.
 2. Sample 20%, max failure limit 10%
 3. CxA shall review start-up check-lists and TAB reports.
 4. Verify automatic start/stop of fan and open/close of outdoor air damper as applicable.
 5. Start heating and cooling system, manipulate control device to obtain maximum cooling and heating. Measure temperatures and pressures to determine capacity.
 6. Weather permitting cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
 7. Check calibration of control devices and for stable control response.
 8. Check for free and adequate flow of AC condensate.

9. Simulate power outage and ensure automatic and orderly restart.
- V. Air Handling Unit Functional Performance Test
1. Participants shall include CxA, MC, TAB, and BAS.
 2. Sample 100%, max failure limit 0%
 3. CxA shall review pre-functional checklists, start-up check-lists and TAB reports.
 4. Verify automatic start/stop of fan and open/close of outdoor air damper.
 5. Start heating and cooling system, manipulate control device to obtain maximum cooling and heating. Measure temperatures and pressures to determine capacity.
 6. Weather permitting cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
 7. Check calibration of control devices and for stable control response and component performance including chilled water coils, hot water coils, steam coils, humidifiers, economizer cycles, etc. Ensure proper coordination of control loops and that no fighting or energy wastes result
 8. Check for free and adequate flow of AC condensate.
 9. Spot check valve close off under peak pressure conditions that the valve will try to close.
 10. For variable speed fans:
 - a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
 - b. Manually ramp fan speed from min. to max. to ensure stable operation of fans.
 - c. Record representative part load output from the drive.
 - d. Check calibration of control inputs.
 - e. Check drive bypass operation if applicable.
 11. For fans with inlet vanes:
 - a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
 - b. Manually modulate vanes from min. to max. to ensure stable operation of fans.
 - c. Record representative part load power draw on the motor.
 - d. Check calibration of control input.
 12. Ensure minimum required ventilation rates are maintained across the full range of control where applicable.
 13. Test all interfaces with the fire alarm system and all smoke control sequences.
 14. Verify interlocks with exhaust fans where applicable.
 15. Test proof alarming where applicable.
 16. Test operation of applicable safeties including freeze stats, high and low static devices, smoke detection, etc. Check AH component status in each event.
 17. Check system status and operation in the Off, Unoccupied, and Occupied Mode of operation. Validate proper start up and shut down sequences.
 18. Simulate power outage, operation under emergency power where applicable, and ensure automatic and orderly restart.
 19. Where systems are headered and/or sequenced, vary loading to affect stage up and stage down. Adjust parameters to affect smooth staging. Validate that header pressure is not compromised in the event of a failure of one of the units.
 20. 20. Check temperature sensor coordination by isolating or stopping coils and heat wheels with air flowing.

- W. Fan/Air System Functional Performance Test.
1. Participants shall include CxA, MC, TAB, and BAS.
 2. Sample 100%
 3. CxA shall review pre-functional check-lists, start-up reports and TAB reports.
 4. Verify start/stop control sequences.
 5. Check the capacity of the fan at maximum conditions.
 6. Cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
 7. For variable speed fans:
 - a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
 - b. Manually ramp fan speed from min. to max. to ensure stable operation of fans. Record representative part load output from the drive.
 - c. Check calibration of control input.
 - d. Check drive bypass operation if applicable.
 8. For fans with inlet vanes:
 - a. Manipulate air terminal units to change flow conditions and observe control response. Ensure stable control response to step change in flow conditions.
 - b. Manually modulate vanes from min. to max. to ensure stable operation of fans. Record representative part load power draw on the motor.
 - c. Check calibration of control input.
 9. Verify interlocks with exhaust fans where applicable.
 10. Test all interfaces with the fire alarm system and all smoke control sequences.
 11. Test proof alarming where applicable. Simulate failures of fans and ensure proper start-up of back up fans. Check status indication at minimum fan speed to ensure reliable and repeatable condition.
 12. Test operation of applicable safeties including freeze stats, high and low static devices, smoke detection, etc.
 13. Check system status and operation in the Off, Unoccupied, and Occupied Mode of operation. Validate proper start up and shut down sequences.
 14. Simulate power outage, operation under emergency power where applicable, and ensure automatic and orderly restart.
 15. Where systems are headered and/or sequenced, vary loading to affect stage up and stage down. Adjust parameters to affect smooth staging. Validate that header pressure is not compromised in the event of a failure of one of the units.

X. HVAC VAV Air Terminal Functional Performance Test

1. Participants shall include CxA, MC, TAB, and BAS.
2. Sample 20%, max failure limit 10%
3. CxA shall review start-up check-lists and TAB reports.
4. Check the calibration of zone temperature sensors.
5. Set boxes for both minimum and maximum flow (typically by setting the space temperature setpoint up and down) and check the calibration of the flow settings
6. Check the stability of the zone temperature control loop for the damper and any associated heating devices by changing the space setpoints and observing the response.
7. Cause all applicable modes of operation using false loading where practical. Check proper sequence for switching modes and proper operation within a mode.
8. Determine the optimal settings for the control parameters

9. Simulate and test the unoccupied and emergency mode response of the box where applicable
 10. Check the capacity of the heating device where applicable.
- Y. Building Automation System Functional Performance Test
1. Participants shall include CxA, MC, and BAS.
 2. Controls system sampling will typically correspond to the sampling rate of a system or piece of equipment. These sampling rates are indicated in Section 3.01 for the respective item.
 3. Contractor shall operate the equipment and subsystems through all specified modes of control and sequences of operation including full and part load conditions, and emergency conditions.
 4. Verify that equipment operates in accordance with design intent and approved control diagrams. This shall include checking the operation of dampers, valves, smoke detectors; high and low limit controls, of a sample of 25% of components with a maximum failure limit of 10%.
 5. Analog Input Sensors: (at a sample of 50% of the inputs on the sampled devices (see above for device samples) with a maximum failure rate of 10%) Spot check analog input sensors (space temperature sensors, outside, return, and mixed air temperature sensors, discharge air temperature sensors, chilled water and hot water temperature sensors, and humidity sensors, air and water differential pressure sensors, airflow monitoring stations, etc.) for acceptable accuracy (which is generally as specified for the device).
 6. Valves, Dampers and Actuators: (at a sample of 50% of the inputs on the sampled devices (see above for device samples) with a maximum failure rate of 10%) Ensure that valves and dampers and their actuators close off or seal against the maximum pressure differential. Ensure that the actuators stroke throughout the correct range and that the positioners are set correctly where applicable.
 7. Analyze trends of control system points for a minimum of a one week period prior to and throughout the Acceptance period. Trends shall be analyzed to identify any control problems, lack of capacity, control loops fighting or unstable, etc.
 8. Spot (at a sample of 50% of the inputs on the sampled devices (see above for device samples) with a maximum failure rate of 10%) check the operation of all automatic switches (pressure switches, current switches, flow switches, etc.) to ensure that they are adjusted to proper make and break settings.
 9. Verify the stand alone functionality of the controllers. Generally disconnect LAN communication wiring and ensure that the controller functions properly and that the loss of communication is acknowledged by the interface. Restore communications and ensure an orderly restoration to normal control.
 10. Verify that the EMS interface, EMS software, graphics and functions are in accordance with design intent and approved control diagrams.
 - a. Validate intuitive interface and graphic linking.
 - b. Validate all graphics are done and accurate.
 - c. Validate that all graphics contain required information.
 - d. Validate that all security passwords and access to system information has been set up correctly.
 - e. Validate that point naming convention is consistent and per Owner requirements.
 11. Check dial in communications and pager functions where applicable to ensure functionality.
- Z. Lighting Fixtures And Lighting Controls/277/120V Functional Performance Test

1. General: Provide the services of a factory trained manufacturer's representative to assist the contractor in the installation and start up service of the lighting control system and train Owner's maintenance personnel as specified below. Representative will confirm the proper installation and operation of all system components.
2. Train Owner's maintenance personnel on the operation and programming of the lighting control system. Seven days of training will be provided for up to 50 users.
3. Start-up checklists: Perform the following final checks before startup:
 - a. Ensure all labeling is affixed and accurate
 - b. Ensure all terminations are tight.
 - c. Check sensor placement is adequate for required duty.
 - d. Ensure adequate access is provided to all panels and that documentation of that panel is provided in it.
 - e. Ensure all circuits for the loads are energized and ready for testing.
4. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
 - a. Test, calibrate, and set all digital and analog sensing, and actuating devices. Calibrate each instrumentation device by making a comparison between the graphic display and the reading at the device, using an instrument traceable to the National Bureau of Standards, which shall be at least twice as accurate as the device to be calibrated (e.g., if field device is +/-0.5% accurate, test equipment shall be +/-0.25% accurate over same range). Record the measured value and displayed value for each device in the Start Up Report.
 - b. Check each digital control point by making a comparison between the control command at the control panel and the status of the controlled device. Check each digital input point by making a comparison of the state of the sensing device and the OI display. Record the results for each device in the Start-Up Report.
 - c. Check loads on all breakers to ensure that the breaker is properly sized.
 - d. Enter all schedules per occupant's direction.
5. For Operator Interfaces:
 - a. Verify all elements on the graphics are functional and properly bound to physical devices and/or virtual points and that hot links or page jumps are functional and logical.
 - b. Output all specified reports for review and approval.
 - c. Verify the alarm printing and logging is functional and per requirements
 - d. Validate all interfaces with other systems on a point by point basis
6. Daylighting and Dimming Controls:
 - a. Participants shall include CxA, EC and trained manufacturer's representative.
 - b. Sample 50%
 - c. CxA shall review pre-functional check-lists and start-up reports.
 - d. Verify daylighting and dimming control sequences and setpoints for photocells for required foot-candle levels at desk level.
 - e. Check proper sequence for low voltage switch modes and proper operation within a mode.
7. Occupancy Sensors
 - a. Participants shall include CxA, EC and trained manufacturer's representative.

- b. Sample 50%
 - c. CxA shall review pre-functional check-lists and start-up reports.
 - d. Verify that the area occupancy can be monitored
 - e. Verify that the sensor can be overridden when sensor problems occur.
 - f. Verify that the area lights turn on when occupied and off when unoccupied for fifteen minutes.
 - g. Verify that the sensor is adjusted and does not cause nuisance tripping.
- AA. Power Distribution System Functional Performance Test
- 1. Participants shall include CxA and EC.
 - 2. General: Provide the services of a NETA certified testing contractor to assist the contractor in equipment and power distribution system start-up and pre-functional testing. Representative will confirm the proper installation and operation of all system components.
 - 3. Start-up checklists: Perform the following final checks before startup:
 - a. Ensure all labeling is affixed and accurate
 - b. Ensure all terminations are tight.
 - c. Inspect for physical, electrical and mechanical condition of equipment and cabinet - no damage evident.
 - d. Equipment installed agrees with shop drawings and specifications
 - 4. Ensure adequate access is provided to all panels and that documentation of that panel is provided in it.
 - 5. Ensure all circuits for the loads are energized and ready for testing.
 - 6. Perform Test Procedures in accordance with technical specifications and provide Test Reports for CxA review.
 - 7. Simulate a utility outage and verify that all equipment being served by the emergency power system functions properly through the sequence of operations without interruptions or alarms.
- BB. Uninterruptible Power Supplies Functional Performance Test
- 1. Participants shall include CxA and EC.
 - 2. Sample 100%
 - 3. Upon completion of the emergency power system, factory start-up and contractor pretesting, the CxA will witness a contractor test to verify complete system power loss and verify proper power provision of critical systems. The test will not be scheduled until all other systems dependent on emergency power have been tested and approved.
 - 4. The contractor shall demonstrate the power management system to the CxA.
 - 5. The contractor is to provide NETA certified third party testing of the power distribution system and provide the CxA with a certified test report. CxA will review contractor provided as-builts for proper identification and labeling of all equipment, piping and devices.
- CC. Data and Communication Systems Functional Performance Test
- 1. Audio/Visual Systems
 - a. Participants shall include CxA, EC and A/V Subcontractor
 - b. Sample 50%
 - c. Witness the testing of audio integrated with the video.
 - d. Verify sound matches voices on the video.
 - e. Witness the contractor testing the audio from the microphones.
 - f. Verify audio levels within the audio mixing equipment.
 - g. Verify audible audio levels within the room.
 - h. Verify contractor is performing the test in full operation of the audio visual system.

- i. Verify the contractor is testing the handheld microphones, the lapel microphones, and the stationary microphones independently and simultaneously to ensure no feedback is present in the system during this operation.
- DD. Security System Functional Performance Test
 - 1. Participants shall include CxA, EC, and Security subcontractor.
 - 2. Sample 50%, max failure limit 10%
 - 3. CxA shall review pre-functional checklists and start-up reports.
 - 4. Verify cable and system component installation complies with the specifications and drawings.
 - 5. Verify correct panel and door hardware power supplies and batteries are connected and operational.
 - 6. Verify operation at the doors and gates is per the specification.
 - 7. Verify alarms for forced, held open, and closed functions are operational.
 - 8. Verify camera field of view meets owner's requirements.
 - 9. Verify camera recording and video storage meets specifications.
- EE. Fire Alarm Equipment / Fire Alarm/Detection System Functional Performance Test
 - 1. General: General: Provide the services of a qualified fire alarm specialist to supervise the installation, make adjustments, and perform tests on the fire alarm system and train Owner's maintenance personnel.
 - 2. Start-up checklists: Perform the following final checks before startup:
 - a. Ensure all labeling is affixed and accurate
 - b. Ensure all terminations are tight.
 - c. Ensure adequate access is provided to all panels and that documentation of that panel is provided in it.
 - d. Review that all fire alarm devices as shown on the construction drawings and shop drawings are installed.
 - e. Review height and locations of pull stations and visual alarms to comply with ADA.
 - f. Review that smoke and duct detectors are installed according to NFPA 72E and NFPA 90A.
 - g. Check that fire alarm system control panel is clear with no trouble or ground faults.
 - h. Sprinkler flow and tamper switches have been adjusted.
 - i. Check wire supervision on all devices.
 - 3. Starting Procedures: Follow the manufacturer's written procedures and the following as a minimum:
 - a. Check location of all sensors and switches to ensure conformance with requirements.
 - b. Cause activation of all device, assure alarms are initiated and resulting response is per the requirements.
 - c. Verify interfaces with all other inter-related systems or equipment including FMS, sound systems, security systems, HVAC systems, vertical delivery systems, etc. on a point by point basis for all points
 - d. Validate all output devices (speakers and strobes) meet the code criteria (96 dBa at 10' and 117 candela at peak)
 - e. Activate high temperature detectors in the elevator machine room. Verify all sequences including elevator shunt off, elevator recall including alternate floors when main floor is in alarm.
 - f. Activate all sprinkler flow switches. Validate that appropriate zone enunciates and alarms sound.

- g. Verify audio aspects of the system function as required. Verify paging messages can be heard throughout the building.
 - h. For enunciator panels, validate correct graphic and correct identification of all zones. Test the action and interlocks of all override switches as appropriate
4. For Operator Interfaces:
- a. Verify all elements on the graphics are functional and properly bound to physical devices and/or virtual points and that hot links or page jumps are functional and logical.
 - b. Output all specified reports for review and approval.
 - c. Verify the alarm printing and logging is functional and per requirements
 - d. Validate all interfaces with other systems on a point by point basis
5. Training: Train Owner's maintenance personnel on procedures and schedules related to start up and shutdown, troubleshooting, servicing, and preventative maintenance as specified in technical specification sections.
- FF. Landscape Irrigation Functional Performance Test
- 1. Participants shall include CxA and Landscape Contractor.
 - 2. Sample: All irrigation controllers, 20% (of zones coverage test using thermographic camera for bubblers), max failure limit 0%.
 - 3. Check irrigation controller schedule and zone settings and record to verify conformance with approved schedules and settings.
 - 4. CxA shall review as-built drawings, pressure test documentation for drip emitters and inline drip tubing and confirm valves have been adjusted, heads aligned and coverage has been adjusted for each zone.

3.07 DOCUMENTATION, NONCONFORMANCE AND APPROVAL OF TESTS

- A. Documentation: The Commissioning Agent will witness, and document the results of all Systems Functional Performance Tests using the specific procedural forms developed by the Commissioning Agent for that purpose. Prior to testing, the Commissioning Agent will provide these forms to the CM and the CxC for review and approval. The Contractor shall include the filled out forms with the O&M manual data.
- B. Nonconformance: The Commissioning Agent will record the results of the Systems Functional Performance Tests on the procedure or test form. All items of nonconformance issues will be noted and reported to the CM/CxC on Commissioning Field Reports and/or the Commissioning Master Issues Log.
 - 1. Corrections of minor items of noncompliance identified may be made during the tests. In such cases, the item of noncompliance and resolution shall be documented on the Systems Functional Test Procedure.
 - 2. Every effort shall be made to expedite the systems functional Performance Testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the Commissioning Agent shall not be pressured into overlooking noncompliant work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so by direction from the CM.
 - 3. As the Systems Functional Performance Tests progresses and an item of noncompliance is identified, the Commissioning Agent shall discuss the issue with the Contractor and the VA.
 - 4. When there is no dispute on an item of noncompliance, and the Contractor accepts responsibility to correct it:
 - a. The Commissioning Agent will document the item of noncompliance and the Contractor's response and/or intentions. The Systems Functional

- Performance Test then continues or proceeds to another test or sequence. After the day's work is complete, the Commissioning Agent will submit a Commissioning Field Report to the CM. The Commissioning Agent will also note items of noncompliance and the Contractor's response in the Master Commissioning Issues Log. The Contractor shall correct the item of noncompliance and report completion to the CM and the Commissioning Agent.
- b. The need for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test and the test shall be repeated.
5. If there is a dispute about item of noncompliance, regarding whether it is an item of noncompliance, or who is responsible:
 - a. The item of noncompliance shall be documented on the test form with the Contractor's response. The item of noncompliance with the Contractor's response shall also be reported on a Commissioning Field Report and on the Master Commissioning Issues Log.
 - b. Resolutions shall be made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive and acceptance authority is with the CM.
 - c. The Commissioning Agent will document the resolution process.
 - d. Once the interpretation and resolution have been decided, the Contractor shall correct the item of noncompliance, report it to the Commissioning Agent. The requirement for retesting will be determined by the Commissioning Agent. If retesting is required, the Commissioning Agent and the Contractor shall reschedule the test. Retesting shall be repeated until satisfactory performance is achieved.
- C. Cost of Retesting: The cost to retest a System Functional Performance Test shall be solely the responsibility of the Contractor. Any required retesting by the Contractor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.
- D. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform in compliance with the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance specifications, all identical units may be considered unacceptable by the CM. In such case, the Contractor shall provide the CM with the following:
1. Within one week of notification from the CM, the Contractor shall examine all other identical units making a record of the findings. The findings shall be provided to the CM within two weeks of the original notice.
 2. Within two weeks of the original notification, the Contractor shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
 3. The CM shall determine whether a replacement of all identical units or a repair is acceptable.
 4. Two examples of the proposed solution shall be installed by the Contractor and the CxA shall be allowed to test the installations for up to one week, upon which the CxA will decide whether to accept the solution.
 5. Upon acceptance, the Contractor shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

- E. Approval: The Commissioning Agent will note each satisfactorily demonstrated function on the test form. Formal approval of the Systems Functional Performance Test shall be made later after review by the Commissioning Agent and by the CM. The Commissioning Agent will evaluate each test and report to the CM using a standard form. The CM will give final approval on each test using the same form, and provide signed copies to the Commissioning Agent and the Contractor.

3.08 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

- A. Training Preparation Conference: Before operation and maintenance training, CxA shall convene a training preparation conference to include Owner's operation and maintenance personnel, Contractor, and subcontractors. Perform the following:
1. Review installed systems, subsystems, and equipment.
 2. Review instructor qualifications.
 3. Review instructional methods and procedures.
 4. Review training module outlines and contents to ensure it meets the specific maintenance personnel requirements.
 5. Review course materials (including operation and maintenance manuals).
 6. Inspect and discuss locations and other facilities required for instruction.
 7. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
 8. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable
- B. Training of Owner Personnel
1. Provide the CxA with training agendas and schedule at least two weeks before the planned training.
 2. Provide designated Owner personnel with comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of commissioned electrical equipment or system.
 3. Training shall start with classroom sessions, if necessary, followed by hands-on training on each piece of equipment, which shall illustrate the various modes of operation, including start-up, shutdown, fire/smoke alarm, power failure, etc.
 4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system will be repaired or adjusted as necessary and the demonstration repeated.
 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. This person may be the start-up technician for the piece of equipment, the installing contractor or manufacturer's representative. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
 6. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
 7. Training shall include:
 - a. Use the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - b. Include a review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shutdown, seasonal changeover and any emergency procedures.
 - c. Discuss relevant health and safety issues and concerns.

- d. Discuss warranties and guarantees.
 - e. Cover common troubleshooting problems and solutions.
 - f. Explain information included in the O&M manuals and the location of all plans and manuals in the facility.
 - g. Discuss any peculiarities of equipment installation or operation.
 - h. Classroom sessions shall include the use of overhead projections, slides, video and audio taped material as might be appropriate.
- 8. Hands-on training shall include start-up, operation in all modes possible, including manual, shutdown and any emergency procedures and maintenance of all pieces of equipment.
 - 9. Training shall occur after functional testing is complete, unless approved otherwise by the Project Manager.

C. BAS Demonstration and Orientation

- 1. The intent of the demonstration and orientation is to provide the Owner, Testing Contractor, and Commissioning Authority with a reasonable level of assurance that the system is complete and ready for functional performance testing, and to provide an initial orientation to the system configuration, set-up, features, and commissioning related procedures.
- 2. Demonstrate the operation of a sampling of the BAS hardware, software, and all related components and systems to the satisfaction of the CxA. Schedule the demonstration with the Owner's representative 2 weeks in advance. Demonstration shall not be scheduled until all hardware and software submittals, and the Pre-functional Test Reports are approved. If in the judgment of the CxA the Work fails to be demonstrated to be complete and ready for functional testing, so as to require additional site visits by the CxA for re-demonstration, Contractor shall reimburse Owner for all costs of subsequent CxA site visits for demonstration.
- 3. The Contractor shall supply all personnel and equipment for the demonstration, including, but not limited to, instruments, ladders, etc. Contractor supplied personnel shall be competent with and knowledgeable of all project-specific hardware, software, and the HVAC systems. All documentation and submittals shall be at the job site.
- 4. The system shall be demonstrated following the same procedures used in the Pre-functional Test. Demonstration shall include, but not necessarily be limited to, the following:
 - a. Demonstrate that all required software is installed on workstations. Demonstrate that all graphic screens, alarms, trends, and reports are installed as submitted and approved.
 - b. Demonstrate that a sampling of points specified and shown can be interrogated and/or commanded (as applicable) from all workstations, as specified.
 - c. Demonstrate that remote dial-up communication abilities (as applicable) are in accordance with contract requirements.
 - d. Demonstrate correct calibration and calibration procedure for a sampling of input/output devices selected by the Owner and CxA.
 - e. Demonstrate that all DDC and other software programs exist at respective field panels. The Direct Digital Control (DDC) programming and point database shall be as submitted and approved.
 - f. Demonstrate that all DDC programs accomplish the specified sequences of operation.
 - g. Demonstrate that the panels automatically recover from power failures, as specified.

- h. Demonstrate that the stand-alone operation of panels meets the requirements of these Specifications. Demonstrate that the panels' response to LAN communication failures meets the requirements of these Specifications.
- 5. See Division 23 for control technician time for demonstration time to include in project price. Additional time required for repeating demonstration of control system because of initial failure shall be provided at no cost to the Owner.
- 6. Failure of any of the above items shall be noted as part of the functional testing, and failed items shall be corrected to conform to contract requirements.
- 7. BAS Demonstration shall be completed prior to functional performance testing and Substantial Completion.

3.09 Performance Period

- A. Upon successful completion of functional acceptance tests, a performance period of 10 consecutive calendar days shall commence on first day following the last acceptance test. This period shall be completed prior to final acceptance of the project. In event of failure to meet standard of performance during any initiated performance period, it is not required that one 10-calendar day period expire in order for another performance period to begin.
- B. If equipment or system operate and demonstrate continuing compliance with specified requirements for period of 10 consecutive calendar days from commencement date of performance period, it shall be deemed to have met the standard of performance.
- C. Equipment will not be accepted by the Owner and final payment will not be made by the Owner until acceptable performance is met.
- D. Contractor shall provide Commissioning Authority with trend logs of the system performance for the control variables and set point in each control process in 15-minute time intervals.
- E. Systems shall be first tested as independent building systems followed by tests of systems tied into Owner's systems. Types of Owner's systems include, but are not limited to, central plant heating and cooling; off-site security / alarm monitoring; and campus automated controls systems.
- F. Upon Contractor's completion of the requirements of the commissioning plan and the successful completion of the performance period, and receipt of the required documentation, the Commissioning Authority shall provide the Owner with a statement of acceptable performance.
- G. Operational Test: Prior to the start of functional performance testing, the system shall operate properly for two weeks without malfunction, without alarm caused by control action or device failure, and with smooth and stable control of systems and equipment in conformance with these specifications. At the end of the two weeks, contractor shall forward the trend logs to the CxA for review. CxA shall determine if the system is ready for functional performance testing and document any problems requiring contractor attention.
 - 1. If the systems are not ready for functional performance testing, Contractor shall correct problems and provide notification to the Owner's representative that all problems have been corrected. The Acceptance Period shall be restarted at a mutually scheduled time for an additional one week period. This process shall be repeated until Commissioning Authority issues notice that the BAS is ready for functional performance testing.
 - 2. During the Operational Test, the contractor shall maintain a hard copy log of all alarms generated by the FMS. For each alarm received, contractor shall diagnose the cause of the alarm, and shall list on the log for each alarm, the diagnosed cause of the alarm, and the corrective action taken. If in the contractor's opinion, the cause of the alarm is not the responsibility of the contractor, contractor shall immediately notify the Owner's representative.

3. During the Acceptance Phase, the contractor shall maintain all controller network and workstation hardware and software in a state that will allow remote access by CxA to Trend Logs as specified below.

H. Trend Logs

1. Trend logs are databases of ASCII characters (usually numbers) representing a historical record of the systems operation. Contractor shall establish and store these trend logs.
2. Trend logs shall be set up for all control system points on an average of 15 minute intervals or change of value thresholds as approved by CxA. BAS contractor must design panel and network loading to accommodate this trending without adversely impacting the control system functionality.
3. CxA will analyze trend logs of the system operating parameters to evaluate normal system functionality. Contractor shall establish these trends, ensure they are being stored properly, and forward the data in electronic format to the CxA.
4. Data shall include a single row of field headings and the data thereafter shall be contiguous. Each record shall include a date and time field. Recorded parameters for a given piece of equipment or component shall be trended at the same intervals and be presented in a maximum of two separate two dimensional formats with time being the vertical axis and field name being the horizontal axis.. Data shall be forwarded in one of the following formats.
 - a. Microsoft ACCESS Database (.mdb)
 - b. Microsoft EXCEL Spreadsheet (.xls)
 - c. Comma Separated Value (.csv or .txt) preferably with quotes delimiting text fields and # delimiting date/time fields
5. If sample times are trended as COV or change of value, when output to the trending file, the latest recorded value shall be listed with any given time increment record. If the system does not have the capability to fill the archive with the latest value, the parameter shall be recorded based on the interval common to the unit.
6. Contractor shall provide the CxA with required passwords, phone numbers, etc. to allow the CxA access to the trend log data and allow downloading to a remote location. Contractor shall also provide step-by-step written instructions for accessing the data.

3.10 DEFERRED TESTING

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the project completion level, required occupancy condition or other deficiency, execution of checklists and performance testing may be delayed upon approval of the CxA. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated.
- B. Seasonal Testing: During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity through the Owner/CM. Tests will be executed, documented by the CxA and deficiencies should be corrected by the appropriate contractor/ subcontractors with the CxA witnessing. Any final adjustments to the O&M manuals and as-built drawings due to the testing shall be made by the contractor.

3.11 Warranty Review

- A. During the first year of the system and buildings' operation, it is important to assure that the performance of the facility is maintained, particular before the warranty period expires. At 22 months into a 24 month warranty period, operation of system and components is reviewed by the Owner, Contractor, and the CxA to identify any items that

must be repaired or replaced under warranty. CxA will also interview building operating personnel to identify any outstanding warranty failures and any persistent equipment failures that should be handled within the warranty period. This review is based on warranty items and continued performance with Owner's project Requirements. The CxA will document the results and forwards recommendations to Owner and Contractor for resolution.

END OF SECTION 019113

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SECTION 024000 - DEMOLITION

1. PART 1 - GENERAL

1.1 SUMMARY

- A. Removing above- and below-grade site improvements within limits indicated.
- B. Disconnecting, capping or sealing, and abandoning site utilities in place.
- C. Disconnecting, capping or sealing, and removing site utilities.
- D. Disposing of objectionable material.

1.2 RELATED SECTIONS

- A. Section 31 11 00 – Clearing and Grubbing.
- B. Section 31 23 00 – Excavation and Fill.

1.3 DEFINITIONS

- A. ANSI: American National Standards Institute.
- B. CAL-OSHA: California Occupational Safety and Health Administration.

1.4 SUBMITTALS

- A. Follow Submittal procedure outlined in Section 01 30 00 – Submittal Procedures.

1.5 PROJECT CONDITIONS

- A. Except for materials indicated to be stockpiled or to remain the Owner's property, cleared materials are the Contractor's property. Remove cleared materials from site and dispose of in lawful manner.
- B. Salvable Improvements: Carefully remove items indicated to be salvaged and store where indicated on plans or where designated by the Owner. Avoid damaging materials designated for salvage.
- C. Unidentified Materials: If unidentified materials are discovered, including hazardous materials that will require additional removal other than is required by the Contract Documents, immediately report the discovery to the Owner. If necessary, the Owner will arrange for any testing or analysis of the discovered materials and will provide instructions regarding the removal and disposal of the unidentified materials.

2. PART 2 - PRODUCTS

2.1 SOIL MATERIALS

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- A. Backfill excavations resulting from demolition operations with on-site or import materials conforming to structural backfill defined in Section 31 23 00 Excavation and Fill.

3. PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points during construction.
- B. Protect existing site improvements to remain during construction.

3.2 RESTORATION

- A. Restore damaged improvements to their original condition, as acceptable to the Owner.

3.3 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed or abandoned.
- B. Arrange to shut off indicated utilities with utility companies or verify that utilities have been shut off.
- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless authorized in writing by the Owner, and then only after arranging to provide temporary utility services according to requirements indicated.
- D. Coordinate utility interruptions with utility company affected.
- E. Do not proceed with utility interruptions without the permission of the Owner and utility company affected. Notify Owner and utility company affected two working days prior to utility interruptions.
- F. Excavate and remove underground utilities that are indicated to be removed.
- G. Securely close ends of abandoned piping with tight fitting plug or wall of concrete minimum 6-inches thick.

3.4 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, pile caps, piles, paving, curbs, and gutters, as indicated. Where concrete slabs, curb, gutter and asphalt pavements are designated to be removed, remove bases and subbase to surface of underlying, undisturbed soil.
- C. Unless the existing full-depth joints coincide with line of pavement demolition, neatly saw-cut to full depth the length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

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- D. Remove driveways, curbs, gutters and sidewalks by saw cutting to full depth. If saw cut falls within 30-inches of a construction joint, expansions joint, score mark or edge, remove material to joint, mark or edge.

3.5 BACKFILL

- A. Place and compact material in excavations and depressions remaining after site clearing in conformance with Section 31 23 00 Excavation

3.6 DISPOSAL

- A. Remove surplus obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off the Owner's property.

3.7 Construction Waste Management

- A. Construction Waste shall be managed in accordance with provisions of Section 01 74 19 Construction Waste Management and Disposal. Documentation shall be submitted to satisfy the requirements of that section.

END OF SECTION 024000

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SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Concrete for composite floor construction.
- C. Concrete for foundation pile caps.
- D. Floors and slabs on grade.
- E. Concrete reinforcement.
- F. Joint devices associated with concrete work.
- G. Concrete curing.

1.02 REFERENCE STANDARDS

- A.0 2016 CBC Chapter 19A ~~17A~~
- A.1 ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials; 2010.
- B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).
- C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete; 1998 (Reapproved 2004).
- D. ACI 301 - Specifications for Structural Concrete; 2010 (Errata 2012).
- E. ACI 302.1R - Guide for Concrete Floor and Slab Construction; 2004 (Errata 2007).
- F. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000.
- G. ACI 305R - Hot Weather Concreting; 2010.
- H. ACI 306R - Cold Weather Concreting; 2010.
- I. ACI 308R - Guide to Curing Concrete; 2001 (Reapproved 2008).
- J. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; 2014 (Errata 2016).
- K. ACI 347R - Guide to Formwork for Concrete; 2014.
- L. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
- M. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement; 2016.
- N. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2015.
- O. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field; 2015ae1.
- P. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2016.
- Q. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2016b.
- R. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2016a.
- S. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- T. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2016.

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- U. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- V. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2011.
- W. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2014.
- X. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2016.
- Y. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2015.
- Z. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2014.
- AA. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2016.
- AB. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014a.
- AC. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete; 2011.
- AD. ASTM C1582/C1582M - Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete; 2011.
- AE. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types); 2004 (Reapproved 2013).
- AF. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction; 2004a (Reapproved 2013).
- AG. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting; 2015.
- AH. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2013).
- AI. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2014a.
- AJ. ASTM E1155 - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers; 2014.
- AK. ASTM E1155M - Standard Test Method for Determining F(F) Floor Flatness and F(L) Floor Levelness Numbers (Metric); 2014.
- AL. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.
- AM. COE CRD-C 513 - COE Specifications for Rubber Waterstops; 1974.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
- D. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Custom shop drawings shall be produced by or for supplier and shall include uniquely created erection/placement details for all project conditions as required. Copies of or references to Contract Drawings shall not be accepted.

1.04 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- E. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- F. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 2. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
 - 3. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
- B. Low-Alloy Reinforcing Steel: ASTM A706/A706M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
- C. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
- D. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I or II Portland type.
- B. Fine and Coarse Aggregates: ASTM C 33.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Fly Ash: ASTM C618, Class F, ACI 318 26.4.2.2 Max 25%.
- E. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Accelerating Admixture: ASTM C494/C494M Type C.
- H. Retarding Admixture: ASTM C494/C494M Type B.
- I. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder: Multi-layer, fabric-, cord-, grid-, or aluminum-reinforced polyethylene or equivalent, complying with ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. The use of single ply polyethylene is prohibited.
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Grout: Comply with ASTM C1107/C1107M.
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

2.06 BONDING AND JOINTING PRODUCTS

- A. Waterstops: Rubber, complying with COE CRD-C 513.
- B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 - 1. Material: ASTM D1751, cellulose fiber.
 - 2. Material: ASTM D1752 sponge rubber (Type I).

2.07 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
- C. Moisture-Retaining Sheet: ASTM C171.
 - 1. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch.
 - 2. White-burlap-polyethylene sheet, weighing not less than 10 ounces per linear yard, 40 inches wide.
- D. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
 - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- C. Normal Weight Concrete:

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1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on drawings.
 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
- D. Structural Lightweight Concrete:
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: As indicated on drawings.

2.09 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- C. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Architect not less than 24 hours prior to commencement of placement operations.
- D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement drawings prepare joint surface per contract drawings.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.05 SLAB JOINTING

- A. Locate joints as indicated on the drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

- D. Load Transfer Construction and Contraction Joints: Install load transfer devices as indicated; saw cut joint at surface as indicated for contraction joints.
- E. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.06 SEPARATE FLOOR TOPPINGS

- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.

3.07 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
 - 1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
 - 2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
 - 3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
 - 4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
- B. Measure F(F) Floor Flatness and F(L) Floor Levelness in accordance with ASTM E1155 (ASTM E1155M), within 48 hours after slab installation; report both composite overall values and local values for each measured section.
- C. Correct the slab surface if composite overall value is less than specified and if local value is less than two-thirds of specified value or less than F(F) 13/F(L) 10.
- D. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.08 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 - 1. Smooth Rubbed Finish: Not more than 24 hours after form removal, wet concrete and rub with carborundum brick or other abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. Color of dry grout to match adjacent surfaces. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
 - 3. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float. Color of dry grout to match adjacent surfaces.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Surfaces to Receive Thick Floor Coverings: "Wood float" as described in ACI 302.1R; thick floor coverings include quarry tile, ceramic tile, and Portland cement terrazzo with full bed setting system.
 - 2. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
 - 3. Decorative Exposed Surfaces: Trowel as described in ACI 302.1R; use steel-reinforced plastic trowel blades instead of steel blades to avoid black-burnish marks; decorative exposed surfaces include surfaces to be stained or dyed, pigmented concrete, surfaces to receive liquid hardeners, surfaces to receive dry-shake hardeners, surfaces to be polished, and all other exposed slab surfaces.

3.09 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 - 1. Normal concrete: Not less than 7 days.
 - 2. High early strength concrete: Not less than 3 days.
- C. Surfaces Not in Contact with Forms:
 - 1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
 - 2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - 3. Final Curing: Begin after initial curing but before surface is dry.

3.10 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.11 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.12 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

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SECTION 033010 - CAST-IN-PLACE CONCRETE FOR LANDSCAPE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. Related Sections:
 - 1. Section 321313 "Concrete Paving" for surface finish.
 - 2. Section 018113 Sustainable Design Requirements

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for SSc7.1: Provide documentation stating SRI value of hardscape.
 - 2. Product Data for credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and point of extraction, with cost, and LEED Product Submittal Cover Sheet.
 - 3. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 4. Product Data for Credit IEQ 4.3: For curing and sealing compounds, documentation including printed statement of VOC content.
- C. Design Mixtures: For each concrete mixture.
- D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.
- E. Samples: Provide a 3' tall x 3' long x 8" wide job site sample of each site wall finish specified, for review and approval by Owner's Representative prior to installation. Sample shall represent final appearance of the site wall, including construction joints and any stain, sealer or other surface applications. Provide additional samples until finish is considered acceptable by the Owner's Representative, at no additional cost to the Owner. The approved sample shall serve as a standard of appearance for the final work to be produced and shall remain on site until all site walls have been reviewed and approved by the Owner's Representative.

1.3 INFORMATIONAL SUBMITTALS

- A. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly and support of formwork.
- B. Material certificates.
- C. Material test reports.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, deformed.
 - 1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class I zinc coated after fabrication and bending.
 - 2. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- E. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from galvanized-steel wire into flat sheets.
- F. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, deformed steel.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

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1. Portland Cement: ASTM C 150, gray.
 2. Blended Hydraulic Cement: ASTM C 595, cement.
- B. Normal-Weight Aggregates: ASTM C 33, graded.
1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C 330, 1/2 inch nominal maximum aggregate size.
- D. Water: ASTM C 94/C 94M and potable.

2.4 ADMIXTURES

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

2.5 FIBER REINFORCEMENT

- A. Synthetic Micro-Fiber: Fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1/2 to 1-1/2 inches long.

2.6 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
- B. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
- C. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
- D. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
- E. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 millimeters thick.

2.8 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz. /sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 - 1. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.9 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

2.10 CONCRETE MIXTURES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of Portland cement, which would otherwise be used, by not less than 50 percent per (ACI 318-14 26.4.2.2).
- C. Admixtures: Use admixtures according to manufacturer's written instructions.

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1. Use water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

D. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days, unless otherwise indicated on the contract drawings.
2. Maximum Water-Cementitious Materials Ratio: 0.50.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
7. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 pound /cubic yards.

E. Proportion structural lightweight concrete mixture as follows:

1. Minimum Compressive Strength: 3000 psi at 28 days, unless otherwise indicated on the contract drawings.
2. Calculated Equilibrium Unit Weight: 115 lb. /cubic feet, plus or minus 3 pound /cubic feet, as determined by ASTM C 567.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than 3/8 inch.
5. Air Content: 7 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size 3/8 inch or less.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
7. Synthetic Micro-Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 pound /cubic yard.

2.11 FABRICATING REINFORCEMENT

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

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

2.13 ACCESSORIES

- A. Pre-emergent Herbicide: Surflan.
- B. Integral Color (Non-immersion Conditions: L.M. Scofield Chromix or approved equal.

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- C. Chemical Surface Retarder: 'Top-Cast' by Grace Construction Products.
- D. Liquid Surface Sealer: 'HLQ-125 by Sinak Corporation.
- E. Patch Bond: Weld-Crete.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer or radius exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Waterstops: Install in construction joints and at other joints indicated according to manufacturer's written instructions.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.7 CONCRETE FINISHING

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

3.8 CONCRETE PROTECTION, CURING AND SEALING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 pound/square foot x height before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Concrete surface sealer: All concrete paving shall be sealed with a clear penetrating concrete sealer. If efflorescence or alkali-staining is evident after the concrete has cured, lightly wash the surface with a mild muriatic acid solution (usually a 10:1 dilution) that has been thoroughly rinsed with water and cleaned with diluted Lithochrome Floor Cleaner by L.M. Scofield, or approved equal. Rinse again and dry thoroughly. After concrete mix has cured for at least one month, the concrete surface shall be thoroughly washed with fresh, clean water. After surface is thoroughly dried, apply 'HLQ-125' as manufactured by SINAK Corporation, or approved equal, per manufacturer's specifications.

3.9 CONCRETE SURFACE REPAIRS

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

3.10 FIELD QUALITY CONTROL

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

END OF SECTION 033000

SECTION 033500 – ARCHITECTURAL CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Finishing of exposed formed concrete.
 - 2. Final slab finishing and curing.
 - 3. Tooled joints.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division-3 section "Cast-In-Place Concrete" for structural requirements.

1.2 DEFINITIONS:

- A. Flatness: Degree to which surface approximates plane.
- B. Levelness: Degree to which line or surface parallels horizontal. Horizontal is normal to direction of gravity.
- C. Envelope: Vertical distance between two level lines or planes.
- D. Specified Overall Value: Composite value of samples taken at given level, regardless of number of concrete placements required to complete level. Specified overall F numbers represent minimum values allowed for entire floor, looked at as whole.
- E. Minimum Local Value: Minimum local F(F) or F(L) value at given level, taken within one floor test area defined as Minimum Local Area. Boundaries of Minimum Local Areas may not cross construction joints. For slabs-on grade, Minimum Local Area will be bounded by construction and/or control joints, or by column lines and half-column lines, whichever is smaller. For elevated slabs, Minimum Local Area will be bounded by column lines and/or half-column lines.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.

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7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Tolerances:

1. Tolerances for Concrete Construction and Materials shall conform to requirements of ACI 117 (1), "Standard Specifications for Tolerance for Concrete Construction and Materials, ACI 301, Specification for Structural Concrete for Buildings, and ACI 302, Guide for Concrete Floor and Slab Construction, except as modified by requirements of these Contract Documents. Form offsets may conform to ACI 117, Section 4.5.4, except this shall not operate to relieve Contractor of providing specified finish of formed surfaces.
2. Floor finish tolerances for surfaces designated to receive troweled finish shall be measured in accordance with ACI 117 (2), Section 4.5.6, except as modified by these Contract Documents. Refer to Division-3 section "Cast In-Place Concrete" for screeding and crack control requirements, related suggestions, and for Flatness and Levelness Inspection, and curing requirements.

C. Regulatory Requirements:

1. Comply with all applicable requirements of the laws, codes, ordinances and regulations of Federal, Regional, and State authorities having jurisdiction. Obtain necessary approvals from all such authorities.
2. Comply with South Coast Air Quality Management District (SCAQMD) regulations controlling use of volatile organic compounds (VOC's)

1.4 SUBMITTALS

A. Product Data: Submit for the following:

1. Continuous inserts for crack control.
2. Curing-sealer-hardener.
3. Bonding agents.
4. Concrete topping products.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.

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- Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 3. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Crack Control Joint Locations in Slabs-on-Grade: Submit plan showing location of proposed construction joints and control joints for review by the Architect (AOR) prior to concrete slab on grade placement. Include proposed time frame for installation of control joints if by sawcutting methods as specified herein.
- D. Site Samples: Prepare Samples at the site, cast in approved locations and orientations. Prepare as many Samples of each type of concrete as are required for approval. Remove Samples from the site when no longer needed and removal is approved. Approved Samples may be part of permanent construction if meeting all other requirements shown and specified and are so approved. Use form and concrete materials previously approved under Division-3 sections "Concrete Formwork" and "Cast-In-Place Concrete".
1. Slab Samples: Prepare minimum 4-foot square Samples of each required slab finish excluding only monolithic trowel and steel float finishes. Include a transverse expansion joint, scoring, and edging.

1.5 WARRANTY

- A. Installer's Warranty: 2 years.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 FINISHING EXPOSED FORMED CONCRETE

- A. Surface patching and initial curing of formed concrete are specified in Division-3 section "Cast-In-Place Concrete". Rub surfaces with a carborundum brick or equal until smooth and free of form marks, offsets, and other defects, and in uniform planes. Wet rubbed surface and then brush coat with cement grout consisting of 1 part light-colored Portland cement to 2 parts fine aggregate and mixed with water to the consistency of thick paint. Cork or wood float grout to fill all pits, air bubbles, and surface holes. Scrape off excess grout and rub surface with burlap or equal to remove all grout film. After grout sets, again coat with same grout, cure, then brick and burlap rub as necessary to eliminate remaining defects and blemishes, and damp cure surfaces for not less than 3 days or longer if required for complete curing of concrete. Finish, clean, and cure each surface as a continuous operation. Produce uniformly plane smooth surfaces free of grout film, grout or rubbing marks, defects, or blemishes after painting or covering with a flexible type

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finish material. Unless otherwise indicated or specified, apply this finish on exposed formed concrete, exposed concrete at the building foundation, and where indicated or scheduled.

3.2 SLAB FINISHES

- A. Concrete slabs shall be level or sloped as indicated with maximum deviation as listed below. Keep surface moist with a fine fog spray of water as necessary. Dusting with dry cement or sand during finishing operations is prohibited. Finish slab edges and joints with an edging tool. Match approved Sample panels. Conform to the following requirements and apply the following finishes as indicated, specified, approved, and applicable.
- B. Slab Finishing:
1. Refer to Division-3 section "Cast-In-Place Concrete" for screeding requirements at elevated slabs.
 2. After concrete has been placed, struck off, consolidated, and restraightened, concrete shall not be worked further until ready for floating. Restraightening operation is best accomplished by use of 8 foot to 10 foot wide bull float. Power floating operations shall begin when the water sheen has disappeared, and when the mix has stiffened sufficiently to permit proper operation of power-driven float.
 3. Consolidate surface with power-driven floats. Hand floating with wood or cork faced floats shall be used in locations inaccessible to power driven machine. Surface shall be restraightened at this stage with ten foot highway straightedge applied at not less than two different angles.
 4. Finish surfaces to tolerances of F(F)-18 (floor flatness) and F(L)-15 (floor levelness) measured according to ASTM E 1155. Minimum Local Value of F(F)-15 and F(L)-10.
 5. High spots shall be cut down and low spots filled during this procedure to produce planes checking true under straightedge in any direction. Uniformly slope surfaces to drains where occurs.
 6. Restraightening operation shall be followed by final float pass to uniform, smooth, granular texture.
- C. Sacking:
1. Exposed concrete curbs, walls, and other surfaces shall be sacked by an application of Portland cement grout, floated, and rubbed. Sacking shall not be performed until patching and filling of holes has been completed. Entire sacking operation for any continuous area shall be started and completed within the same day.
 2. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having consistency of thick paint. Wet surface of concrete sufficiently to prevent absorption of water from grout. Apply grout uniformly with a brush or spray gun, then immediately float surface with a cork or other suitable float, scouring wall vigorously.
 3. While grout is still plastic, finish surface with a sponge-rubber float, removing excess grout. Allow surface to dry thoroughly, then rub vigorously with dry burlap to completely remove dried grout. No visible film or grout shall remain after rubbing with burlap.
- D. Rough Slab Finish: Apply to monolithic slab surfaces to receive trowel finish, unbonded concrete floor topping, and other finishes as specified.
- E. Steel Trowel Finish: Apply to monolithic slab surfaces exposed to view and slab surfaces to be covered with membrane waterproofing, membrane roofing, mortar setting bed for tile resilient flooring, carpet, paint, or other thin-film finish coating system.

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1. First stages of producing trowel finish shall match procedures described for rough finish.
 2. Perform first trowel finish operation with power-driven trowel to produce smooth surface which is relatively free to defects but may still contain some trowel marks. Additional trowelings with power-driven trowel may be necessary.
 3. Perform final troweling with hand trowels after surface has hardened sufficiently to produce ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand troweling operation, free of trowel marks, and uniform in texture and appearance.
 4. Finish surfaces to F(F) and F(L) tolerances specified herein.
 5. Repair defects of sufficient magnitude to telegraph through floor covering by grinding or by application of topping. Refer to Remedy For Out of-Tolerance Floor Surfaces for additional remedial measures.
 6. Apply on following areas and surfaces:
 - a. Resilient floor covering areas.
 - b. Carpet tile areas.
 - c. Elastomeric coating areas.
 - d. Traffic deck coating areas.
 - e. Thin-set tile areas.
 - f. Roof slabs.
 - g. Slabs to receive membrane waterproofing.
 - h. Slabs to receive fluid-applied waterproofing.
- F. Float Finish: Same as for monolithic steel trowel finish less the second retroweling. When ready, apply approved coarse texture finish with a trowel. At walking areas, smooth finish 1" wide at edges, expansion joints, and scoring. Apply on the following surfaces unless otherwise indicated:
1. Exterior vehicle traffic slabs and ramps.
 2. Exterior concrete walks.
 3. Other slabs where indicated or approved by Architect (AOR).
- G. Fine-Broom Finish: Apply first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- H. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- 3.3 SLABS WITH TOPPINGS
- A. Floor Toppings: Place bonded and unbonded topping slabs indicated, conforming to following guidelines:
1. Bonded Toppings: Topping slabs less than 3 inches thick shall be considered to be bonded toppings unless specifically indicated otherwise. Topping slabs 3 inches thick and greater at conditions exposed to exterior weathering are considered as bonded toppings. Prepare for placement of bonded topping slabs as follows:
 - a. Finish surface of base concrete shall consist of "scratch finish" obtained when base course is partially set by brushing with coarse wire broom.

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- b. If base course has not been prepared with noted "scratch finish", then roughen surface by sandblasting or other approved mechanical methods to achieve surface amplitude of 1/8 inch.
 - c. Remove deteriorated concrete, dirt, oil, grease, dust, and other bond-inhibiting materials from surface.
 - d. Dampen surface with clean water. Surface should be at moisture condition of saturated surface dry with no standing or glistening water at time of topping placement.
 - e. Use following concrete topping products for topping thicknesses indicated:
 - 1) 1/2-inch to 1 inch: Polymer-Modified Cementitious Mortar.
 - 2) Greater than 1 inch but less than 3 inches: Polymer Modified Cementitious Concrete with 3/8 inch maximum aggregate
 - 3) 2 inch protection slab: Sand cement slurry mix with a minimum strength of 1000 psi.
 - 4) 3 inches and greater: Conventional Concrete as specified in Drawings with bonding compound applied to base concrete.
 - a. No concrete topping shall be less than 1/2 inch in total thickness.
2. Unbonded Toppings: Topping slabs 3 inches thick and greater shall be conventional concrete unless noted otherwise. Prepare for placement of unbonded topping slabs as follows:
- a. Broom and vacuum clean base surface to receive topping.
 - b. Use conventional concrete as specified in Drawings.
 - c. Locate construction joints directly over base slab construction joints. Tool edges.
 - d. Roughen to 1/4-inch amplitude all surfaces against which additional concrete is to be placed.
3. Application of topping or underlayment:
- a. Prime floor surface as recommended by topping or underlayment manufacturer.
 - b. Add aggregate for thicker areas as recommended by topping or underlayment manufacturer.
 - c. Install in accordance with manufacturer's directions.
 - d. For areas which are to have finish flooring, use self-leveling concrete underlayment.
 - e. For areas that will be exposed as wearing surface, use self-leveling concrete topping.

3.4 FIELD QUALITY CONTROL

A. Floor Tolerance Measurements:

1. Requirements, criteria, and time period for measuring and reporting for Flatness and Levelness Inspection of Floor Slabs is specified in Division-3 section "Cast In-Place Concrete".
2. Where normal data collection under provisions of ASTM E1155 indicates possibility of work below Minimum Local Value, additional data may be required to confirm extent, or boundary, of that defective work. If area is identified as not meeting specified Minimum Local Value, area in question shall be replaced or repaired in accordance with provisions of Remedy For Out-of-Tolerance Floor Surfaces, along Minimum Local Area boundaries.
3. Correct work that does not meet specified tolerances required herein. Refer to Remedy For Out-of-Tolerance Floor Surfaces.
4. Additional testing to confirm boundary of defective or out of-tolerance work shall be at Contractor's expense.
5. Contractor shall include additional concrete required to achieve specified slab surface tolerances. Refer to Division-3 section "Cast-In-Place Concrete".

6. Finish Tolerances: Floor slabs and concrete toppings designated to receive troweled finish shall conform to following ACI F-number requirements: Floor levelness, F(L), does not apply to elevated slabs on metal deck and steel beam framing system. Floor levelness, F(L), does apply to concrete toppings over elevated slab surfaces.
 - a. Slabs-on-Grade, Concrete topping over slabs-on-grade:
 - 1) Typical values, unless noted otherwise:
 - a) Specified Overall Value: F(F)-25/F(L)-20.
 - b) Minimum Local Value: F(F)-17/F(L)-14.
 - 2) To receive thin set tile or resilient flooring:
 - a) Specified Overall Value: F(F)-35/F(L)-20.
 - b) Minimum Local Value: F(F)-27/F(L)-14.

B. Floor Elevation Tolerances:

1. When tested in accordance with requirements of ASTM E 1155, following percentages of elevation samples on floor slabs at single elevation shall fall within level 3/4 inch envelope centered about mean elevation of readings.
 - a. Slabs on Grade: 85 percent.
2. Arithmetic mean of these elevation samples shall not deviate from design grade more than following amounts:
 - a. Slabs-on-Grade: 1/4 inch, plus or minus.

3.5 REMEDY FOR OUT OF TOLERANCE FLOOR SURFACES

A. General:

1. Remedial work, testing, retesting, and consulting services necessary to correct out-of-tolerance floor surfaces shall be at Contractor's expense with no extension to construction schedule.
2. Repair and replacement procedures, limits, and products shall be in manner that does not diminish the desired appearance or serviceability of structure and shall be approved by Architect of Record (AOR) and Structural Engineer of Record (SEOR). Contractor shall submit detailed work plan for areas where remedial measures are necessary, prior to remedial work. Include following information:
 - a. Specific boundaries of area to receive remedial work.
 - b. Methods and products proposed.
 - c. Grout/topping/underlayment product literature.

B. Remedial Measures:

1. Slabs-on-Grade: Minimum Local Areas measuring below either or both of specified Minimum Local Values shall be removed, replaced, and retested unless approved by AOR and SEOR.
2. Elevated Slabs: Minimum Local Areas measuring below specified Minimum Local Value(s) shall be repaired by grinding or by application of topping or underlayment to entire surface of Minimum Local Area, and retested, unless following conditions occur:
 - a. Such area is approved by AOR and SEOR, and written acceptance is provided.
 - b. Repair of such area would diminish desired appearance and serviceability of structure, or is in general considered unacceptable to DSA for other reasons, in which case Minimum Local Area shall be replaced and retested.
3. Structural Repairs: Are applicable to defects described above at structural load-bearing members where structural integrity of structure is affected.

4. Perform structural repairs with prior approval of the AOR and SEOR for method and procedure using specified bonding compound and mortar.

3.6 CONCRETE SURFACE REPAIRS

A. General:

1. Locate surface defects where repair is required by visual inspection of formed and unformed surfaces. Mark location in manner that does not cause further defect. Record and maintain record of such defects.
2. Bonding Compounds: Specified in Division-3 section "Cast-In-Place Concrete".
3. Repair Mortar: Specified in Division-3 section "Cast-In-Place Concrete", unless otherwise specified herein.
4. Out-of-Tolerance Floor Surfaces: Refer to Remedy for Out-of-Tolerance Floor Surfaces herein.
5. Remove and replace concrete with surface defects if defects cannot be repaired as approved by AOR and SEOR.

B. Surface Defects: Repair and patch following surface defects when such conditions are exposed to view, and when durability, serviceability, and structural integrity of structure is affected by defect.

1. Honeycombs, rock pockets, and voids over 1/4" in any dimension.
2. Holes left by tie rods, bolts, or other.
3. Surface crazing.
4. Cracks 0.025 inch wide or wider.
5. Cracks in excess of 0.01 inch wide at exterior exposed conditions and where water tightness is critical as approved by AOR and SEOR.
6. Cracks which penetrate completely through member, regardless of width.
7. Spalls which affect durability, structural integrity, or finish appearance at surfaces exposed to view.
8. Stains, discolorations, and texture irregularities at surfaces exposed to view which cannot be corrected by cleaning or rubbing processes.
9. High or low irregularities in unformed surfaces other than as specified for Out-of-Tolerance Floor Surfaces.

C. Types of Repair:

1. Non-Structural Repairs: Applicable to defects described above which affect durability and serviceability of structure, but do not affect structural load-bearing integrity of structure.
 - a. Cut out surface defect to depth not less than 1 inch. Make edges of cut perpendicular to surface. Cut out area should be rectangular and encompass entire surface defect.
 - b. Dampen with water and brush-coat area to be repaired with bonding agent. Place repair mortar within "pot life" of bonding agent or re-prime with bonding agent.
 - c. For surfaces exposed to view, repair mortar shall match color and texture of surrounding surfaces. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with repair.
 - d. Correct high areas and irregularities at unformed surfaces by grinding after concrete has cured 14 days minimum.
 - e. Correct low areas and irregularities at unformed surfaces immediately after completing surface finishing operations by cutting out low areas as required and replacing with repair mortar or underlayment compound as approved by AOR and SEOR.

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3.7 CLEANUP AND PROTECTION

- A. Construction Waste Management:
 - 1. At end of each work day, recycle or dispose of unused materials, debris, and containers.
- B. Protect the Work so it will not deteriorate or be damaged. Remove protection at time of Substantial Completion.

END OF SECTION 033500

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SECTION 042000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ACI 402/602/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2013.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2016.
- C. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2016.
- D. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- E. ASTM C140/C140M - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2016.
- F. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- G. ASTM C150/C150M - Standard Specification for Portland Cement; 2016.
- H. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- K. ASTM C476 - Standard Specification for Grout for Masonry; 2010.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, mortar, and masonry accessories.
- C. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.04 QUALITY ASSURANCE

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

1.05 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1.0 Compressive Strength $f'_m = 2000$ psi

- 1.1 Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depth of 8 inches.
2. Special Shapes: Provide non-standard blocks configured for corners.
3. Load-Bearing Units: ASTM C90, medium weight.

2.02 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Mortar Aggregate: ASTM C144.
- E. Grout Aggregate: ASTM C404.
- F. Water: Clean and potable.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; uncoated.

2.04 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 1. Manufacturers:
 - a. Hohmann & Barnard, Inc; www.h-b.com/sle.
- B. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.05 MORTAR AND GROUT MIXES

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 1. Masonry below grade and in contact with earth: Type M.
 2. Loadbearing masonry: Type M.
- B. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 1. Bond: Running.
 2. Coursing: One unit and one mortar joint to equal 8 inches.
 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

3.06 REINFORCEMENT AND ANCHORAGE - GENERAL

- A. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.
- B. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.

3.07 GROUTED COMPONENTS

- A. Lap splices minimum 48 bar diameters, unless noted otherwise.
- B. Support and secure reinforcing bars and other embedded items from displacement. Maintain position within 1/2 inch of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.

3.08 CONTROL AND EXPANSION JOINTS

- A. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- B. Form expansion joint as detailed on drawings.

3.09 BUILT-IN WORK

- A. As work progresses, install built-in fabricated metal frames, anchor bolts, and plates and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.

3.10 TOLERANCES

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

3.11 CUTTING AND FITTING

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

3.12 PARING

- A. Dampen masonry walls prior to paring.
- B. Scarify each paring coat to ensure full bond to subsequent coat.
- C. Parge masonry walls in two uniform coats of mortar to a total thickness of 3/4 inch.
- D. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.
- E. Strike top edge of paring at 45 degrees.

3.13 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for conformance to requirements of this specification.

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3.14 CLEANING

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

3.15 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

SECTION 051200
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members, support members and struts.
- B. Grouting under base plates.

1.02 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; 2011.
- B. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; 2010.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- E. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2013.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- H. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2014.
- I. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use; 2010.
- J. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- K. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2015.
- L. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric); 2007 (Reapproved 2013).
- M. ASTM A992/A992M - Standard Specification for Structural Steel Shapes; 2011 (Reapproved 2015).
- N. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- O. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
- P. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2014a.
- Q. ASTM E94 - Standard Guide for Radiographic Examination; 2004 (Reapproved 2010).
- R. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments; 2013.
- S. ASTM E165/E165M - Standard Test Method for Liquid Penetrant Examination for General Industry; 2012.
- T. ASTM E709 - Standard Guide for Magnetic Particle Testing; 2015.
- U. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2013.
- V. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2015.

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- W. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- X. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- Y. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
- Z. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections; 2009.
- AA. SSPC-SP 3 - Power Tool Cleaning; 1982 (Ed. 2004).

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
- D. Mill Test Reports: Indicate structural strength, destructive test analysis and non-destructive test analysis.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.
- F. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.04 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Comply with Section 10 of AISC S303 "Code of Standard Practice for Steel Buildings and Bridges" for architecturally exposed structural steel.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- D. Erector: Company specializing in performing the work of this section with minimum 5 years of documented experience.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade B.
- E. Steel Sheet: ASTM A1011/A1011M, Designation SS, Grade per drawings hot-rolled, or ASTM A1008/A1008M, Designation SS, Grade per drawings cold-rolled.
- F. Pipe: ASTM A53/A53M, Grade B, Finish black.
- G. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.
- H. Sag Rods: ASTM A36/A36M.
- I. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563 or ASTM A563M nuts and ASTM F436/F436M washers.
- J. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.

- K. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563 or ASTM A563M nuts and ASTM F436/F436M Type 1 washers.
- L. Headed Anchor Rods: ASTM A307, Grade C, plain.
- M. Load Indicator Washers: Provide washers complying with ASTM F959 at connections requiring high-strength bolts.
- N. Welding Materials: AWS D1.1/D1.1M or D1.8/D1.8M as required; type required for materials being welded.
- O. Sliding Bearing Plates: Teflon coated.
- P. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- Q. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.
- R. Touch-Up Primer for Galvanized Surfaces: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
- C. Develop required camber for members.

2.03 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 3.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

2.04 SOURCE QUALITY CONTROL

- A. High-Strength Bolts: Provide testing and verification of shop-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts", as required by contract documents.
- B. Welded Connections: Visually inspect all shop-welded connections and test as required by contract documents using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC S303 "Code of Standard Practice for Steel Buildings and Bridges".
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

- C. Field weld components and shear studs indicated on shop drawings.
- D. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- E. Do not field cut or alter structural members without approval of Architect.
- F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.03 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts", as required by contract documents.
- C. Welded Connections: Visually inspect all field-welded connections and test as required by contract documents using one of the following:
 - 1. Radiographic testing performed in accordance with ASTM E94.
 - 2. Ultrasonic testing performed in accordance with ASTM E164.
 - 3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
 - 4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes requirements regarding the appearance and surface preparation of Architecturally Exposed Structural Steel. (AESS). Refer to division 5 section "Structural Steel Framing" for all other requirements regarding steel work not included in this section.
- B. This section applies to any members noted on Architectural drawings as AESS C.
- C. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 5 Section "Structural Steel Framing" also apply to AESS framing.
 - 3. Division 5 Sections "Steel Decking" for erection requirements relating to exposed steel decking and its connections.
 - 4. Division 5 Sections "Metal Fabrications" for loose steel bearing plates and miscellaneous steel framing.
 - 5. Division 9 Sections "High-Performance Coatings" for finish coat requirements and coordination with primer and surface preparation specified in this section.

1.2 DEFINITIONS

- A. Architecturally Exposed Structural Steel: Structural Steel conforming to one of the categories of Architecturally Exposed Structural Steel or AESS Refer to ANSI/AISC 303-16 "Code of Standard Practice for Steel Buildings and Bridges".
- B. AESS C: Structural Steel designated as "AESS C in the contract documents and conforming to ANSI/AISC 303-16, Chapter 10 definition of AESS C. These are custom AESS elements with characteristics described in the contract documents. See Table 10.1 for characteristics.

1.3 SUBMITTALS

- A. LEED Submittals
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

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- B. Product Data for each type of product specified. Submit per Division 9 Section "High-Performance Coatings".
- C. Fabrication Documents: Detailing for fabrication of AESS components.
 - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
 - 2. Include details that clearly identify all the requirements listed in sections 2.3 "Fabrication" and 3.3 "Erection" of this specification for each part. Provide connections for exposed AESS consistent with concepts shown on the architectural or structural drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined herein.
 - 4. Indicate orientation of HSS seams and mill marks (where applicable).
 - 5. Indicate type, size, finish and length of bolts, distinguishing between shop and field bolts. Identify high-strength bolted slip-critical, direct-tensioned shear/bearing connections.
 - 6. Orient bolt heads towards view (building interior).
 - 7. Clearly indicate which surfaces or edges are exposed and what class of surface preparation is being used.
 - 8. Indicate special tolerances and erection requirements as noted on the drawings or defined herein.
 - 9. Indicate vent or drainage holes for HSS members.
- D. Mock Up: Provide two (2) mock ups of the nature and extent indicated on the contract documents.
 - 1. Locate one (1) mockups on-site and one (1) in the fabricator's shop as directed by Architect. Mockups shall be full size unless the Architect approves smaller models.
 - 2. Notify the Architect one week in advance of the dates and times when mockups will be available for review.
 - 3. Demonstrate all applicable AESS characteristics for the specified category of AESS on the elements and joints in the mock up.
 - 4. Build mockups using member sizes and materials indicated for final Work.
 - 5. The mock up shall demonstrate weld quality and contouring of the welds at the aligned walls of the members.
 - 6. The mock up shall demonstrate the specified surface preparation and finish coating.
 - 7. HSS members shall extend at least 6" from the joint in the mock-up.
 - 8. Obtain Architect's written approval of mockups before starting fabrication
 - 9. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
- E. Qualification data for firms and persons specified in the "Quality Assurance" Submittal to demonstrate their capabilities and experience. Include lists of completed projects names and address, names and addresses of architects and owners, and other information specified.
- F. For each project, submit photographs showing detail of installed AESS.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).

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3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Fabricator Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel', engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this Project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the Work.
- C. Erector Qualifications: In addition to those qualifications listed in Division 5 Section 'Structural Steel', engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicted for this Project and with a record of successful in-service performance.
- D. Comply with applicable provisions of the following specifications and documents:
1. ANSI/AISC 303-16," Code of Standard Practice for Steel Buildings and Bridges", Section 10.
- E. Pre-installation Conference: The General Contractor shall schedule and conduct conference at the project site. As a minimum, the meeting shall include the General Contractor, Fabricator, Erector, the finish-painting subcontractor, and the Architect. Coordinate requirements for shipping, special handling, storage, attachment of safety cables and temporary erection bracing, final coating, touch up painting, mock up coordination, architect's observations, and other requirements for AESS.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Deliver AESS to Project site in such quantities and at such times to ensure continuity of installation. All tie downs on loads shall be nylon straps or shall use softeners when using chains

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or wire rope slings to avoid damage to edges and surfaces of members. The standard for acceptance of delivered and erected members shall be equivalent to the standard employed at fabrication.

- B. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. Use special care in handling to prevent twisting or warping of AESS members.
- C. Handle finish pieces using nylon type slings, or chains with softeners, or wire ropes with softeners such that they are not damaged. Conform to ANSI/AISC 303-16 Sections 10.4, 10.5, and 10.6.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Fabrication Documents. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.7 COORDINATION

- A. Coordinate installation of anchors for AESS members that connect to the work of other trades. Furnish setting drawings, templates, and directions for installing anchors, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to the project site in time for installation. Anchorage concepts shall be as indicated on drawings and approved on final Fabrication Documents.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Meet requirements Division 5 Section "Structural Steel Framing".

2.2 PAINT SYSTEM

- A. Comply with Division 9 Section "High-Performance Coatings".

2.3 FABRICATION AESS 1

- A. Use special care in handling and shipping of AESS both before and after shop painting minimize damage to any shop finish. Use Nylon type slings or softeners when using chains or wire rope slings.
- B. The permissible tolerances for member depth, width, out of square, and camber and sweep shall be as specified in ASTM A6-2014 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling (ASTM A6), ASTM A500-2013 Standard

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Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes (ASTM A500), and Standard Specification for Cold-Formed Welded Carbon Steel Structural Sections (HSS) (ASTM A1085).

- C. Fabricate and assemble AESS in the shop to the greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by the Architect. Detail AESS assemblies to minimize field handling and expedite erection.
 - D. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
 - E. Remove all backing and run out tabs.
 - F. Grind all sharp edges smooth, including all sheared, punched or flame cut edges
 - G. Provide a continuous appearance to all welded joints including tack welds. Provide joint filler at intermittent welds.
 - H. Bolted Connections: Make in accordance with Section "Structural Steel Framing". Provide bolt type and finish as noted herein.
 - I. Weld Connections: Comply with AWS D1.1 and Section "Structural Steel Framing". Appearance and quality of welds shall be consistent. Assemble and weld built-up sections by methods that will maintain alignment of members without warp exceeding the tolerance of this section.
 - J. Install all bolts on the same side of the connection. Oriented uniformly in the direction indicated Consistent from one connection to another.
 - K. Remove all weld spatter, slivers and similar surface discontinuities.
 - L. Grind off projections larger than 1/16" at butt and plug welds.
 - M. Continuous Weld Appearance: Where continuous welding is noted on the drawings, provide welds of a uniform size and profile.
 - N. Seal Welds: Seal weld open ends of round and rectangular hollow structural section with 3/8" closure plates. Provide venting as required for galvanized members.
- 2.4 FABRICATION AESS 2
- A. Fabricate to Requirements of Fabrication AESS 1 and as follows
 - B. Provide hidden part marks or piece marks that may be fully removed after erection.
- 2.5 FABRICATION AESS 3
- A. Fabricate to Requirements of Fabrication AESS 2 and as follows
 - B. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved mock up.

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- C. Grind projections at butt and plug welds to be smooth with the adjacent surface.
- D. Orientation of HSS seams shall be away from view.
- E. Mill marks shall not be exposed to view. If it is not possible to hide mill marks, then the mill marks are to be removed by appropriate length cutting of mill material. If this is not possible, the fabricator shall remove the mill mark, grind, and fill the surface to be consistent with the approved mock up.
- F. The matching of abutting cross sections is required.

2.6 FABRICATION AESS 4

- A. Not Used.

2.7 FABRICATION AESS C

- A. Fabricate to the requirements of Fabrication AESS 3 and as follows.
- B. Provide a continuous appearance to all shop welds including tack welds. Provide joint filler at intermittent welds.

2.8 SHOP PRIMING

- A. Comply with Division 9 Section "High-Performance Coatings".

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to AESS indicated for galvanizing according to ASTM A123 – 2015 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products. Fabricate such that all connections of assemblies are made in the field with bolted connections where possible.

2.10 FABRICATION QUALITY CONTROL AND QUALITY ASSURANCE AESS 1 AND 2

- A. Structural requirements:
 - 1. Conform to Quality Control requirements per ANSI/AISC 360-16 "Specification for Structural Steel Buildings" Chapter N and ANSI/AISC 303-16, "Code of Standard Practice for Steel Buildings and Bridges", Section 10. Refer to Section "Structural Steel Framing" for additional requirements.
 - 2. Owner will engage a Quality Assurance agency per the requirements of ANSI/AISC 360-16 "Specification for Structural Steel Buildings" Chapter N and ANSI/AISC 303-16, "Code of Standard Practice for Steel Buildings and Bridges", Section 10
- B. AESS acceptance: The Architect shall observe the AESS steel in the shop at a viewing distance consistent with the final installation and determine acceptability based on the qualification data

and submittals. The Quality Assurance agency shall have no responsibility for enforcing the requirements of this section.

2.11 FABRICATION QUALITY CONTROL AND QUALITY ASSURANCE AESS 3 AND 4

- A. Conform to Quality Assurance AESS 1 AND 2 and as follows.
- B. AESS acceptance: The Architect shall observe the AESS steel in the shop at a viewing distance consistent with the final installation and determine acceptability based on the approved mock up. The Quality Assurance Agency shall have no responsibility for enforcing the requirements of this section.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. The erector shall check all AESS members upon delivery for twist, kinks, gouges or other imperfections which may result in rejection of the appearance of the member. Coordinate remedial action with fabricator prior to erecting steel.

3.2 PREPARATION

- A. Provide connections for temporary shoring, bracing and supports only where noted on the approved Fabrication Documents. Temporary connections not shown shall be made at locations not exposed to view in the final structure or as approved by the Architect. Handle, lift and align pieces using nylon straps or chains with softeners required to maintain the appearance of the AESS through the process of erection.

3.3 ERECTION AESS 1

- A. Employ special care to handle and erect AESS. Erect finish pieces using nylon straps or chains with softeners such that they are not damaged.
- B. Place weld tabs for temporary bracing and safety cabling at points concealed from view in the completed structure or where approved by the Architect during the pre-installation meeting. Methods of removing temporary erection devices and finishing the AESS members shall be approved by the Architect prior to erection.
- C. AESS Erection tolerances: Erection tolerances shall meet the requirements of standard frame tolerances for structural steel per Chapter 7 of ANSI/AISC 303-16.
- D. Set AESS accurately in locations and to elevations indicated and according to AISC specifications referenced in this Section.
- E. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
- F. Remove all backing and run out tabs.

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- G. When temporary braces or fixtures are required to facilitate erection, care shall be taken to avoid any blemishes, holes or unsightly surfaces resulting from the use or removal of such temporary elements.
- H. Bolted Connections: Align bolt heads on the same side of the connection as indicated on the approved fabrication or erection documents.
- I. Weld Connections: Comply with AWS D1.1 and Section "Structural Steel Framing". Appearance and quality of welds shall be consistent. Employ methods that will maintain alignment of members without warp exceeding the tolerance of this section.
- J. Remove all weld spatter exposed to view.
- K. Grind off projections larger than 1/16" at field butt and plug welds.
- L. Continuous Welds: Where continuous welding is noted on the drawings, provide continuous welds of a uniform size and profile.
- M. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.
- N. Splice members only where indicated.
- O. Obtain permission for any torch cutting or field fabrication from the Architect. Finish sections thermally cut during erection to a surface appearance consistent with the mock up.

3.4 ERECTION AESS 2

- A. Erect to the requirements of Erection AESS 1 and as follows.
- B. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of ANSI/AISC 303-16.

3.5 ERECTION AESS 3

- A. Erect to the requirements of Erection AESS 2 and as follows.
- B. Field Welding: Weld profile, quality, and finish shall be consistent with mock-ups approved prior to fabrication.

3.6 ERECTION AESS 4

- A. Not Used.

3.7 ERECTION AESS C

- A. Erect to the requirements of Erection AESS 3.

3.8 FIELD QUALITY CONTROL AND QUALITY ASSURANCE AESS 1 and 2

- A. Structural requirements:
 - 1. Conform to Quality Control requirements per ANSI/AISC 360-16 “Specification for Structural Steel Buildings” Chapter N and ANSI/AISC 303-16,” Code of Standard Practice for Steel Buildings and Bridges”, Section 10. Refer to Division 5 Section “Structural Steel Framing” for additional requirements.
 - 2. Owner will engage a Quality Assurance agency per the requirements of ANSI/AISC 360-16 “Specification for Structural Steel Buildings” Chapter N and ANSI/AISC 303-16,” Code of Standard Practice for Steel Buildings and Bridges”, Section 10
- B. AESS acceptance: The Architect shall observe the AESS steel in place and determine acceptability based on the qualification data and submittals. The Quality Assurance Agency shall have no responsibility for enforcing the requirements of this section.

3.9 FIELD QUALITY CONTROL AESS 3, 4, and C

- A. Conform to Field Quality Control AESS 1 AND 2 and as follows.
- B. AESS acceptance: The Architect shall observe the AESS steel in place and determine acceptability based on the approved mock up. The Quality Assurance Agency shall have no responsibility for enforcing the requirements of this section.

3.10 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint shall be completed to blend with the adjacent surfaces of AESS. Such touch up work shall be done in accordance with manufacturer's instructions and as specified in Division 9, Section “High-Performance Coatings.”
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded area. Any repairs to galvanized surfaces shall comply with ASTM A780 – 2015 Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings.

3.11 ATTACHMENT

- A. AESS Category Matrix TABLE 10.1.

END OF SECTION 051213

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SECTION 051250
Buckling Restrained Braces

PART 1 – GENERAL

1.1 SUMMARY

- A. Provide all parts, materials, and labor required for the design, delivery, testing and erection of buckling-restrained braces, which are designed by the manufacturer to meet stiffness, yield strength, and elongation requirements as indicated on the Drawings and other requirements specified Herein.

1.2 REFERENCES

- A. The following applicable standards are to be adhered to unless indicated otherwise.
- B. American Institute of Steel Construction (AISC):
- 1 “Code of Standard Practice for Steel Buildings and Bridges”, latest edition.
 - 2 2010 Seismic Provisions for Structural Steel Buildings (ANSI/AISC 341-10)
- C. American Society for Testing and Materials (ASTM) Standard Specifications:
1. A6 – Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling, latest edition.
 2. A36 – Specification for Carbon Structural Steel, latest edition.
 3. A325– Specification for Structural Bolts, 120/105 ksi Minimum Tensile Strength, latest edition.
 4. A490 – Specification for Structural Bolts, 150 ksi Minimum Tensile Strength, latest edition.
 5. A500 – Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes, latest edition.
 6. A572 – Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel, latest edition.
 7. F959 – Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners, latest edition.
 8. F1852 – Specification for “Twist-off” Type Tension Control Structural Bolts, 120/105 ksi Minimum Tensile Strength, latest edition
 9. F2280 – Specification for “Twist-off” Type Tension Control Structural Bolts, 150 ksi Minimum Tensile Strength, latest edition
- D. American Welding Society (AWS):

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1. 2.4 – Standard Symbols for Welding, Brazing and Nondestructive Examination.
 2. A5.1 – Specification for Carbon Steel Electrodes
 3. A5.18 – Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding
 4. A5.20 – Carbon Steel Electrodes for Flux Cored Arc Welding
 5. D1.1 – Structural Welding Code-Steel, latest edition.
- E. Steel Structures Painting Council (SSPC):
1. Steel Structures Painting Manual, latest edition.
- F. CBC – California Building Code, 2016 Edition.

1.3 DEFINITIONS

- A. Buckling-Restrained Brace (BRB): A steel brace consisting of an outer steel casing, an inner steel core, and a concrete matrix between the core and the outer steel casing. The inner steel core resists against tensile and compressive axial loads and is restrained from buckling by the concrete contained in the outer steel casing.

1.4 SUBMITTALS

- A. The following submittals shall be made. All submittals shall be made in the English language.
- B. Shop Drawings
1. Shop drawings shall clearly display all geometries necessary to manufacture BRB's including plate thickness, lengths, plate dimensions inside and outside of the casing, and casing dimensions.
 2. Shop drawings shall clearly display all connection information including location of bolts, bolt types, bolt diameters, hole size, and faying surface types. Show location and size of BRB members. Give complete information necessary to fabricate elements of the structural steel frame to receive braces and connection plates. Show methods of assembly, including type and size of bolts and/or pins, hole diameter, and preparation and finish of faying surfaces. Identify tolerances for fabrication and erection.
- C. Material Test Reports
1. Tensile tests and chemical analysis for all steel.
 2. Independent coupon tests used to verify core plate initial yield stress, tensile stress, and ultimate elongation.
 - a. Where core plates are fabricated from plate material, coupon tests shall be performed on each plate.

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- b. Where core plates are fabricated from bar stock, coupons shall be made at intervals of each 5 tons of material of same heat and thickness.
 - c. Coupon tests to be taken at point of manufacture. Mill test reports (MTR) may not be used.
 3. Plates 2 inches (50mm) and thicker shall be supplied with Charpy V-Notch testing in accordance with ASTM A673, Frequency P, or approved equal. The impact test shall meet a minimum average value of 20 ft-lbs absorbed energy at +70 degrees Fahrenheit and shall be conducted in accordance with AISC Specification, or approved equal.
- D. Technical Report
1. The Manufacturer shall submit a BRB testing report. The testing configurations used, and the results obtained shall meet the criteria found in the AISC 2010 Seismic Provisions (341-10).
- E. Welding Certificates
1. Welder Performance Qualification Records (WPQR's)
 2. Welding Procedure Specification (WPS) written in conformance with AWS D1.1 for each proposed type of welded joint, whether pre-qualified or qualified by testing.
- F. Manufacturer's Quality Assurance Plan
- G. Manufacturer's in-house Quality Assurance Inspection Report for each brace upon completion of fabrication.
- H. Outside Testing Agency Quality Control Report where applicable.

1.5 QUALITY ASSURANCE

- A. The Manufacturer shall have a detailed Quality Assurance Plan.
1. The Quality Assurance Plan shall contain the procedures for manufacturing buckling-restrained braces including:
 - a. Welding procedures.
 - b. Methodology for verifying and documenting material properties.
 - c. Indication of how the product is to be identified, such that it can be traced back to production quality assurance records.
 - d. A flow chart of the process by which the product is manufactured, including description of production methods.
 - e. Identified manufacturing tolerances for each production process.
 - f. In-process quality control including all points of internal inspection for control and monitoring of the fabrication and assembly process.

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2. Qualification testing shall conform to Article 2.5.
- B. The Manufacturer shall notify Owner of fabrication schedule at least 30 days prior to fabrication in order to allow Owner or Owner's Representative to observe fabrication process.

PART 2 – PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Plants fabricating buckling-restrained braces shall comply with the following:
1. Obtain and maintain accreditation from The American Institute of Steel Construction (AISC Certified Fabricator) in conjunction with any additional certifications required by the local jurisdiction.
 2. Have a minimum of 5 years of documented continuous experience in the fabrication of buckling-restrained braces with a minimum of 30 completed projects over this same period.
 3. Buckling-restrained braces for this project shall be manufactured in the same facility (following the same quality assurance procedures) as the braces manufactured and tested to fulfill the AISC 341 testing requirements.
- B. Buckling-Restrained Braces shall be manufactured and supplied by the following vendor or approved equal.
1. CoreBrace, LLC
5789 West Wells Park Road
West Jordan, UT 84081
801.280.0701
- C. Documentation showing evidence of valid accreditation and experience shall be submitted to the Engineer of Record during the bidding phase for any proposed manufacturer not listed above.
- D. BRB approved equal: BRB manufacturers other than listed above shall demonstrate equivalent Design and Performance Requirements as the system specified in the drawings and this specification section. The Contractor shall submit a proposal to the Architect and Design Team for an alternative as “an equal” in writing prior to the submittal of bids. The Contractor is solely responsible for timely submittal of its proposed “or equal”. Corebrace, LLC was used as the Basis of Design for the buckling-restrained braced frame system. The Basis of Design product has been approved by DSA. If Contractor elects to provide an approved equal product, he/she is solely responsible for obtaining all necessary approvals and all costs associated with obtaining the approval of DSA, including all Architectural and Engineering fees for coordinating with DSA related to the approved equal product proposed by the Contractor. Do not commence installation until all approvals

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have been obtained. The District nor SEOR are not responsible for any costs or delays (including any costs related to delays, schedule impacts, etc.), including any delays or costs caused by or related to DSA or any other governmental agency having jurisdiction over the project, arising from, or related in any manner to, the Contractor electing to provide an approved equal product. Substitution BRB submittal shall include the following:

1. Calculations and Design Drawings shall be provided that display the ability of the proposed "BRB's" to meet the Performance Criteria described herein and showing equivalency with the BRB system shown in the construction documents. Proposed braces shall be equivalent in both strength and stiffness to that shown in the drawings to avoid redistribution of lateral forces.
2. The Design Drawings and Calculations shall be sealed and stamped by a Structural/Professional Engineer (S/P.E.) licensed in California.

2.2 MATERIALS

A. Core Plate

1. ASTM A36 with F_y as noted on the drawings.
 - a. F_y of all core plate material shall be verified via coupon test per Article 1.4.D.2.
 - b. Core plates 2 inches (50mm) and thicker shall be supplied with Charpy V-Notch testing per Article 1.4.D.3.
 - c. If not noted on the drawings, use $38\text{ksi} \leq F_y \leq 46\text{ksi}$

B. Casing

3. ASTM A500, Gr. B or similar for square or rectangular sections.
2. ASTM A500, Gr. B or A53, Gr. B or similar for round sections.

C. Primer

1. Standard shop primer, unless noted otherwise.

D. Bolts, Nuts, and Washers:

1. ASTM A325 or A490 for conventional high-strength bolts, ASTM A563 nuts.
2. ASTM 1852 or F2280 for twist-off type Tension Control Bolt/Nut/Washer Assemblies.

E. Welding Materials

1. Shielded metal arc welding electrodes conform to AWS A5.1, flux-cored arc welding electrodes conform to AWS A5.20, and electrodes used for gas metal arc or submerged arc conform to the requirements of AWS A5.18.

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2. The minimum tensile strength of the E70 class electrodes used in production is 70,000 psi (470 MPa).
 3. Materials shall provide production welds with minimum Charpy V Notch properties of 20 ft-lbs (27 J) at -20°F (-30 C).
- F. Infill Grout
1. Manufacturer's standard infill that has been demonstrated suitable by sub-assembly testing per the Recommended Provisions.

2.3 PERFORMANCE REQUIREMENTS

- A. Core plate material shall have a yield range of 42 ksi within ± 4 ksi unless indicated otherwise in the structural drawings. Coupon tests taken from plates at point of manufacture of BRBs shall be used to verify conformance. Additional coupon tests may be performed to replace coupon tests that fall out of acceptable range.
- B. Increasing amplitude cyclic displacement tests per the AISC Seismic Provisions shall provide stable performance up to a displacement corresponding to 2.0 x Design Story Drift.
1. Hysteretic behavior shall display no post-yield loss of strength, degradation, or pinching.
 2. Fracture of any portion of the BRB shall not occur during the qualifying tests.
 3. The cumulative ductility factor requirement specified in AISC 341 shall be increased from 200 to 300.
- C. The steel core shall resist compression and tension forces. The steel core area shall be as per the project drawings and based on the yield stress range specified.
- D. The steel and concrete casing shall prevent the steel core from buckling globally and locally during compressive loading without binding due to longitudinal shortening and transverse expansion. Demand for local and global stability of casing checks shall be based on the adjusted brace strength at the maximum yield stress ($F_{y,sc,max}$) of the specified yield stress range of the core plate material.
- E. Steel core projections beyond the steel casing and brace connections shall develop the adjusted brace strength without instigation of fracture or instability. For core plate checks use the minimum ($F_{y,sc,min}$) of the specified yield stress range for determining demand. For all other materials use $F_{y,sc,max}$ to determine demand.
- F. The overstrength factors (ω , β) shall be determined at a brace strain level associated with the greater of a 2% interstory drift or twice the design story drift, the latter of which is taken as $(2\phi C_d F_{y,sc,min})/(\rho I_e E)$. Where P_d is

provided, twice the design story drift is taken as $(2C_dP_d)/(A_{sc}\rho I_e E)$. C_d is the design drift deflection amplification factor, E is the nominal modulus of elasticity of the core plate material, I_e is the Importance Factor, ρ is the Redundancy Factor, and P_d is the demand in the BRBs at the controlling drift design load case with gravity loads excluded.

2.4 QUALIFICATION TESTS

- A. Buckling-restrained brace design shall be based on two qualifying cyclic tests conforming to the AISC Seismic Provisions for Buckling Restrained Braced Frames. As stated in the Provisions, at least one of the two qualifying tests needs to be a subassembly test to demonstrate the ability of the BRB to withstand rotational demands. The other test may be performed uniaxially or may also be a subassembly test.
- B. The requirements of the AISC 341 Seismic Provisions shall be met along with the modification in Article 2.4.B.3.
- C. The strain level during testing shall be equivalent to, or greater than, the strains that the project braces will be expected to withstand.
- D. Qualifying cyclical tests can be based on full-scale cyclical tests previously reported for projects, or research that are deemed similar to project conditions by the Manufacturer and Project Engineer.

PART 3 – EXECUTION

3.1 FABRICATION

- A. Braces shall be fabricated in accordance with AISC Code of Standard Practice and in an AISC Certified Shop that participates in the AISC Quality Certification Program.
- B. Core plates shall be cut to profile shown on Design Drawings.
 - 1. The general roughness cannot exceed 1000 micro-inches in the yielding length.
 - 2. Notches in yield length region up to 1/8-inch may be repaired by grinding to a smooth transition. The length of the transition shall not be less than 10 times the notch depth.
 - 3. Notches in the yielding length region greater than 1/8-inch and less than or equal to 3/8-inch may be repaired using procedures outlined in the Company Quality Assurance Manual. The repairs shall be examined using Ultrasonic Testing (UT) procedures in conformance with AWS D1.1.

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4. Notches in the yielding length region greater than 3/8-inch in the yield length shall be rejected.
- C. No splices are allowed in the yielding region of the steel core plate.
- D. Minimum casing dimensions shall be as required by manufacturer or as specified on the project documents.
- E. Holes for bolted connections may be drilled, cut or punched in conformance with AISC standards and burs removed.
- F. Finish shall be manufacturer's standard shop primer. Do not paint connection faying surfaces if connection are designated slip critical unless paint used provides same slip resistance
- G. Assembly of the different components of the brace shall be done in accordance with the manufacturer's Quality Assurance Manual in a manner that ensures proper performance of the brace.
- H. Pin-connection hole tolerance shall be +1/32", -0".

3.2 SHIPPING

- A. Manufacturer to package BRB's for protection against shipping damage.
- B. Manufacturer shall coordinate delivery dates and quantities with Contractor/Owner. Contractor/Owner shall provide adequate storage space and proper lay-down areas.
- C. Braces shall be stored on dunnage not touching the ground.
- D. Coordinate erection aid requirements with contractor/Owner.

3.3 ERECTION

- A. Braces are to be erected under the Structural Steel Specification Section and according to referenced AISC Specifications.
- B. Prior to erection, clean faying surfaces of BRB to be in contact with bolted connections to remove temporary coatings applied for transport and surface contaminants.
- C. Manufacturer shall coordinate with Owner's Representative to verify proper BRB dimensions.

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- D. Allow for erection loads and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of buckling-restrained braces.
- E. No field welding or attaching in other manners to BRB's is allowed, including non-structural pieces unless approved by manufacturer and Engineer of Record (EOR).
- F. No field cutting or altering is permitted without the approval of the manufacturer and EOR.

End of Section

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SECTION 053100
STEEL DECKING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof deck.
- B. Composite floor deck.
- C. Bearing plates and angles.
- D. Stud shear connectors.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- E. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- G. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.
- H. FM (AG) - FM Approval Guide; current edition.
- I. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; Factory Mutual System; 2006.
- J. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
- K. ICC-ES AC43 - Acceptance Criteria for Steel Deck Roof and Floor Systems; ICC Evaluation Service, Inc; 2010 (R2013).
- L. ICC-ES AC70 - Acceptance Criteria for Fasteners Power Driven into Concrete, Steel and Masonry Elements; ICC Evaluation Service, Inc; 2013.
- M. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks; 2007.
- N. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- C. Certificates: Certify that products furnished meet or exceed specified requirements.
- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.04 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
- B. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Deck:
 - 1. Verco Manufacturing, Inc..
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 STEEL DECK

- A. Roof Deck: Non-composite type, fluted steel sheet:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
- B. Composite Floor Deck: Fluted steel sheet embossed to interlock with concrete:
 - 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.

2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.
- B. Stud Shear Connectors: Made from ASTM A108 Grade 1015 bars.
- C. Welding Materials: AWS D1.1/D1.1M.
- D. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.
- F. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to the deck.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gage, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Roof Sump Pans: Formed sheet steel, 14 gage, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.
- C. Floor Drain Pans: Formed sheet steel, 14 gage, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below floor deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On steel supports provide minimum 1-1/2 inch bearing.

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- C. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.
- D. Weld deck in accordance with AWS D1.3/D1.3M.
- E. At floor edges, install concrete stops upturned to top surface of slab, to contain wet concrete.
- F. At openings between deck and walls, columns, and openings, provide sheet steel closures and angle flashings to close openings.
- G. Close openings above walls and partitions perpendicular to deck flutes with single row of foam cell closures.
- H. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- I. Position floor drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- J. Weld stud shear connectors through steel deck to structural members below.
- K. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

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SECTION 053123 – ARCHITECTURAL DECK SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Architecturally exposed ceiling-deck system and accessories.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Deck property information for the proposed deck units.
 2. Preparation instructions and recommendations.
 3. Storage and handling requirements and recommendations.
 4. Erection instructions.
- B. Shop Drawings: Show location, connections, bearing on supports, methods of anchoring, attachment of accessories, adjusting plate details and the manufacturer's erection instructions and pertinent details.
1. Showing plans, sections, elevations, layouts, profiles and product component locations, including anchorage, bracing, fasteners, accessories and finishes.
 2. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners, and accessories.
 3. Indicate method for securing studs and other components to tracks and for framing connections.
 4. Submit calculations for loadings and stresses under Professional engineer's seal registered in the state of the project.
- 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. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.
- E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).

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4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Manufacturer with documented evidence of not less than 10 years of successful experience in the placement of architecturally exposed ceiling-deck systems on projects of similar size, scope and end use.
- C. Installer Qualifications: Company certified by the manufacturer and specializing in performing Work of this section with minimum 5 years documented experience.
- D. Welding: Qualify procedures and personnel according to AWS D1.3, Structural Welding Code - Sheet Steel.
- E. Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and registered in the state of the project.
- F. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.
- G. Welding Standards: Comply with applicable provisions AWS D1.1 and AWS D1.3 of the Structural Welding Code.
- H. Qualify welding processes and welding operators in accordance with AWS Standard Qualification Procedure.
- 1.4 DELIVERY, STORAGE, AND HANDLING
- A. Acoustical roof deck shall be protected from damage during delivery, storage, and handling.

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- B. If storage at the jobsite is required, acoustical roof deck shall be elevated above the ground, sloped to provide drainage, and protected from the weather with a ventilated covering.

1.5 SEQUENCING

- A. Coordinate installation of sound-absorbing insulation strips and non-corrosive spacers (lath when required) in the ribs of cellular acoustical deck to ensure protection of insulation strips against damage from effects of weather and other causes.

1.6 WARRANTY

- A. Provide with the paint manufacturers Versa-Clad 30 year Film Integrity Limited Warranty against cracking, peeling, checking or flaking under normal anticipated conditions.
- B. Installer's warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Architectural Deck System:
 - 1. New Millennium. (Basis of Design)
 - 2. Epic Metals Corporation.
 - 3. Or equal.

2.2 ARCHITECTURAL DECK SYSTEM

- A. Materials General:
 - 1. Minimum Thickness: 20 GA (0.0359-inch or greater as determined by design).
 - 2. Minimum Yield Strength: 40,000-1b/inch².
 - 3. Protective Coating: Galvanized (zinc) coating weight.
 - a. G-90.
 - 4. ICC ES Report - ESR-2657.
- B. Deck Panel Type: Provide the following deck type(s) to the applications indicated on the Drawings.
 - 1. Type: Deep-Dek 4.5, 4-5/8 inch deep rib-shaped panel sections
 - a. Type: Standard deck with the following.
 - 1) Depth: 4-5/8 inch.
 - 2) Pitch: 12 inch.
 - 3) Cover Width: 12 inch except 24 inch for cellular panels.
 - 4) Side-lap Formation: Nestable.
 - 5) Accessories: Dek Strut.

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- C. Paint Coatings: Manufacturer shall apply uniform, factory-applied coatings, combining steel sheet, passivation, pre-treatment primer and finish top-coat paint where specified to deck panel sections. Coatings shall comply with AAMA 621.
- a. Architecturally exposed ceiling-side deck panel surfaces: Protect pre-finished deck with craft-paper interleaving between deck panel surfaces.
 - b. Manufacturer's Designation:
 - 1) Versa-Clad 30 (PVDF).
 - c. Colors: As selected by Architect.
- D. Fasteners
1. Welded attachment of any architectural ceiling-deck system assembly component is not permitted unless expressly allowed in writing by manufacturer.
 2. Mechanical fasteners for deck panel to support steel not exceeding 3/16 inch thickness and deck panel side-lap attachments.
 - a. Hex-head, self-drilling screws with 300 series stainless steel over hex washer head with integrated EDPM washer; thermo-set polyester film over zinc-plated carbon steel shanks and powder paint coated heads color matched to the top-coat paint finish of the deck panels
 - b. Screws attaching two steel components with a combined material thickness less than 0.095-inch shall possess back-out resistant threads.
 - c. Size, Spacing and Location: As indicated in ceiling-deck system installation drawings.
 3. Type: Mechanical fasteners for deck panels to support steel equal to or greater than 3/16 inch thick:
 - a. Description: Powder-actuated pins with integral washer and knurled shanks of diameter and length matched by Pin Manufacturer to the steel support member's base thickness.
 - b. Size, Spacing and Location: As indicated in ceiling-deck system installation drawings.
 4. Hilti: ICC ES Report - ESR-2776.
- E. Accessories:
1. Provide Ridge and Valley Plates, Butt Plates, Z-Closures, Finish Strips, Sump Pans and Cell Closures as required.
 2. Use size, spacing and location as indicated in ceiling-deck system installation drawings

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not install roof deck until supporting construction is in place.
- B. Examine support framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work of this section.
- C. If supporting construction is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Locate deck bundles to prevent overloading of support members.

3.3 INSTALLATION - GENERAL

- A. Install deck panels and accessories in accordance with the Contract Documents approved installation drawings and requirements of this Section.
- B. Place each deck panel on structural supports and adjust to final position with accurately aligned side laps and ends butted over structural supports to assure minimum specified end bearing length.
- C. Cut and neatly fit deck units and accessories around openings and other work projecting through or adjacent to the decking.
- D. Deck Panel Attachments to structural supports, deck side-lap, and deck perimeter edge attachments: Attach with fasteners of the type, size and spacing indicated on the ceiling-deck system installation drawings immediately after panel placement and alignment. Welded attachment of any architectural ceiling-deck system assembly component is not permitted unless expressly allowed in writing by Manufacturer. If allowed, specification language covering the execution of weld fastening shall accompany the written approval.
- E. Minimum Fastening Requirements:
- F. Fasten deck panels to supports as indicated on the ceiling-deck system installation drawings using mechanical fasteners, powder-actuated pins or self-drilling screws.
- G. Fasten side-laps of deck panel sections as indicated on the ceiling-deck system installation drawings. Fasten side-laps with No. 10 diameter self-drilling screws.
- H. Fasten perimeter edges of deck panels at maximum 12 inch (305 mm) on center intervals or as indicated on the ceiling-deck system installation drawings. Use mechanical fasteners, powder-actuated pins or self-drilling screws.
- I. Accessory Attachments: Anchor accessories to supporting members with self-drilling screws at 12 inch (305 mm) on center intervals or as Indicated on the ceiling-deck system installation drawings.
- J. Reinforce unscheduled openings cut through roof deck in accordance with SDI MOC2 or as indicated on the ceiling-deck system Installation drawings or the structural drawings.
- K. Do not expose the insulation batts to snow, rain, or condensation. Remove and replace any wet insulation.

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3.4 INSPECTION AND REPAIR

- A. Remove dirt and debris from entire deck surfaces before installation of any topping material.
- B. Prior to the application of the roof covering, inspect completed portions of the ceiling-deck system assembly and correct any deficiencies and/or damage to the surface. Replace decking that has been damaged.
- C. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint.
- D. Repair Painting: Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.5 PROTECTION

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

END OF SECTION 053123

SECTION 054000
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud non-load bearing exterior wall and non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.

1.02 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2016.
- E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2015.
- F. ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases; 2015.
- G. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2011a (Reapproved 2015).
- H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).
- I. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel; 2008.
- J. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to the metal framing system, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria, limitations.
- C. Product Data: Provide manufacturer's data on factory-made framing connectors, showing compliance with requirements.
- D. Manufacturer's Installation Instructions: Indicate special procedures and any conditions requiring special attention.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing:
 - 1. CEMCO: www.cemcosteel.com.
 - 2. ClarkDietrich Building Systems: www.clarkdietrich.com.
 - 3. The Steel Network, Inc: www.SteelNetwork.com.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Framing Connectors and Accessories:
 - 1. Same manufacturer as metal framing.
 - 2. Simpson Strong Tie: www.strongtie.com.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 FRAMING SYSTEM

- A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

2.03 FRAMING MATERIALS

- A. Studs and Track: ASTM C955; studs formed to channel, "C", or "Sigma" shape with punched web; U-shaped track in matching nominal width and compatible height.
 - 1. Galvanized in accordance with ASTM A653/A653M, G90/Z275 coating.
 - 2. Provide components fabricated from ASTM A1008/A1008M, Designation SS (structural steel).
- B. Framing Connectors: Factory-made, formed steel sheet.
 - 1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 - 2. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - 3. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
 - 4. Wall Stud Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connections as and where indicated on the drawings.

2.04 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness as indicated on drawings; finish to match framing components.
- B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.05 FASTENERS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.
- B. Anchorage Devices: Powder actuated.
- C. Welding: In conformance with AWS D1.1/D1.1M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION OF STUDS

- A. Install components in accordance with manufacturers' instructions and ASTM C1007 requirements.
- B. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated in Drawings.
- F. Install framing between studs for attachment of architectural, mechanical and electrical items, and to prevent stud rotation.
- G. Touch-up field welds and damaged galvanized surfaces with primer.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/8" inch in 10 feet.
- B. Maximum Variation of any Member from Plane: 1/8" inch.

END OF SECTION

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SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Steel framing and supports for countertops.
2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
3. Miscellaneous framing supports.
4. Miscellaneous steel trim.
5. Support angles for elevator door sills.
6. Metal bollards.
7. Stainless bollards with ADA actuator bar.
8. Abrasive metal nosings.
9. Slotted Channel Framing.
10. Trash enclosure gates.
11. Wire mesh.

B. Related Sections include the following:

1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
2. Division 9 Section "Painting" for field painting.

1.2 DEFINITIONS

A. Exterior: Defined as the following:

1. Areas, locations, and surfaces that are unprotected, or exposed to environmental elements.
2. Areas, locations and surfaces within uncontrolled environments.
3. Areas, locations and surfaces of unconditioned spaces, including belowgrade/underground, partially-exposed, or "covered" parking areas.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For items specified.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
- D. Samples for Verification: For each type and finish of extruded nosing.

1.5 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.

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20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Treads, Risers, and Nosings: CBC Section 11B-504.

1. Interior stairs shall have the upper approach and lower tread marked by a stripe providing clear visual contrast. Exterior stairs shall have the upper approach and all treads marked by a stripe providing clear visual contrast.
2. The stripe providing clear visual contrast shall be a minimum of 2" wide to a maximum of 4" wide placed parallel to, and not more than 1" from, the nose of the step or upper approach. The stripe shall extend the full width of the step or upper approach and shall be of material that is at least as slip resistant as the other treads of the stair. A painted stripe shall be acceptable. Grooves shall not be used to satisfy this requirement.
3. The radius of curvature at the leading edge of the tread shall be no greater than ½". Nosings that project beyond risers shall have the underside of the leading edge curved or beveled. The maximum angle for a riser to slope under the tread shall be 30 degrees from vertical. Nosings shall extend 1-1/4" maximum over the tread below.
4. Treads shall be 11" deep minimum. Risers shall be 7" high maximum and 4" high minimum. All steps on a flight of stairs shall have uniform riser heights and uniform tread depths. Open risers are not permitted.

1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. 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.
- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal fabrications that fails in materials or workmanship within specified warranty period.
 1. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Extruded Abrasive Metal Nosings: Subject to compliance with requirements, provide either the product by named manufacturer or an equal product by one of the other manufacturers specified.

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1. Type 24 by American Safety Tread Co., Inc. (Basis of Design)
 2. Type 24 Spectra by Wooster Products Inc.
 3. Or equal.
- B. Corrugated Metal Panels for Trash Enclosure Gates:
1. Tomen Building Components, Inc. (TBC), Ontario, CA. (Basis of Design)
 2. BHP Steel Building Products USA, Inc., West Sacramento, CA.
 3. Smith Steelite, Moon Township, PA.
 4. Verco Manufacturing Co., Phoenix, AZ.
 5. VicWest Steel, Oregon, Salem, OR.
 6. Or equal.
- C. Perforated Metal: Subject to compliance with requirements, provide product from following manufacturers.
1. McNichols. (Basis of Design)
 2. Banker.
 3. Accurate Perforating.
 4. Hendrick Manufacturing.
 5. Or equal.

2.2 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.
- B. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- E. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- F. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
1. Size of Channels: 1-5/8 by 1-5/8 inches or as indicated.
 2. Material: Galvanized steel complying with ASTM A 653, commercial steel, Type B, with G90 coating; 0.108-inch nominal thickness.

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2.4 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe, galvanized.
 - 1. Fill pipe with concrete and finish with dome top.
 - 2. Pipe diameter: As indicated on Drawings.
- B. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch- thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.

2.5 STAINLESS BOLLARDS WITH ADA ACTUATOR BAR.

- A. 6"x6"x42"H 304 satin stainless steel bollard, surface mount with concealed mounting base and back slanted stainless steel removable 10° angle top.
 - 1. Product: BPS SM INGR RAT US32D (630) by Wikk Industries Inc or equal.
- B. 6"x36"H 304 satin stainless steel vertical actuator bar with ISA and 'PUSH TO OPEN' text.
 - 1. Product: I36-3 US32D (630) by Wikk Industries Inc. or equal.

2.6 ABRASIVE METAL NOSINGS

- A. Extruded Units: Aluminum, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in sizes and configurations indicated and in lengths necessary to accurately fit openings or conditions.
 - 1. Provide anti-slip strip of contrasting color 2 inches wide, parallel to and not more than 1 inch from the front nose of each step.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Apply bituminous paint to concealed bottoms, sides, and edges of cast-metal units set into concrete.
- D. Apply clear lacquer to concealed bottoms, sides, and edges of extruded units set into concrete.

2.7 TRASH ENCLOSURE GATES

- A. Gate Configuration, Frame Height, and Opening Width: As indicated on Drawings.
- B. Framing: Fabricated steel tubes, angles, and plates as detailed on Drawings, hot-dipped galvanized finish after fabrication, with galvanized corrugated steel panel infill.
- C. Corrugated Metal Panels: TBC-7.2 Industrial Panels, 18 gage, 1-1/2 inch deep, 36-inch wide coverage, corrugations spaced 7.2 inches on center, ASTM A526 with factory coating designation G90 complying with ASTM A525.
- D. Gate Hardware:

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1. As indicated on Drawings, welded-on heavy weight butt hinges, minimum 3-hinges per gate leaf, hot-dipped galvanized finish.
 2. Cane Bolts: Provide for inactive leaf of pairs of gates. Fabricated from 3/4-inch- diameter, round steel bars, hot-dip galvanized after fabrication. Finish to match gates. Provide galvanized-steel pipe strikes to receive cane bolts in both open and closed positions.
- E. Finish: Field finish per Division 9 Section "Painting".
1. Color: As indicated on Drawings.

2.8 WIRE MESH

- A. Guardrail Mesh:
1. Product: McNichols or equal
 2. Pattern as indicated on Drawings
- B. Exterior Gate:
1. Product: Perforated metal panels.
 2. Pattern as indicated on Drawings.
- C. Product: Grating by McNichols or equal.
1. Product Line: Bar Grating.
 2. Construction Type: Press-Locked
 3. Series Type & Name: GCM-1-100 - CLOSE MESH (7-P-4) – ADA.
 4. Product Spacing: 7-P-4.
 5. Primary Material: Carbon Steel (CS).
 6. Alloy, Grade or Type: Hot Rolled (HR).
 7. Material Finish: Mill Finish.
 8. Bearing Bar Size & Shape: 1" Height x 3/16" Thick Rectangular Bar.
 9. Bearing Bar Height: 1".
 10. Bearing Bar Thickness: 3/16".
 11. Bearing Bar Shape: Rectangular.
 12. Bearing Bar Spacing: 7/16" on Center.
 13. Clear Space Between Bearing Bars: 1/4".
 14. Bearing Bar Surface: Smooth.
 15. ADA Compliant: ADA-Compliant Product When Direction of Bearing Bars (Span) Installed Perpendicular to Dominant Direction of Travel.
 16. Used at building roof openings above west exterior stair and the north canopy.

2.9 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, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Anchor Bolts: ASTM F 1554, Grade 36.
1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

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2.10 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 Division 9 painting Sections.
- C. Surface Preparation: SSPC-SP2 Hand Tool Clean and /or SSPC-SP3 Power Tool Clean.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.

2.11 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 true to line and level 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 where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, 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.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch

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embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.12 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 retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.13 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.

2.14 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.

2.15 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

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- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
- D. Field Finish: Comply with Division 9 Section "Painting" for field painting.

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 bolts, 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.

3.2 INSTALLING METAL BOLLARDS

- A. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch bolts at each bollard, unless otherwise indicated.
 - 1. Embed anchor bolts at least 4 inches in concrete.
- B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

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- C. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.
- D. Fill bollards solidly with concrete, mounding top surface to shed water.

3.3 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

- A. Center nosings on tread widths.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 7 Section "Joint Sealants" to provide a watertight installation.

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

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Preassembled steel stairs: Metal pan, concrete filled, and metal nosing.

B. Related Sections include the following:

1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
2. Division 3 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
3. Division 5 Section "Metal Fabrications" for metal treads and nosings not installed in metal stairs.

1.2 DEFINITIONS

A. Exterior: Defined as the following:

1. Areas, locations, and surfaces that are unprotected, or exposed to environmental elements.
2. Areas, locations and surfaces within uncontrolled environments.
3. Areas, locations and surfaces of unconditioned spaces, including belowgrade/underground, partially-exposed, or "covered" parking areas.

1.3 DESIGN REQUIREMENTS

A. Treads, Risers, and Nosings: CBC Section 11B-504.

1. Interior stairs shall have the upper approach and lower tread marked by a stripe providing clear visual contrast. Exterior stairs shall have the upper approach and all treads marked by a stripe providing clear visual contrast.
2. The stripe providing clear visual contrast shall be a minimum of 2" wide to a maximum of 4" wide placed parallel to, and not more than 1" from, the nose of the step or upper approach. The stripe shall extend the full width of the step or upper approach and shall be of material that is at least as slip resistant as the other treads of the stair. A painted stripe shall be acceptable. Grooves shall not be used to satisfy this requirement.
3. The radius of curvature at the leading edge of the tread shall be no greater than 1/2". Nosings that project beyond risers shall have the underside of the leading edge curved or beveled. The maximum angle for a riser to slope under the tread shall be 30 degrees from vertical. Nosings shall extend 1-1/4" maximum over the tread below.
4. Treads shall be 11" deep minimum. Risers shall be 7" high maximum and 4" high minimum. All steps on a flight of stairs shall have uniform riser heights and uniform tread depths. Open risers are not permitted.

B. Accessibility Requirements for Railings and Handrails: CBC Section 11B-505.

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1. Top of gripping surfaces of handrails shall be 34" minimum and 38" maximum vertically above walking surfaces, stair nosings, and ramp surfaces. Handrails shall be at a consistent height above such surfaces.
2. Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-1/2" minimum. Handrail may be located in a recess if the recess is 3" maximum deep and 18" minimum clear above the top of the handrail.
3. Handrail gripping surfaces shall be continuous along their length and shall not be obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20% of their length. Where provided, horizontal projections shall occur 1-1/2" minimum below the bottom of the handrail gripping surfaces.
4. Handrail gripping surfaces with a circular cross section shall have an outside diameter of
5. 1-1/4" minimum and 2" maximum.
6. Handrail gripping surfaces with a non-circular cross section shall have an outside dimension of 4" minimum and 6-1/4" maximum, and a cross-sectional dimension of 2-1/4" maximum.
7. Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive elements and shall have rounded edges.
8. Handrails shall not rotate within their fittings.
9. Handrail gripping surfaces shall extend beyond and in the same direction of stair flights and ramp runs in accordance with CBC Section 11B-505.10. Such extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
10. A 2" minimum high curb or a barrier shall be provided to prevent the passage of a 4" diameter sphere rolling off the sides of a ramp surface. Such a curb or a barrier shall be continuous and uninterrupted along the length of a ramp. CBC Section 11B-405.9.2.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Stairs: Provide metal stairs capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 1. Uniform Load: 100 lbf/sq. ft.
 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
 3. Uniform and concentrated loads need not be assumed to act concurrently.
 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 5. Limit deflection of treads, platforms, and framing members to L/240 or 1/4 inch, whichever is less.
- B. Structural Performance of Railings: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 1. Handrails:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 3. Infill of Guards:
 - a. Uniform load of 25 lbf/sq. ft. applied horizontally.

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- b. Infill load and other loads need not be assumed to act concurrently.
- C. Seismic Performance: Provide metal stairs capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.5 SUBMITTALS

- A. Product Data: For metal stairs and the following:
 - 1. Precast concrete treads.
 - 2. Abrasive nosings.
 - 3. Paint products.
 - 4. Grout.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Provide templates for anchors and bolts specified for installation under other Sections.
 - 2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design.
- E. Samples for Verification: For the following products, in manufacturer's standard sizes:
 - 1. Precast concrete treads.
 - 2. Abrasive nosings.
- F. Welding certificates.
- G. Qualification Data: For professional engineer.

1.6 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).

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4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Provide 2 inch contrasting color (70% recommended) warning stripe 1 inch max. from edge of nosing of each exterior stair and top landing. Top landing and bottom tread nosing only at interior stairs.
- C. Installer Qualifications: Fabricator of products.
- D. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
1. Preassembled Stairs: Commercial class.
 2. Ornamental Stairs: Architectural class.
- E. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
 2. AWS D1.3, "Structural Welding Code--Sheet Steel."

1.7 COORDINATION

- A. Coordinate installation of anchorages for metal stairs. 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.
- B. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

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1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal stairs that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Preassembled Stairs: Contractor has option to build from components.
 - 1. American Stair Corporation.
 - 2. Sharon Stairs.
 - 3. Commercial class.
 - 4. Local iron workers.

2.2 METALS, GENERAL

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

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
- C. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.

2.4 ABRASIVE METAL NOSINGS

- A. Extruded Abrasive Metal Nosings as specified in Division 5 Section "Metal Fabrications".

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2.5 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. 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.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts for exterior stairs.
- D. Machine Screws: ASME B18.6.3.
- E. Plain Washers: Round, ASME B18.22.1.
- F. Lock Washers: Helical, spring type, ASME B18.21.1.
- G. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency. Include evaluation report numbers.
 - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

2.6 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 Division 9 painting Sections.
- C. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- 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.
- G. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

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- H. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.
- I. Welded Wire Fabric: ASTM A 185, 6 by 6 inches--W1.4 by W1.4, unless otherwise indicated.

2.7 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding, unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
 - 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. 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.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- F. Weld connections 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. Weld exposed corners and seams continuously, unless otherwise indicated.
 - 5. 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.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.8 PREASSEMBLED STEEL-FRAMED STAIRS

- A. Stair Framing:

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1. Fabricate stringers of steel channels.
 - a. Provide closures for exposed ends of channel stringers.
 2. Construct platforms of steel channel headers and miscellaneous framing members as needed to comply with performance requirements and headroom limitations.
 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
 4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
- B. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.0677 inch.
- C. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.0966 inch.
1. Steel Sheet: Uncoated hot-rolled steel sheet, unless otherwise indicated.
 2. Directly weld risers and treads to stringers; locate welds on underside of stairs.
 3. Provide platforms of configuration indicated or, if not indicated, the same as treads. Weld platforms to platform framing.
 4. Finish tread and platform surfaces with manufacturer's standard epoxy-bonded abrasive finish.

2.9 STEEL TUBE RAILINGS

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
- B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
- C. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- D. Close exposed ends of railing members with prefabricated end fittings.
- E. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
1. Connect posts to stair framing by direct welding, unless otherwise indicated.

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2. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
3. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.

2.10 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 1. ASTM A 123, for galvanizing steel and iron products.
 2. ASTM A 153, for galvanizing steel and iron hardware.
 3. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:
 1. Exterior Stairs (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Interior Stairs (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- E. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. 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.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.

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- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. 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.
- F. 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.
- G. Place and finish concrete fill for treads and platforms to comply with Division 3 Section "Cast-in-Place Concrete."
 - 1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.
- H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
- B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonmetallic, nonshrink grout, unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING STEEL TUBE RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
 - 1. Anchor posts to steel by welding directly to steel supporting members.
 - 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
- B. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:
 - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

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2. Use type of bracket with predrilled hole for exposed bolt anchorage.
3. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
4. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed 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 9 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 055100

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SECTION 055134 - ALUMINUM LADDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Over the parapet ladders.
 - 2. Ships ladders.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. 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.
- D. Qualification Data: Refer to Quality Assurance provisions for submittal requirements evidencing experience, certifications and resources.
- E. Verification Samples: For each finish specified, two samples, minimum size 6 inches square, represent actual product color.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. ANSI Standard A14.3.
 - 2. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 3. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).

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4. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 5. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 6. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 7. 2016 California Energy Code, Part 6, Title 24 CBSC.
 8. 2016 California Historical Code, Part 8, Title 24 CBSC.
 9. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 10. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 11. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 12. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 13. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 14. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 16. NFPA 20 - Stationary Pumps, 2016 Edition.
 17. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 18. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 19. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 20. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 21. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 22. Americans with Disabilities Act (ADA), Title II.
- B. Manufacturer Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.
- C. Record of successful in-service performance.
- D. Sufficient production capacity to produce required units.
- E. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum ladders that fails in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Aluminum Ladders: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. O’Keeffe’s Inc. (Basis of Design)
 - 2. Royalite.
 - 3. Alaco.
 - 4. Precision.
 - 5. Cotterman.
 - 6. ACL.
 - 7. Or equal.

2.2 MATERIALS

- A. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.
- B. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.
- C. Fasteners: As recommended by ladder manufacturer.

2.3 OVER THE PARAPET LADDERS

- A. Product: Model 504 Tubular Rail Low Parapet Access Ladder with Walk-through Rail Extension by O’Keeffe’s Inc. or equal.
 - 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. Channel side rails are not acceptable.
 - 4. Walk-Through Rail Extension: Not less than 3 feet 6 inches above the landing and shall be fitted with deeply serrated, square, tubular grab rails.

2.4 SHIPS LADDER

- A. Product: Model 522 by O’Keeffe’s Inc. or equal.
 - 1. CBC 1009.14 Ship Ladder:
 - a. Ship ladders are permitted to be used in Group I-3 as a component of a means of egress to and from control rooms or elevated facility observation stations not more than 250 square feet with not more than three occupants and for access to unoccupied roofs.
 - b. Ship ladders shall have a minimum tread depth of 5 inches. The tread shall be projected such that the total of the tread depth plus the nosing projection is no less than 8-1/2 inches. The maximum riser height shall be 9-1/2 inches.

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- c. Handrails shall be provided on both sides of ship ladders. The minimum clear width at and below the handrails shall be 20 inches.
- 2. Type: Ship Ladder with Platform and Return.
- 3. Incline: 75 degree.
- 4. 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.
- 5. Rungs shall withstand a 1,500 pound load without deformation or failure.
- 6. 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. Channel side rails are not acceptable.

2.5 ALUMINUM FINISHES

- A. Mill finish. As extruded.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Anchor securely using fasteners specified by manufacturer or others of equivalent or greater strength and corrosion resistance.

END OF SECTION 055134

SECTION 055213 - PIPE AND TUBE RAILINGS

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 pipe and tube railings.
 - 2. Aluminum pipe and tube railings.
 - 3. Stainless-steel pipe and tube railings.
- B. Related Sections:
 - 1. Section 055112 "Metal Stairs" for steel tube railings associated with metal stairs.
 - 2. Section 057300 "Decorative Metal Railings" for ornamental railings fabricated from pipes and tubes.
 - 3. Section 092216 "Non-Structural Metal Framing" for metal backing for anchoring railings.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Steel: 72 percent of minimum yield strength.
 - 2. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
 - 3. Stainless Steel: 60 percent of minimum yield strength.
- C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.

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- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Railing brackets.
 - 3. Grout, anchoring cement, and paint products.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified professional engineer.
- B. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

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- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION AND SCHEDULING

- 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 for railings. 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.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.2 STEEL AND IRON

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

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- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- F. Expanded Metal: ASTM F 1267, Class 1 (uncoated).
- G. Perforated Metal: Cold-rolled steel sheet, ASTM A 1008/A 1008M, or hot-rolled steel sheet, ASTM A 1011/A 1011M, commercial steel Type B, 0.060 inch thick, with 1/4-inch holes 3/8 inch o.c. in staggered rows.
- H. Perforated Metal: Galvanized-steel sheet, ASTM A 653/A 653M, G90 coating, commercial steel Type B, 0.064 inch thick, with 1/4-inch holes 3/8 inch o.c. in staggered rows with 1/8-by-1-inch round end slotted holes in staggered rows.
- I. Woven-Wire Mesh: Intermediate-crimp, diamond pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal diameter wire complying with ASTM A 510.

2.3 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Tubing: ASTM B 221, Alloy 6063-T5/T52.
- C. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
- D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.
- E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.
- G. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.
- H. Perforated Metal: Aluminum sheet, ASTM B 209, Alloy 6061-T6, 0.063 inch thick, 1/4-inch holes 3/8 inch o.c. in staggered rows.
- I. Woven-Wire Mesh: Intermediate-crimp, diamond pattern, 2-inch woven-wire mesh, made from 0.162-inch nominal diameter wire complying with ASTM B 21, Alloy 6061-T94.

2.4 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Pipe: ASTM A 312/A 312M, Grade TP 304.
- C. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
- D. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.

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- E. Expanded Metal: ASTM F 1267, Class 3 (corrosion-resistant steel), made from stainless-steel sheet, ASTM A 240/A 240M or ASTM A 666, Type 304.
- F. Perforated Metal: Stainless-steel sheet, ASTM A 240/A 240M or ASTM A 666, Type 304, 0.062 inch thick, with 1/4-inch holes 3/8 inch o.c. in staggered rows.
- G. Woven-Wire Mesh: Intermediate-crimp, square pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal diameter wire complying with ASTM A 580/A 580M, Type 304.

2.5 FASTENERS

- A. General: Provide the following:
 - 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
 - 2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
 - 3. Aluminum Railings: Type 304 stainless-steel fasteners.
 - 4. Stainless-Steel Railings: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
 - 2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 - 3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For aluminum and stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and for color match, strength, and compatibility in fabricated items.

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- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Shop Primers: Provide primers that comply with Section 099113 - Exterior Painting, Section 099123 - Interior Painting, and Section - 099600 High-Performance Coatings.
- F. 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.
- G. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- H. Shop Primer for Galvanized Steel: Water based galvanized metal primer complying with MPI#134.
- I. Intermediate Coats and Topcoats: Provide products that comply with Section 099113 -Exterior Painting, Section 099123- Interior Painting, and Section 099600- High-Performance Coatings.
- J. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- K. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- L. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- M. 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.
- N. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units for shipping and handling limitations. Clearly mark units for

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- reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. 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.
 - D. Form work true to line and level with accurate angles and surfaces.
 - E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 - F. Cut, reinforce, drill, and tap to receive finish hardware, screws, and similar items.
 - G. Connections: Fabricate railings with welded connections unless otherwise indicated.
 - H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 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 flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
 - I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
 - J. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
 - K. Form changes in direction as follows:
 - 1. As detailed.
 - 2. By radius bends of radius indicated.
 - L. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
 - M. Close exposed ends of railing members with prefabricated end fittings.
 - N. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
 - O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

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1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- Q. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.
- R. For removable railing posts, fabricate slip-fit sockets from steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
 1. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
- S. Expanded-Metal Infill Panels: Fabricate infill panels from expanded metal made from same metal as railings in which they are installed.
 1. Edge panels with U-shaped channels made from metal sheet, of same metal as expanded metal and not less than 0.043 inch thick.
 2. Orient expanded metal with long dimension of diamonds vertical.
- T. Perforated-Metal Infill Panels: Fabricate infill panels from perforated metal made from same metal as railings in which they are installed.
 1. Edge panels with U-shaped channels made from metal sheet, of same metal as perforated metal and not less than 0.043 inch thick.
 2. Orient perforated metal with pattern vertical.
- U. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.
 1. Orient wire mesh with wires perpendicular and parallel to top rail.
- V. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.8 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.

- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.9 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
2. Hot-dip galvanize indicated steel and iron railings, including hardware, after fabrication.
3. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
4. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
5. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
6. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

- D. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.

- E. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning.

- F. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel, for shop painting.

1. Shop prime uncoated railings with primers specified in Section 099113 - Exterior Painting and Section 099123- Interior Painting.
2. Do not apply primer to galvanized surfaces.

- G. Shop-Painted Finish: Comply with Section 099113 - Exterior Painting.

1. Color: As indicated.

- H. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel, for shop painting. Apply at spreading rates recommended by coating manufacturer.

1. Color: As indicated.

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2.10 ALUMINUM FINISHES

- A. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- C. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - 1. Color: As selected by Architect from full range of industry colors and color densities.
- D. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: As indicated.

2.11 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines, or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. 180-Grit Polished Finish: Oil-ground, uniform, directionally textured finish.
- D. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.
- E. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.
- F. Directional Satin Finish: No. 4.
- G. Dull Satin Finish: No. 6.
- H. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

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1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.

3.5 ATTACHING RAILINGS

- A. Secure wall brackets and railing end flanges to building construction as follows:
1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 2. For hollow masonry anchorage, use toggle bolts.
 3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 4. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
 5. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
 6. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

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3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed 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. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 057300 – DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Stainless-steel ornamental railings.
 - 2. Stainless-steel post-supported railings with wire-mesh infill.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.
- B. Exterior: Defined as the following:
 - 1. Areas, locations, and surfaces that are unprotected, or exposed to environmental elements.
 - 2. Areas, locations and surfaces within uncontrolled environments.
 - 3. Areas, locations and surfaces of unconditioned spaces, including belowgrade/underground, partially-exposed, or "covered" parking areas.

1.3 DESIGN REQUIREMENTS

- A. Accessibility Requirements for Railings and Handrails: CBC Section 11B-505.
 - 1. Top of gripping surfaces of handrails shall be 34" minimum and 38" maximum vertically above walking surfaces, stair nosings, and ramp surfaces. Handrails shall be at a consistent height above such surfaces.
 - 2. Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-1/2" minimum. Handrail may be located in a recess if the recess is 3" maximum deep and 18" minimum clear above the top of the handrail.
 - 3. Handrail gripping surfaces shall be continuous along their length and shall not be obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20% of their length. Where provided, horizontal projections shall occur 1-1/2" minimum below the bottom of the handrail gripping surfaces.
 - 4. Handrail gripping surfaces with a circular cross section shall have an outside diameter of
 - 5. 1-1/4" minimum and 2" maximum.
 - 6. Handrail gripping surfaces with a non-circular cross section shall have an outside dimension of 4" minimum and 6-1/4" maximum, and a cross-sectional dimension of 2-1/4" maximum.
 - 7. Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive elements and shall have rounded edges.
 - 8. Handrails shall not rotate within their fittings.

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9. Handrail gripping surfaces shall extend beyond and in the same direction of stair flights and ramp runs in accordance with CBC Section 11B-505.10. Such extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
10. A 2" minimum high curb or a barrier shall be provided to prevent the passage of a 4" diameter sphere rolling off the sides of a ramp surface. Such a curb or a barrier shall be continuous and uninterrupted along the length of a ramp. CBC Section 11B-405.9.2.

1.4 PERFORMANCE REQUIREMENTS

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 1. Stainless Steel: 60 percent of minimum yield strength.
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 1. Handrails:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.5 SUBMITTALS

- A. Product Data: For the following:
 1. Manufacturer's product lines of railings assembled from standard components.
 2. Grout, anchoring cement, and paint products.
- B. LEED Submittals:
 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with

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cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- E. Samples for Verification: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Each type of glass required.
 - 3. Fittings and brackets.
 - 4. Welded connections.
 - 5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.
- F. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.

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15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for system's 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 structural analysis, preconstruction testing, field testing, and in-service performance.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Division 1 Section "Product 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.
- E. Welding: Qualify procedures and personnel according to the following:
1. AWS D1.1, "Structural Welding Code--Steel."
 2. AWS D1.6, "Structural Welding Code--Stainless Steel."

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings 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 dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 2. Provide allowance for trimming and fitting at site.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. 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.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

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1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of ornamental railings that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Decorative Stainless-Steel Railings:
 - 1. Blum, Julius & Co., Inc.
 - 2. Blumcraft of Pittsburgh.
 - 3. Livers Bronze Co.
 - 4. Or equal.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails, unless otherwise indicated.
 - 1. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.
 - 3. Provide formed-steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.
 - 4. Provide extruded-aluminum brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

2.3 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Plate and Sheet: ASTM A 666, Type 304.
- C. In-fill frame work: Stainless Steel.

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- D. In-fill Woven-Wire Mesh: Stainless steel intermediate-crimp, square pattern, 2-inch woven-wire mesh, made from 0.135-inch nominal diameter wire complying with ASTM A 510.
 - 1. Product: McNichols or equal.

2.4 FASTENERS

- A. General: Provide the following:
 - 1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
 - 2. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Anchors: Provide cast-in-place anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

2.5 MISCELLANEOUS MATERIALS

- A. Plastic Handrail Cap: Thermoplastic rail covering, color as indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- C. 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.
- D. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

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- C. Make up wire-rope assemblies in the shop to field-measured dimensions with fittings machine swaged. Minimize amount of turnbuckle take-up used for dimensional adjustment so maximum amount is available for tensioning wire ropes. Tag wire-rope assemblies and fittings to identify installation locations and orientations for coordinated installation.
- D. 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.
- E. Form work true to line and level with accurate angles and surfaces.
- F. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- G. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 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 flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- J. Form changes in direction as follows:
 - 1. As detailed.
- K. Close exposed ends of hollow railing members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch or less.
- M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide fillers made from crush-resistant material, or other means to transfer wall loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- O. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with steel plate forming bottom closure.

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2.7 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 shipment.
- 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 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.

2.8 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform finish indicated, free of cross scratches.
- C. Finish: Brushed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

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3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

3.4 ANCHORING POSTS

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch buildup, sloped away from post.
- C. Anchor steel posts to steel with flanges, angle or floor type as required by conditions, welded to posts and bolted to metal supporting members.

3.5 CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections.

3.6 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057300

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SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Wall sheathing.
 - 2. Vapor permeable membrane air barrier.
 - 3. Sheathing joint-and-penetration treatment.

- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Polyvinyl-Chloride (PVC) Roofing" for roof boards.
 - 3. Division 7 Section "Composite Wall Panels" for vapor permeable membrane air barrier specified in this section used in conjunction with composite wall panels.

1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. For building wrap, include data on air-/moisture-infiltration protection based on testing according to referenced standards.

- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).

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5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sheathing that fails in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 2. Warranty Period: 5 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Glass-Mat Gypsum Sheathing:
 - 1. G-P Gypsum Corporation.
 - 2. Securock Glass Mat Sheathing by USG.
 - 3. Gold Bond Brand e2XP by National Gypsum.
 - 4. Or equal.

- B. Fluid-Applied, Vapor Permeable Membrane Air Barrier: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Perm-A-Barrier VP by Grace Construction Products. (Basis of Design)
 - 2. Ecoflex-PS by Epro Services.
 - 3. Barriseal by Carlisle Coatings & Waterproofing.
 - 4. Air-Bloc 06 by Henry Company.
 - 5. Air-Shield LMP by W.R Meadows, Inc.
 - 6. Or equal.

2.2 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177.
 - 1. Product: Dens-Glass or Dens-Elements by G-P Gypsum Corporation or equal.
 - a. Type X.
 - b. Thickness: As indicated on Drawings.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 - 3. Location: At eaves, rakes, valleys, penetrations, slope and direction changes, horizontal and soffit areas, in addition to where indicated on Drawings
 - 4. Method: Overlap with felt after putting down Self-Adhering sheet.

2.4 FLUID-APPLIED, VAPOR PERMEABLE MEMBRANE AIR BARRIER

- A. Product: Perm-A-Barrier VP by Grace Construction Products. (Basis of Design)
 - 1. Physical and Performance Properties: Provide products with the following minimum properties:
 - a. Fluid-applied type would be equal to specified self-adhering underlayment at Contractor's option.

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- b. Membrane Air Permeance: Not to exceed 0.0004 cfm/sq. ft. of surface area (at specified thickness) at 1.57-lbf/sq. ft. pressure difference when applied to CMU wall; when tested per ASTM E2178.
 - c. Membrane Vapor Permeance: Not less than 11.2 perms; when tested per ASTM E96.
 - d. Assembly Performance: Provide continuous air barrier assembly that has air leakage not to exceed 0.0008 cfm/sq. ft. of surface area under pressure differential of 0.3 in. water (1.57 pounds per square foot) when tested in accordance with ASTM E 2357.
 - e. UV Exposure Limit: Not more than 180 calendar days; per ASTM D412 and ASTM E96-Method B.
- B. Contractor has the option of providing self-adhered product in lieu of fluid-applied product. Comply with the following requirements:
- 1. Product: Perm-A-Barrier VPS by Grace Construction Products or equal.
 - a. Description: Self-adhered membrane consisting of a breathable carrier film with a specially designed adhesive, which permits the transfusion of water vapor and provides superior protection against the damaging effects of air and water ingress on building structures, Product shall have the following minimum physical properties:
 - 1) Air Permeance, ASTM E2178: Not to exceed 0.004 cfm/sq. ft. under a pressure differential of 0.3 in. water. (1.57 psf).
 - 2) Assembly Air Permeance, ASTM E2357: Not to exceed 0.04 cfm/sq. ft. under pressure differential of 0.3 in. water (1.57 psf).
 - 3) Water Vapor Permeance, ASTM E96: Not less than 15 perms.
 - 4) Water Resistance, AATCC-127: No less than 5 hrs at 55 cm/21 inch.
 - 5) Breaking Force, ASTM D5034: 55 lbf MD, and 44 lbf CD.
 - 6) Pull Adhesion, ASTM D4541: min. 15 psi to primed glass faced gypsum sheathing, min. 12 psi to primed CMU.
 - 7) Peel Adhesion, ASTM D903: min. 5 pli to primed glass faced gypsum sheathing, min. 4 ply to Perm-A-Barrier® VPS, min. 2.5 ply to primed CMU.
 - 8) UV Exposure Limit: Not more than 150 calendar days.
 - 9) Water Penetration Resistance Around Nails, ASTM D1970 Modified: Pass.
 - 10) Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - b. Transition Membrane: Perm-A-Barrier Detail Membrane; a 36 mil (0.9mm) of self-adhesive rubberized asphalt integrally bonded to 4 mil (0.1 mm) of cross-laminated, high-density polyethylene film to provide a min. 40 mil (1.0 mm) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.
 - c. Transition Aluminum Membrane: Perm-A-Barrier Aluminum Flashing; a 35 mil (0.9 mm) of self-adhesive rubberized asphalt integrally bonded to 5 mil (0.1 mm) of aluminum film to provide a min. 40 mil (1.0 mm) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.
 - d. Flexible Membrane Through-Wall Flashing: Perm-A-Barrier Wall Flashing; a 32 mil (0.8 mm) of self-adhesive rubberized asphalt integrally bonded to 8 mil (0.2 mm) of cross-laminated, high-density polyethylene film to provide a min. 40 mil (1.0 mm) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

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- e. Primer for Primary Self-adhered air barrier membrane: Perm-A-Barrier Primer Plus; a water-based primer which imparts an aggressive, high tack finish on the treated substrate.
- f. Wall Primer for Self-adhered transition membrane and Self-adhered flexible membrane wall flashing: Perm-A-Barrier WB Primer; a water-based primer which imparts an aggressive, high tack finish on the treated substrate.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153.
- B. Power-Driven Fasteners: NES NER-272.
- C. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch thick, attach sheathing to comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch thick, attach sheathing to comply with ASTM C 954.

2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and complying with requirements for elastomeric sealants specified in Division 7 Section "Joint Sealants."
 - 1. Sealants, General: Sealants shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.
- B. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.7 MISCELLANEOUS MATERIALS

- 1. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in CBC's "California Building Code."
- D. 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.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. 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 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 masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
- D. 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.

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1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.3 FLUID-APPLIED, VAPOR PERMEABLE MEMBRANE AIR BARRIER

- A. General: Comply with fluid-applied, vapor permeable membrane air barrier manufacturer's written instructions.
- B. Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation.
- C. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Cover membrane within 14 days.
- D. Apply double thickness or install extra layer of self-adhered membrane at fastener locations.

3.4 SHEATHING JOINT-AND-PENETRATION TREATMENT

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.
 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600

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SECTION 064000 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Plastic-laminate cabinets.
 - 2. Solid surface countertops.
 - 3. Quartz surface countertops.
 - 4. Mail slots.
 - 5. Resin/Ecoresin Panels.

- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 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.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Cabinet and Drawer Hardware:
 - a. Operable parts for all accessible casework shall comply with CBC Section 11B-309.

1.4 SUBMITTALS

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

- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

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3. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 4. MRc7, Certified Wood. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 5. EQc4.1, Low-Emitting Materials, Adhesives and Sealants. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 6. EQc4.2, Low-Emitting Materials, Paints and Coatings. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 7. EQc4.4, Low-Emitting Materials, Composite Wood and Agrifiber Products. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- 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. Apply WI-certified compliance label to first page of Shop Drawings and follow Section 1, "Guidelines for Architectural Millwork Shop Drawing".
- D. Samples for Initial Selection: For each type of product indicated requiring product selection.
- E. Samples for Verification:
1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
 2. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
 3. Exposed cabinet hardware and accessories, one unit for each type and finish.
 - a. Hardware samples will be returned up on approval.
- F. Product Certificates: For each type of product, signed by product manufacturer.
- G. Woodwork Quality Standard Compliance Certificates for Product and Installation: WI-certified compliance certificates confirming conformance with Certified Compliance Program (CCP).
- H. Qualification Data: For Installer and fabricator.

1.5 QUALITY ASSURANCE

- A. Reference Standards:
1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).

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3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Americans with Disabilities Act (ADA), Title II or Title III. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.
- C. Installer Qualifications: Licensee of WI's Certified Compliance Program.
- D. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
1. Before delivery to job-site, Millwork supplier:
 - a. Licensees of WI shall issue a certified compliance certificate indicating millwork products being furnished for this project, and certifying that these products and their installation, will fully meet requirements of grade or grades specified.
 - b. Non-Licensees of WI shall provide evidence that they have arranged for inspection by WI inspector after completion of fabrication and installation. If conditions are found to be compliant, inspector will issue Compliance Certificate indicating millwork products being furnished for this project, and certifying that these products and their installation, will fully meet requirements of grade or grades specified.
 2. Each elevation of casework and each countertop shall bear certified compliance label.
 3. Cabinet Design Series (CDS): CDS numbers on Drawings indicate typical designs.
- E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by

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testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

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. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. 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. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of interior architectural woodwork that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years.

- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. High-Pressure Decorative Laminate:
1. Wilsonart International; Div. of Premark International, Inc. (Basis of Design)
 2. Formica Corporation.
 3. Nevamar Company, LLC; Decorative Products Div.
 4. Arpa.
 5. Abet Laminati.
 6. Or equal.
- B. Solid Surfacing Materials:
1. Formica Corporation. (Basis of Design)
 2. E. I. du Pont de Nemours and Company.
 3. Nevamar Company, LLC; Decorative Products Div.
 4. Wilsonart International; Div. of Premark International, Inc.
 5. Or equal.
- C. Quartz surfaces: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
1. Cambria. (Basis of Design)
 2. Samsung.
 3. Quartz surfacing by Caesarstone.
 4. Zodiaq by DuPont.
 5. Silestone by Consentino.
 6. IceStone.
 7. Or equal.
- D. Resin/Ecoresin Panels:
1. Lumicor. (Basis of Design)
 2. 3-Form.
 3. Or equal.

2.2 MATERIALS

- A. General: Provide materials that comply with requirements of WI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Sustainable Requirements:
1. Recycled Content: Hardboard, medium-density fiberboard, and particleboard shall contain a minimum 95 percent recycled content.
 2. Certified Wood: For non-recycled wood materials, provide wood obtained from sources that participate in a well-managed forest and chain-of-custody program certified by an independent agency accredited by the Forest Stewardship Council (FSC).
 3. Low-Emitting Materials:

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- a. Provide composite wood products containing no added urea formaldehyde.
 - b. Adhesives applied on site shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.
 4. Horizontal shelving core: 3/4 inch plywood per District Standards.
- C. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
1. Type: Standard type, unless Special Purpose type is indicated.
- D. Quartz Surfacing Material:
1. Composition: 93 percent crushed quartz aggregate combined with resins and pigments and fabricated into slabs using a vacuum vibro-compaction process.
 2. Performance:
 - a. Flexural Strength: 7,420 psi, ASTM C880.
 - b. Compressive Strength: ASTM C-170
 - 1) Dry: 10,430 psi average.
 - 2) Wet: 11,265 psi average.
 - c. Izod Impact Strength: 0.361ft. lbs./inch of notch average; ASTM D256.
 - d. Bond Strength: 205 psi; ASTM C482 modified.
 - e. Modulus of Rupture: 2,110 average, ASTM C99.
 - f. Mohs Hardness: 6.5-7.5; scratch test.
 - g. Absorption: 0.022%; ASTM C97.
 - h. Stain and Acid Resistance: Not affected; ASTM D2299.
 - i. Surface Burning Characteristics: Flame spread = 10, smoke density = 195; ASTM E84.
 - j. Thermal Shock Resistance: Passes 5 cycles, 75°F-295°F; ASTM C484.
 - k. Coefficient of Thermal Expansion: 1.36x10 inch per °F.; ASTM C531.
 - l. Weathering Resistance: Not affected after seven days in 1% sulfuric acid; ASTM C217.
 - m. Freeze-Thaw Resistance: No visible damage or discoloration after 25 cycles (-45°C to 23°C); S.L.P. with ASTM C62 as guide.
 - n. Wear Resistance: 36.12 gram average; ASTM C501, tested with 1 kg. load, 1000 cycles at 70 r.p.m.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. Adjustable Shelf Pilaster Standards: Side-mounted system using multiple holes for pin supports and coordinated self rests, polished chrome finish, for nominal 1 inch spacing adjustments.
1. Product: 255/256 Mortise-Mount Pilaster Shelving System by Knap & Vogt or equal.
 - a. Holds up to 500 lbs. per shelf.
 - b. 23 gauge high strength steel.
 - c. 39/64" wide x 11/64" deep.
 - d. BHMA Grade 1 approved.
 - e. Self supports: KV #256.
 - f. Mortise-Mount system.
 - g. 1/2" vertical slot adjustment.
 - h. Numbered slots for fast, accurate clip insertion.
 - i. Punched nail/screw holes.
 - j. Limited Lifetime Warranty.
 - k. Made in USA.

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- B. Shelf Support Pins:
 - 1. Product: KV #330 by Knape & Vogt or equal.
 - a. Stainless steel.
 - b. Pin diameter for 5 mm hole (approx 13/64 inch).
- C. Grommets: Plastic, 2 inch diameter, locations as indicated. If locations are not indicated, as selected by Architect during shop drawing review.
 - 1. Doug Mockett, Sugatsune, Wood Technology, or equal.
- D. Drawer and Door Pulls: For all, including accessible casework.
 - 1. Metal wire pull handles by Rockford Process Control, Inc. or equal.
 - 2. Operable parts for all accessible casework shall comply with CBC Section 11B-309.
 - 3. Finish: Nickel finish.
- E. Cabinet Locks: Casework shall lock. Casework in a room shall be keyed alike and each room shall be keyed differently. All locks shall be master keyed with one master key for all casework.
- F. Hinges: Model 376 by Rockford Process Control, Inc. or equal.
 - 1. Heavy duty, .090" cold rolled steel, 5-knuckle institutional hinge; mill ground with hospital tips, 270 degree opening angle.
 - 2. 2-3/4 inch height, drilled knuckle ID with precision drawn pins.
 - 3. All mounting holes are countersunk for #8 flat head screws.
 - 4. Non-removable knurled pin.
 - 5. Exceed ANSI/BHMA 156.9 Grade 1 requirements.
- G. Drawer Slides: Heavy-duty, full extension, ball bearing, soft closing, drawer glides by Blum or equal.
- H. Drawer Bottoms: 1/4 inch plywood with melamine finish.

2.4 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. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Contact Adhesive: 250 g/L.
- E. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium-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. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.
 - 2. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.
- D. 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.
 - 1. Notify Architect 7 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.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

2.6 PLASTIC-LAMINATE CABINETS

- A. WI Construction Style: Style A, Frameless, Custom Grade.
- B. WI Construction Type: Type I, multiple self-supporting units rigidly joined together.
- C. WI Door and Drawer Front Style: Flush overlay.
- D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade HGS, 0.048 inches (1.2 mm) thick.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade HGS, 0.048 inches (1.2 mm) thick.
 - 4. Edges: Self-edge banded.
- E. Semi-Exposed Surfaces: Any of one of following.
 - 1. Low pressure decorative polyester overlay.

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2. Low pressure decorative melamine overlay.
3. HPL cabinet liner.
4. Solid Phenolic core (SPC).
5. Vinyl at cabinet backs and drawer bottoms only.

F. Concealed Surfaces: Any of one of following.

1. Solid Wood or Plywood: Any hardwood or softwood species, with no defects affecting strength or utility. Hardwood and softwood lumber kiln dried to 7 and 10 percent moisture content, respectively.
2. Particleboard: ANSI A208.1, Grade M-2.
3. Medium-Density Fiberboard: ANSI A208.2.
4. Solid Phenolic core (SPC).

G. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from laminate manufacturer's full range.

2.7 SOLID-SURFACING-MATERIAL COUNTERTOPS

- A. Solid-Surfacing-Material Thickness: 3/4 inch.
- B. Edge: 1-1/2 inch thick eased edge.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
- D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

2.8 SOLID AND QUARTZ SURFACING-MATERIAL COUNTERTOPS

- A. Material Thickness: 3/4 inch.
- B. Edge: 1-1/2 inch thick eased edge.
- C. Colors, Patterns, and Finishes: As indicated on Drawings.
- D. Fabricate tops indicated on Drawings. Comply with surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
- E. Drill holes in countertops for plumbing fittings in shop.

2.9 BACKFED MAIL SLOTS

- A. Custom configuration as indicated on Drawings.
- B. Materials: As indicated on Drawings.

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2.10 MAIL SLOT

- A. Product: Brushed Aluminum, SKU: 25-7340SS by Taymor or equal.
 - 1. Aluminum construction.
 - 2. Metal sleeve insert.
 - 3. Interlocking flap and frame.
 - 4. Spring loaded exterior plate.
 - 5. Matching finish interior plate.

2.11 CUSTOM RESIN PANELS

- A. Products: Decorative panels by Lumicor or equal.
- B. Profile and Shapes: As indicated on Drawings.
- C. Material Test Results:
 - 1. ASTM D 2843 Smoke Density: 4.1%, PASS Less than 75.
 - 2. ASTM D 635 Flame Spread: Rate of burning: 1.2 in/min, PASS CC2.
 - 3. ASTM D 1929 Self-ignition Temp.: 852°F, PASS Greater than 650°F.
 - 4. ASTM E 84: 1/2 inch thickness.
 - a. Flame Spread: 95, Class C (76-200).
 - b. Smoke Developed: 450, 450 (less than 450).
 - 5. ASTM E 84: 1 inch Thickness.
 - a. Flame Spread: 115, Class C (76-200).
 - b. Smoke Developed: 150, 450 (less than 450).
- D. Color and Pattern: As selected by Architect from manufacturer's full range.

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.

3.2 INSTALLATION

- 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.

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- 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 if transparent finish is 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. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- 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 o.c. and to walls with adhesive.
 - 3. Calk space between backsplash and wall with sealant specified in Division 7 Section "Joint Sealants."
- H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- I. Refer to Division 9 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 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 semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064000

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SECTION 068200 - FIBER REINFORCED PLASTIC PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fiber reinforced plastic (FRP) panel system for adhesive mounting.
 - 2. Moldings, adhesive, and joint sealants.

- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 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. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 4. MRc7, Certified Wood. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 5. EQc4.1, Low-Emitting Materials, Adhesives and Sealants. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 6. EQc4.2, Low-Emitting Materials, Paints and Coatings. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 7. EQc4.4, Low-Emitting Materials, Composite Wood and Agrifiber Products. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

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

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- D. Maintenance Instructions.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6 WARRANTY

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- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fiber reinforced plastic panels that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fiber Reinforced Plastic Panels: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Symmetrix FRP by Marlite (Basis of Design)
 - 2. Crane Composites (formerly Kemlite).
 - 3. Glasteel.
 - 4. Or equal.

2.2 PANEL SYSTEM

- A. Plastic Panel System: Factory finished panels, trim, sealant, and accessories.
- B. Panels: Fiberglass reinforced polyester, USDA approved for incidental food contact.
 - 1. Surface Burning Characteristics: Flame spread index of 200 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E 84 (Class C/III).
 - 2. Thickness: 3/32 inch, nominal.
 - 3. Width: 48 inches.
 - 4. Height: 96 inches.
 - 5. Flexural Strength: 17,000 psi, when tested in accordance with ASTM D 790.
 - 6. Flexural Modulus: 600,000 psi, when tested in accordance with ASTM D 790.
 - 7. Tensile Strength: 8,000 psi, when tested in accordance with ASTM D 638.
 - 8. Tensile Modulus: 9,430 psi, when tested in accordance with ASTM D 638.
 - 9. Barcol Hardness: 40, when tested in accordance with ASTM D 2583.
 - 10. Impact Resistance: 7 ft-lb/in, when tested in accordance with ASTM D 256, Izod method.
 - 11. Coefficient of Thermal Expansion: 0.0000157 in/in/degree F, measured in accordance with ASTM D 696.
 - 12. Water Absorption: 0.17 percent, when tested in accordance with ASTM D 570.
 - 13. Specific Gravity: 1.53, when tested in accordance with ASTM D 792.
 - 14. Front Finish:
 - a. Surface Texture: Gently pebbled, high-gloss.
 - 1) Color: As indicated on Drawings.
- C. Panel Trim: Extruded PVC, in manufacturer's standard colors.
 - 1. Outside corners, inside corners, edge trim, and division molding.
- D. Sealant: Marlite Silicone Sealant; gunnable silicone rubber; clear.
 - 1. Low-Emitting Materials: Sealants shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.

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

END OF SECTION 068200

SECTION 071413 - HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rubberized-asphalt waterproofing membrane , reinforced.

B. Related Sections include the following:

1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
2. Division 7 Section "Joint Sealants" for joint-sealant materials and installation.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

- C. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.

1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

- D. Samples: For the following products in manufacturer's standard sizes unless otherwise indicated:

1. Flashing sheet.
2. Membrane-reinforcing fabric.

- E. Product Test Reports: For waterproofing, based on evaluation of comprehensive tests performed by a qualified testing agency.

- F. Warranties: Sample of special warranties.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.

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2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: A firm that is acceptable to manufacturer for installation of waterproofing required for this Project and is eligible to receive special warranties specified.
- C. Preinstallation Conference: Conduct conference at Project site.
1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
- 1.4 DELIVERY, STORAGE, AND HANDLING
- A. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
 - B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
 - C. Protect stored materials from direct sunlight.

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1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below 0 deg F.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.
 - 1. Warranty pavers will not dish or warp and will not crack, split, or disintegrate in freeze-thaw conditions.
 - 2. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pedestal-mounted pavers on plaza decks.
 - 3. Warranty Period: 5 years.
- B. Special Installer's Warranty: Specified form signed by Installer, covering Work of this Section, for warranty period of 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane:
 - 1. American Hydrotech, Inc.; Monolithic Membrane 6125. (Basis of Design)
 - 2. Carlisle Coatings & Waterproofing Inc.; CCW-500R.
 - 3. Henry Company; 790-11.
 - 4. Or equal.

2.2 WATERPROOFING MEMBRANE

- A. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane: Single component; 100 percent solids; hot fluid-applied, rubberized asphalt.

2.3 FLASHING SHEET MATERIALS

- A. Elastomeric Flashing Sheet: 50-mil- minimum, uncured sheet neoprene as follows:
 - 1. Tensile Strength: 1400 psi minimum; ASTM D 412, Die C.
 - 2. Elongation: 300 percent minimum; ASTM D 412.
 - 3. Tear Resistance: 125 psi minimum; ASTM D 624, Die C.
 - 4. Brittleness: Does not break at minus 30 deg F; ASTM D 2137.

2.4 AUXILIARY MATERIALS

- A. Primer: ASTM D 41, asphaltic primer.
- B. Elastomeric Sheet: 50-mil- minimum, uncured sheet neoprene as follows:
 - 1. Tensile Strength: 1400 psi minimum; ASTM D 412, Die C.
 - 2. Elongation: 300 percent minimum; ASTM D 412.
 - 3. Tear Resistance: 125 psi minimum; ASTM D 624, Die C.
 - 4. Brittleness: Does not break at minus 30 deg F; ASTM D 2137.
- C. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum termination bars; approximately 1 by 1/8 inch thick; with anchors.
- D. Sealants and Accessories: Manufacturer's recommended sealants and accessories.
- E. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.

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.
 - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
 - 1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.

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- E. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 JOINTS, CRACKS, AND TERMINATIONS

- A. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.
 - 1. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D 4258.
 - 2. Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of 6 inches on each side of moving joints and cracks or joints and cracks exceeding 1/8 inch thick, and beyond deck drains and penetrations. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
 - 3. Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of 6 inches on each side of nonmoving joints and cracks not exceeding 1/8 inch thick, and beyond roof drains and penetrations.
 - a. Apply second layer of hot fluid-applied, rubberized asphalt over reinforcing fabric.
- B. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric sheet extended a minimum of 6 inches on each side of joints and adhere to substrates in a layer of hot rubberized asphalt. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.

3.4 FLASHING INSTALLATION

- A. Install elastomeric flashing sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
- B. Prime substrate with asphalt primer.
- C. Install elastomeric flashing sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.
- D. Extend elastomeric flashing sheet up walls or parapets a minimum of 8 inches above plaza deck pavers and 6 inches onto deck to be waterproofed.
- E. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of roofing.

3.5 MEMBRANE APPLICATION

- A. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow to dry.
- B. Heat and apply rubberized asphalt according to manufacturer's written instructions.
 - 1. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
- C. Start application with manufacturer's authorized representative present.

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- D. Unreinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to form a uniform, unreinforced, seamless membrane, 180-mil average thickness, but not less than 125 mil thick.
- E. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils; embed reinforcing fabric, overlapping sheets 2 inches; spread another 125-mil- thick layer to provide a uniform, reinforced, seamless membrane 215 mils thick.
- F. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

3.6 CLEANING AND PROTECTION

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Protect installed from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071413

SECTION 071909 - CONCRETE MOISTURE AND ALKALINITY TESTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for independent testing and inspection requirements for concrete moisture and alkalinity.
- B. Related Sections include the following:
 - 1. Division 7 Section "Concrete Moisture and Alkalinity Barrier" for concrete sealers to reduce moisture and alkalinity level when testing fails.

1.2 SUBMITTALS

- A. Independent testing agency qualifications: Past 4 year history of testing of comparable project size and scope.
- B. Product data: Moisture test kit.
- C. Testing Results: Provide interior temperature, humidity, moisture vapor and alkalinity results for testing period.
 - 1. Alkalinity and Adhesion Test Report.
 - 2. Moisture Test Report.
- D. Locations Map: Provide each testing result documented on a locations map. Map may be finish floor plan by Architect or similar representation.
- E. Record Submittals: Testing reports and locations map.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).

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9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

1.4 SCHEDULING

- A. Site Meeting: Testing Agency, Owner, Architect and Contractor shall meet 30 days prior to flooring installation to discuss testing requirements, specifications and locations prior to testing.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Moisture Test, ASTM F 1869 Test kit:
 1. Non-recycled anhydrous calcium chloride at 94% purity.
 2. Dome with self adhesive butyl sealant.
 3. Calcium chloride container:
 - a. Content weight limited to 16 grams +/- 1 gram.
 - b. Dimensions: 69mm +/- 1mm diameter with 16mm +/- 1mm height.
 4. Products:
 - a. American Moisture Test, Inc. www.DomeTest.com (866) 670-9700.
 - b. Sinak.
 - c. Or equal.
- B. Gram Scale: Calibrated to 0.1 grams as specified by ASTM
- C. Alkalinity Test, ASTM F 710 Meter:
 1. Digital wide range 1–14 pH meter.
 2. Waterproof flat tip.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site: Weatherproofed, doors installed and windows secured. Do not start testing process when site has standing water, surface contaminates, exposed to exterior conditions or concrete installation is less than 90 days of age.

3.2 PREPARATION

- A. Clean concrete substrates of adhesives residue, paint, curing, sealing, floor coverings a minimum of 24 hours prior to installation of testing equipment.
- B. Temperature & Humidity: Maintain site at the temperature and humidity conditions to those anticipated during normal occupancy and maintain these conditions minimum of 7 days (exceed ASTM F1869 requirements) prior and during testing period.
- C. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with testing results.

3.3 TESTING

- A. Apply test at a rate of three (3) test for areas up to 1,000 square feet and one (1) test per each 1,000 square feet thereafter. Mark concrete test location for future identification.
 - 1. Moisture:
 - a. Perform all gram scale weights on site.
 - b. Expose dome for 60 to 72 hours.
 - c. Report results as pounds of emission.
 - d. Mark each test location by marker for future identification.
 - 2. Alkalinity:
 - a. Apply manufacture solution to form a 1 inch diameter circle directly to interior of moisture dome.
 - b. Allow to absorb into concrete for 1 minute.
 - c. Expose flat tip pH meter to solution and allow to calculate.
 - 3. Report results, calculations and locations as a submittal.

3.4 FIELD QUALITY CONTROL

- A. Testing: Engage and pay for qualified independent testing agency specified to perform the following field tests and inspections and prepare test reports:
 - 1. Testing agency shall perform tests for characteristics specified, using applicable referenced testing procedures.
 - 2. Testing agency shall verify thickness of coatings during traffic coating application.
 - 3. If test results show coating materials do not comply with requirements, remove noncomplying materials, prepare surfaces, and reapply coatings.

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- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Do not allow floor coverings to be installed in areas above 3.0 pounds per ASTM F 1869 and pH levels greater than 10 or floor covering manufacturer's requirements.

END OF SECTION 071909

SECTION 071910 - CONCRETE FLOOR SEALER

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes concrete sealer.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 SYSTEM DESCRIPTION

- A. Ground and Floor Surfaces:
 - 1. Minimum 0.6 static coefficient of friction under wet conditions per ADAAG A4.5.1. and ASTM D2047.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include manufacturer's printed statement of VOC content.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples: For each type of sealer and substrate indicated, 12 by 12 inches in size, with specified water-repellent treatment applied to half of each Sample.
- D. Manufacturer Certificates: Signed by manufacturers certifying that water repellents comply with requirements.
- E. Qualification Data: For Installer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for assemblies.
- G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).

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3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Installer Qualifications: An employer of workers trained and approved by manufacturer.

C. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit water repellents to be applied according to manufacturers' written instructions and warranty requirements:
1. Ambient temperature is above 40 deg F.
 2. Concrete surfaces and mortar have cured for more than 28 days.
 3. Concrete or brick masonry walls are not treated prior to 30 days after building close-in.
 4. Rain or snow is not predicted within 24 hours.
 5. Application proceeds more than 24 hours after surfaces have been wet.
 6. Substrate is not frozen, or surface temperature is above 40 deg F.
 7. Windy conditions do not exist that may cause water repellent to be blown onto vegetation or surfaces not intended to be treated.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency.
1. Warranty Period: 2 years.

- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Patching compound, cementitious, thin patching and skim-coating material, designed for reducing surface defects on interior floors. : Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
1. Degussa.
 2. ChemMasters.
 3. Or equal.
- B. Concrete Clear Sealer for protecting antiqued, imprinted, chemically stained, exposed-aggregate, and colored or uncolored concrete hardscapes and floors: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
1. Scofield. (Basis of Design)
 2. Consolideck LS by Prosoco.
 3. Degussa.
 4. ChemMasters.
 5. Or equal.

2.2 PENETRATING WATER REPELLENTS

- A. General: Sealants applied on the interior of the building envelope shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.

2.3 PATCHING COMPOUND

- A. Patching compound, cementitious, thin patching and skim-coating material, designed for reducing surface defects on interior floors.
1. Composition and Materials:
 - a. Complex, precisely engineered, polymer-modified, cementitious, thin patching material produced by a proprietary manufacturing and intergrinding process.
 - b. Designed for ease of mixing and installation, superior adhesion without priming, and rapid strength gain, it is a single-component, non-gypsum-based, powdered material containing no sand or calcium chloride.

2.4 SEALER

- A. Product: Cementone by Scofield.
1. Concrete Clear Sealer for protecting antiqued, imprinted, chemically stained, exposed-aggregate, and colored or uncolored concrete hardscapes and floors.
 2. Waterborne, modified acrylic emulsion.

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3. Optimized for surface penetration, leveling ability, and ease of application by airless sprayer without thinning.
4. Some separation occurs during storage that is easily reincorporated when stirred before using.
5. Cleanup with soap and water.

PART 3 - EXECUTION

3.1 PREPARATION

A. New Concrete:

1. Newly placed concrete shall be sufficiently cured to allow concrete to become reactive, minimum 28 days.
2. Do not use liquid curing materials. Cure concrete flatwork with new, unwrinkled, non-staining, high quality curing paper. Do not overlap curing paper.
3. Surfaces shall be cured using the same method and different sections (pours) chemically stained when the concrete is the same age.
4. Immediately prior to chemically staining, thoroughly clean the concrete. Sweep surfaces, the pressure wash or scrub using a rotary floor machine. Use suitable, high-quality commercial detergents to facilitate cleaning. Rinse surfaces after cleaning until rinse water is completely clean. Allow floor to dry completely prior to application of floor stain.
5. Concrete surfaces must be uniformly slip-resistant and profiled to meet a Concrete Surface Preparation (CSP) profile of 1-2 per ICRI guidelines.
6. Some concrete may require abrading to open the surface and make it sufficiently penetrable. In these instances the concrete surface must be sanded using an 60-80 mesh-sanding screen or a grit brush. After sanding, all residue must be removed by power vacuuming. The surface should then be pressure washed or scrubbed using a rotary floor machine.
7. For preparation, the sandblaster should be capable of producing a light, uniform sandblast and be equipped with a dust collector.
8. For preparation, the pressure washer should be equipped with a fan tip and have a minimum pressure capability of 4000 psi. Hot water capability may facilitate cleaning of existing concrete.
9. Acid washing may be required when the above surface preparation does not yield adequate penetration or if there are excessive alkali deposits or surface discoloration. The reacted residue must be abraded using a low-speed floor machine equipped with a 60 mesh screen or a grit brush and then thoroughly rinsed until the rinse water is clear and free of solids, a minimum of two times. After rinsing, neutralize any remaining acid residue by washing with a solution of baking soda (sodium bicarbonate) and water. (Test pH of floor should be 7 or higher.)

B. Existing Concrete:

1. Clean concrete surfaces so that surfaces are completely penetrable before receiving the initial application of chemical stain. Test surfaces to receive stain by spotting with water. Water should immediately darken the substrate and be readily absorbed. If water beads and does not penetrate or only penetrates in some areas, additional surface preparation and testing shall be performed.

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2. Cleaning method used depends on the condition of the concrete surface. To remove dirt and other contaminants, detergents and other commercial grade cleaners should be considered and tested.
 3. Rinse concrete substrates until rinse water is completely clean.
 4. For preparation of interior floors, the rotary floor machine should be heavy duty and operate at approximately 175 rpm. With a 60-80 mesh-sanding screen or a grit brush, remove all contaminants and weak cement paste from the surface. This will also open the surface to allow the chemical stain to penetrate.
 5. Acid washing may also be required. (Refer to New Concrete Preparation.)
- C. Scoring: Score decorative jointing in concrete surfaces 1/8-inch (3.2 mm) deep with diamond blades. Rinse until water is completely clean.

3.2 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.
- C. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.3 APPLICATION OF SEALER

- A. Concrete substrate shall be completely dry.
- B. Apply sealer according to manufacturer's written instructions at a rate of 300 to 500 square feet per gallon per coat. Two coats are required.
- C. Maintain a wet edge at all times.
- D. Allow sealer to completely dry before applying additional coats.
- E. Apply second coat of sealer at 90 degrees to the direction of the first coat using the same application method and rates.
- F. Seal horizontal joints in areas subject to pedestrian or vehicular traffic.

3.4 CLEANING

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- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071910

SECTION 071920 - CONCRETE MOISTURE AND ALKALINITY BARRIER

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Concrete moisture and alkalinity barrier when moisture or alkalinity test fails.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Concrete Moisture and Alkalinity Testing" for independent moisture and alkalinity testing prior to installation of flooring materials.

1.2 PERFORMANCE REQUIREMENTS

- A. Ground and Floor Surfaces: Slip resistant per CBC 1124.B.1.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include manufacturer's printed statement of VOC content.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples: For each type of barrier and substrate indicated, 12 by 12 inches in size, with specified water-repellent treatment applied to half of each Sample.
- D. Manufacturer Certificates: Signed by manufacturers certifying that barrier comply with requirements.
- E. Qualification Data: For Installer.
- F. Product Test Reports: Independent third party testing results:
 - 1. ASTM E 96 Water Vapor Transmission: up to 95% Vapor Reduction
 - 2. ASTM D 4541 Concrete Adhesion: 500psi or concrete cohesive failure
 - 3. ASTM D 1308 Chemical Resistance: 100% resistant to acid and alkali
- G. Field Quality Control Documents: Post installation testing by independent testing agency per ASTM F1869, ASTM D 4541.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.

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2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- C. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

- A. Extended Warranty Period: Barrier warranty for 15 years covering performance, concrete adhesion, moisture or alkalinity damage to barrier and installed floor coverings. In the event of barrier failure, manufacture shall cover labor and material cost to replace moisture or alkalinity damaged flooring or coatings, reapply barrier, adhesives, patching compounds and installation accessories.
1. Moisture Vapor Reduction: No upper performance limitations.
 2. Alkalinity Control: No upper performance limitations.
 3. Manufacturing defects warranties are not acceptable.
- B. Warranty shall not exclude ACI documents, dew point, concrete salts, admixtures, resin and silicate surfaces treatments. Installations on slab surfaces deems acceptance of on site conditions. Barrier manufacturer is responsible for complete review of concrete mix designs, admixtures, sub slab vapor barrier installed and curing methods for written acceptance prior to installations.
- C. Installer: Submit 15 year warranty covering installation defects and improper installations on workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Concrete Moisture and Alkalinity Barrier: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
1. Vapor-Guard DC by Advance Moisture Control.
 2. MES 100 by Floor Seal Technology Inc.
 3. VAP-1 2000 FS by Koster.
 4. Or equal.

2.2 CONCRETE MOISTURE AND ALKALINITY BARRIER

- A. Physical Properties:
1. Formulation: Synthetic resin chemistry
 2. Concrete Adhesion: Chemical and mechanical bond
 3. Exterior Installations: Complete resistance to thermal expansion and ultraviolet (UV) light exposure.
 4. Dew Point: Performance not affected by dew point, temperature or humidity.
 5. Moisture Vapor Result: Rate of less than 3 lb of water/1000 sq. ft. in 24 hours.
 6. Alkalinity Result: pH range of 5-9.
 7. Tensile Strength: 6,000 to 8,000psi.
 8. Compressive Yield: 12,000psi.
 9. Ultimate Flexural: 10,000psi.
 10. Sealants applied on the interior of the building envelope shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.
- B. Concrete Topcoat: Cement based self-leveling underlayment product acceptable to sealant manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to barrier manufacturer's written instructions, to ensure that surface is dry enough.
1. Shot blast surface to allow maximum penetration and adhesion. Grind near walls and edges.
- B. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
- C. Coordination with Sealants: Do not apply barrier until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
1. Barrier work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 APPLICATION

- A. Barrier: Apply by squeegee and roller application methods to saturate entire surface. Spread rates shall produce results of up to 95% moisture reduction per ASTM E 96 and post installation testing rate specified.
- B. Roller and squeegee methods to saturate concrete porosity. Final surfaces shall be light reflective white.
- C. Joint and Crack Treatment: Apply barrier directly over cracks, holes, and slab imperfections for maximum flexibility, moisture vapor and alkalinity control.
- D. Cement Topcoat: As required for applications under resilient flooring for sealants installed after curing of concrete.

3.3 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. Conduct moisture-alkalinity test by an independent testing company prior to resilient flooring and carpet installation.

3.4 CLEANING

- A. Immediately clean barrier from adjoining surfaces and surfaces soiled or damaged by barrier application as work progresses. Repair damage caused by barrier application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 071920

SECTION 072100 - ROOFING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Rigid Roofing Insulation.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
 - 3. Division 9 Section "Non-Load-Bearing Steel Framing" for framing requirements.
 - 4. Division 9 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 - Paintings and Coatings: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 4. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

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1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Source Limitations: Obtain each type of roofing insulation through one source from a single manufacturer.

C. 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.

1.4 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.

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1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of building insulation that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Rigid Insulation: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Dow Chemical Co.
 - 2. Owens Corning.
 - 3. Pactiv Building Products.
 - 4. Or equal.

2.2 RIGID INSULATION FOR THERMAL AND FOR SLOPE

- A. Expanded Polystyrene (EPS) Board Insulation: ASTM C 578, Type X; Expanded polystyrene board with natural skin surfaces, with drainage channels one face; with the following characteristics:
 - 1. Tapered Board: Slope as indicated; minimum thickness 1/2 in; fabricate of fewest layers possible.
 - 2. Compressive Resistance: 15 psi.
 - 3. Board Density: Minimum 1.5 pcf.
 - 4. R value per inch: Approximately 3.7.
 - 5. R value: As indicated on Drawings.

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.

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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.
- 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.

END OF SECTION 072100

SECTION 072110 - BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Concealed thermal and sound insulation.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
 - 3. Division 9 Section "Non-Load-Bearing Steel Framing" for framing requirements.
 - 4. Division 9 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.2 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.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 - Paintings and Coatings: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 4. Product Data for Credit IEQc4.2: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

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- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

- C. 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.

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1.5 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.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of building insulation that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Glass-Fiber Batt/Blanket Thermal and Sound Insulation: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Johns Manville (JM). (Basis of Design)
 - 2. CertainTeed Corporation.
 - 3. Guardian Fiberglass, Inc.
 - 4. EcoBatt with ECOSE technology by Knauf Fiber Glass.
 - 5. Owens Corning.
 - 6. Lamtec.
 - 7. Or equal.
- B. Board Insulation for Exterior Cavity Wall and Rainscreen: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Roxul, Inc. (Basis of Design)
 - 2. Or equal.
- C. Slag-Wool-Fiber/Rock-Wool-Fiber Blanket (Fire-Safing) Insulation: Subject to compliance with requirements, provide products by one of the following manufacturers.
 - 1. Thermafiber Safing Insulation by Thermafiber.
 - 2. Fibrex Insulations Inc.
 - 3. Owens Corning.
 - 4. Or equal.
- D. Acoustical Boards: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. SelectSound Acoustic Board insulation by Owens Corning. (Basis of Design)
 - 2. Insul-Shield, Black Mat Boards, by Johns Manville.
 - 3. Or equal.

2.2 GLASS-FIBER BATT/BLANKET INSULATION

- A. Unfaced, Glass-Fiber Batt/Blanket Insulation: 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. Glass-fiber bonded with acrylic thermosetting binder.
 - 1. For walls and partitions: Unfaced Batts.
 - 2. Formaldehyde-free, Unfaced Batts by JM or equal.
- B. Faced, Glass-Fiber Batt/Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft vapor-retarder membrane on 1 face.
 - 1. For ceilings under decks: FSK-25 Faced Batts with 2 inch tabs or Panel Deck FSK-25 Faced Batts with 5 inch tabs.
 - 2. Formaldehyde-free, FSK-25 Faced Batts by JM or equal.
- C. Thermal Rating: R values as indicated on Drawings.
- D. Sound Attenuation Ratings: Minimum R-11 on interior walls and partitions, unless otherwise indicated on Drawings.

2.3 BOARD INSULATION FOR EXTERIOR CAVITY WALL AND RAINSCREEN

- A. Product: ROXUL INC., CAVITYROCK DD by Roxul, Inc. or equal.
- B. Non-combustible, lightweight, water repellent, rigid insulation board with rigid upper surface to ASTM C612 Type IVB.
 - 1. Density:
 - a. Outer layer: 6.24 lb/ft³ to ASTM C612.
 - b. Inner layer: 3.75 lb/ft³ to ASTM C612.
- C. Board insulation for exterior cavity wall: To ASTM C612 Type IVB.
 - 1. Fire performance:
 - a. Non-combustibility: To ASTM E136.
 - b. Maximum use temperature: 1200 °F.
 - c. Surface Burning Characteristics: To ASTM E84.
 - 1) Flame spread: 0.
 - 2) Smoke developed: 0.
 - 2. Thermal resistance R value/1 inch at 75 °F: 4.3 h ft² °F/Btu per ASTM C518.
 - 3. Water vapor permeance: 27.2 Perm minimum.
 - 4. Moisture sorption: 1 % maximum to ASTM C1104/C1104M.
 - 5. Fungi resistance: Zero mold growth to ASTM C1338.
 - 6. Corrosive resistance:
 - a. Steel to ASTM C665: Pass.
 - b. Stainless steel to ASTM C795: Conforms.
 - 7. Recycled content: 40% minimum.
- D. Accessories:

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1. Mechanical fasteners in accordance with insulation manufacturer's written recommendations.
 - a. Foundation insulation board: 1.5 inches concrete nails with 3/4 inch washers.
2. Insulation Clips: in accordance with manufacturer's written recommendations.
3. Adhesive: All-purpose construction adhesive in accordance with insulation manufacturer's written recommendations.

2.4 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER BLANKET (FIRE-SAFING) INSULATION

- A. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: 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.

2.5 ACOUSTICAL (BLACK DUCT LINER) BOARD

- A. Product: SelectSound Black Acoustic Board by Owens Corning or equal.
 1. Sizes: 24" x 48" and 48" x 96" standard sizes.
 2. Dimensionally stable with no capability for shrinking or warping.
 3. Resilient composition with good resistance to damage from job-site impact.
 4. Composed of inorganic glass fibers.
 5. Mat face shall be able to be cleaned by vacuuming.
 6. Not be susceptible to rot or mildew contamination.
 7. Not cause corrosion greater than caused by sterile cotton to steel and aluminum, when tested in accordance with ASTM C665.
 8. Acoustical Performance (Tested to ASTM C423, Type A mounting):
 - a. 1 inch thick: 0.70 NRC.
 - b. 2 inch thick: 1.00 NRC.
 9. Surface Burning of Core Material (tested to UL 723, or CAN/ULC-S102-M):
 - a. Flame spread 25.
 - b. Smoke developed 50.
 10. Water vapor sorption – by weight (Tested to ASTM C1104): 1. <3% at 120oF (49oC) at 95% relative humidity.
 11. Minimum Compressive Strength (Tested to ASTM C165): 3 lb. Density
 - a. At 10% deformation: 25 lb/ft² (1197 Pa).
 - b. At 25% deformation: 90 lb/ft² (4309 Pa).
 12. Fungi resistance: Meets all requirements of ASTM C1338.

2.6 ACCESSORIES

- A. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inches wide.
- B. Nails or Staples: Steel wire; electroplated, or galvanized; type and size to suit application.

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.
- 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.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Install insulation in cavities formed by framing members according to the following requirements:

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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.
4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically.

3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072110

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SECTION 074200 – EXTERIOR CLADDING PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes Solid Phenolic panels including:
 - 1. System shall be designed to provide a complete drained and back ventilated rainscreen system which includes incorporating moisture control at the outer face of the cladding system, structural design of the cladding and aluminum subframing system, design of the rainscreen cavity (for ventilation, thermal and acoustic performance) and design of the weather membrane system for inner moisture control.
 - 2. Division 6 Section “Sheathing” for sheathing and building wrap requirements.
 - 3. Division 7 Section “Building Insulation” for thermal insulation.
 - 4. Division 7 Section "Composite Wall Panels" for metal-faced composite wall panels.
 - 5. Division 7 Section "Sheet Metal Flashing and Trim" for flashing and other sheet metal work that is not part of metal wall panel assemblies.

- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 DEFINITIONS

- A. AVB: Air and Vapor Barrier.

1.3 DESIGN REQUIREMENTS

- A. Provide in conjunction with wall substrate and air barrier a weather tight wall assembly utilizing the “rain screen principle”.

- B. System design shall be single-source responsibility by the cladding supplier.

- C. Drained and Back Ventilated Rainscreen Panel Design. System shall drain water and condensation to exterior. A complete pre-engineered system including but not limited to solid phenolic cladding panels, aluminum metal support structure, closure pieces, trim and flashing. Fasteners are exposed. The panels shall be secured to an aluminum metal support structure, which secures to cold-formed metal framing or other structural materials. Spacing of cold-formed metal framing indicated on structural drawings shall not be greater than 16 inch OC. Membrane should be visually inspected for breaches (and repaired as recommended by membrane manufacturer) prior to installation of support system.

- D. Joints: Shall be dry and un-caulked. Optional closure pieces can be utilized for moisture control.

- E. Membrane: A Trespa approved AWB shall be used (especially in NFPA 285 approved assemblies).

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- F. Insulation: A Trespa approved AWB shall be used (especially in NFPA 285 approved assemblies).
- G. Metal Flashing: Provide metal flashing for a proper water managed assembly, to direct condensation and water infiltration within the wall to weeping points. Coordinate details and installation with Air and Water Barrier.
- H. Drainage flashing is the primary component of a water managed system which diverts water that has penetrated the exterior cladding away from the cladding compartment or condensation that occurs at the interior face of cladding surface.
- I. Provide metal drainage flashing at locations listed below prior to installation of membrane to assure proper water drainage. Membrane shall assure proper lap over flashing:
 - 1. At bottom of system
 - 2. At penetrations: windows, doors, louvers, etc.
 - 3. At floor line or other locations which accommodate vertical movement
- J. End Dams: provide shop-formed end dams where drainage flashing terminates at openings.
 - 1. Configuration shall be triangular shaped, full width of horizontal flashing leg x 1 inch high
 - 2. Attachment: solder joints and miters for an air and water tight condition
- K. System shall provide 1 inch "clear" airspace behind cladding for proper ventilation.
- L. Every vertical section of the façade cladding shall have a ventilation opening at the bottom and top, having a width/depth of 2.36 in 2ft.

1.4 SUBMITTALS

- A. Product Data.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: Submit CAD generated shop drawings showing profiles of panel units, details of forming, joint supports, anchorages, trim, flashings, sealants and accessories. Show details of weatherproofing at edge terminations, show elevations, and layout of entire work.
 - 1. Shop drawings should indicate project layout from control grid lines and elevations referring to the required details for each unique condition.
 - 2. The details should show the preferred profiles and performance requirements. Provide a watertight and structurally sound, self-draining wall panel system that meets or exceeds the performance criteria.
- D. Sample of system: Submit an 8" x 8" sample of panel system, complete with factory applied edge treatment, fabricated into units representative of the actual system. Sample need not be in the specified color.

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- E. Color samples: submit 6, 2"x3" samples on aluminum of each specified color and finish.
- F. Test Reports: Submit certified test reports which meet or exceed the requirements.
- G. Report of Approval: ICC-EC Evaluation Report No. ESR 1687, reissued on 02/2018, complies with 2015 IBC.
- H. Affidavit from Panel Fabricator certifying material meets requirements specified.

1.5 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: Installer experienced in performing work of this section who has experience in wall applications similar to that required for this project.
 - 1. Installation History: Installer shall be a firm that has at least five (5) years of experience with exterior wall applications and has successfully completed installations of similar scope and size to this project.
 - 2. Installer who has undergone training at ESC training facility and has been certified to install Trespa Meteon Exterior Rainscreen panels.

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- C. Fabricator/Engineer Qualifications: Fabricator/engineer capable of providing field service representation during construction, approving acceptable installer and application method.
1. Fabricator shall be a Trespa Meteon Certified fabricator.
 2. Fabrication/Engineering History: Panel fabricator/engineer shall assume undivided responsibility for all components of the panel work, and shall demonstrate no less than ten (10) years successful experience of similar panel work in both scope and size to this project.
- D. Manufacturer Qualifications: Solid Phenolic panel Manufacturer experienced in performing work of this section that has experience with the specified materials.
1. Manufacturer of the Solid Phenolic material must have at least ten (10) years experience in the production of Exterior Solid Phenolic panels installed in a rainscreen format
 2. Manufacturer of the Solid Phenolic material must show experience with at least 20 successful rainscreen panel installations in the U.S., with a total minimum of at least 250,000sf of material installed on exterior applications in the U.S.
 3. ICC/EC Report. Solid phenolic panel manufacturer shall have an ICC/EC Research Report.
- E. Code Performance Requirements: Work of the section shall conform to all applicable codes and regulations.
1. Thermal Movement Design Criteria:
 - a. Make allowances for free and noiseless vertical and horizontal thermal movement due to the contraction and expansion of component parts, for an ambient temperature range from -20 degrees F to +180 degrees F. Buckling of panels, separation/opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement of component parts will not be permitted. Fabrication, assembly and erection procedure shall take into account the ambient temperature range at the time of the respective operation.
 2. Wind Loads:
 - a. Assemblies herein specified shall be designed for flexural, shear and torsional stresses for the following positive and negative wind pressures acting normal to the plane of the assemblies. Loading design shall; be based on latest Building Code but in no case less than 20 pounds per square foot with 25 pounds per square foot corner pressure.
 3. Material Stress and Deflection:
 - a. Normal to the plane of the wall between structural supports, deflection of the attached perimeter-framing members shall not exceed $L/175$ of span length or $3/4"$, whichever is less.
 - b. At connection points of framing members to anchors, anchor deflection in any direction shall not exceed $1/16"$. Where connection points are not clearly defined, maximum anchor deflection shall not exceed $1/16"$.
 - c. Stresses must take into account interaction and in no case shall allowable values exceed the yield stress.
 - d. At 1.5 times design pressure, permanent deflections of framing members must not exceed $L/1000$ of the span length, and components must not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed $1/16"$.
- F. Accommodate tolerances of support structure.
- G. Condensation: System shall accommodate positive drainage for moisture entering or condensation occurring within panel system.

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- H. Design drainage system for 100 year rain cycle.
- I. Flatness: System shall be reasonably flat with no noticeable warpage, buckling, deflections or other surface irregularities.
- J. Thermal Performance Requirements:
 - 1. Cladding System shall comply with the thermal performance requirements of ASHRAE 90.1-2009 and maintain an assembly R-value (backup wall and cladding cavity) indicated on Drawings.
 - a. Be manufactured from AL6063-T6 extruded aluminum components (galvanized steel not allowed)
 - b. Be designed with independent non-continuous wall brackets to ensure optimal thermal and moisture performance when required to provide outboard insulation within rainscreen cladding cavity. Systems using continuous zee/hat shapes in lieu of brackets must incorporate a “energy-loss design factor” (up to 50% or as determined from Thermal Modelling/Testing) based on spacing and thickness of profiles.
 - c. Incorporate thermal isolators behind wall brackets to reduce thermal drops/gains thru system components.
 - d. System shall use stainless steel wall anchors
 - e. Provide an energy model to show final R-value of cladding assembly to accommodate ASHRAE 90.1-2009 performance requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Prior to shipping, pack and crate phenolic panel system components to prevent damage during transit and storage. During transport, handle the panels with special care taken not to damage the edges of the sheets.
- B. Inspect phenolic panels and aluminum attachment components immediately upon delivery at site. Notify manufacturer of damage.
- C. Follow manufacturer’s instructions for storage of phenolic panels. Keep pieces in original packing material until ready to install. Remove transport protection films from both sides of the panels at the same time.
- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall and corner panel, including soffit, as shown on Drawings; approximately one bay wide by one story high by full thickness, including insulation, supports, attachments, and accessories.
 - 2. Conduct water spray test of mockup of metal wall panel assembly, testing for water penetration according to AAMA 501.2.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Preinstallation Conference: Conduct conference at Project site.

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1.7 WARRANTY

- A. Manufacturer's standard 10-year warranty. At project closeout, provide manufacturer's limited ten year warranty covering defects in materials. Warranty only available when material installed by an installing contractor trained and approved by the manufacturer's representatives.
- B. Installer's warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Phenolic Panels: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Meteor solid phenolic panels by Trespa. (Basis of Design)
 - 2. Or equal.

2.2 WALL PANELS

- A. Solid Phenolic Wall Panels manufactured using a combination of high pressure and temperature to create a flat panel created from thermosetting resins, homogenously reinforced with wood-based fibers and an integrated decorative surface or printed decor.
- B. Physical Property testing of solid phenolic panels:
 - 1. Modulus of Elasticity: 1,300,000 psi minimum, ISO 178.
 - 2. Tensile Strength: 10,100 psi minimum, ISO 527-2.
 - 3. Flexural Strength: 14,500 psi minimum, ISO 178.
 - 4. Thermal Conductivity: 2.1 BTU/inch/ft².hr.0F, EN 12524.
 - 5. Structural Performance (ASTM E330):
 - a. Panels shall be designed to withstand the Design Wind Load based upon the local building code, but in no case less than 15 psf.
 - b. Wind load testing shall be done in accordance with this standard to obtain the following results:
 - 1) Normal to the plane of the wall, the maximum panel deflection shall not exceed L/175.
- C. Panel Core: Fire retardant (FR) black core.
- D. Panel Thickness: 13mm.
- E. Finish: As selected by Architect from one of the following.
 - 1. Satin sheen.
 - 2. Gloss.
 - 3. Rock.
- F. Color: As selected by Architect from manufacturer's full range.

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2.3 CONCEALED FASTENING

- A. Concealed fastener type for installation with cavity using adjustable brackets.
- B. Substrate: Sheathing wall.
- C. Reveals at Panel: Joint size between the faces of the perimeter extrusions shall be 3/8", nominal.

2.4 SUPPORT COMPONENTS AND ACCESSORIES

- A. Metal Support Structure:
 - 1. Shall be made of extruded aluminum or stainless steel support rails and fixing components designed with adequate durability. System shall also be designed to allow independent hydric and thermal movement of the system components. The design of a drained and back-ventilated system requires the use of an air water barrier to prevent water entry through the entire wall system. The system shall be designed to manage and drain any water entering the cavity behind the cladding and shall be sufficiently vented to allow the cavity to dry and if water vapor diffuses from the building interior through system cavity, it shall be permitted to be vented and/or drained to the exterior.
 - 2. Fasteners: Stainless steel fasteners and anchors of type, size, and spacing required for type of substrate and Project conditions, to meet performance requirements specified, and as indicated in design calculations and shop drawings.
 - 3. Anchor / Fastener Manufacturer to supply written approval of the use of selected screws confirming use in a drained and back-ventilated rainscreen wall assembly.
 - 4. Joints Closures: roll formed/brake shape aluminum closure pieces painted black and insert into open joint condition to protect against direct rain penetration into cavity and protection of membrane from UV exposure.
 - a. Reveals at Panel: Joint size between the faces of the perimeter extrusions shall be 3/8", nominal.
- B. Air and Vapor Barrier:
 - 1. As specified in Division 6 Section "Sheathing".
- C. Sheet metal: Provide sheet metal flashings and trim as required for cladding system.
 - 1. Shop form components to profiles, dimensions, and thicknesses indicated on Drawings. Items to be provided include:
 - a. Cavity drainage flashings: Galvanized steel flashing at bottom of air cavities and pressurized compartments to gravity drain water from cavity.
 - 2. Form sheet metal fabrications in longest possible lengths. Turn back all exposed edges to form hem. Fabricate vertical faces with bottom edge formed outward and hemmed to provide drip.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine walls to receive cladding system. Ensure substrate is structurally sound, clean, and free of contaminants, which could inhibit bond of air barrier.

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1. Maximum substrate/studwall deflection: $L/300$ or as recommended by code and architect per the guidelines of our manufacturer's maximum system deflection.
 2. Maximum substrate surface variation: 1/8 inch in 10 feet.
 3. Stud construction: Verify stud framing is adequately braced without deflection and sheathing is properly secured with edges over firm bearing. Ensure proper framing and supports are provided and located for secure attachment of support rails.
- B. Do not proceed with cladding installation until deficiencies have been addressed.

3.2 PREPARATION

- A. Air barrier: Install air barrier to wall substrate. Install horizontally starting at bottom of wall. Do not leave air barrier membrane exposed for lengthy period of time. Exercise care not to puncture or tear barrier with subsequent cladding operations.
- B. Flashings: Install sheet metal flashings, pressure compartment dividers, and trim as positioned and detailed on Drawings and approved shop drawings. Ensure flashings at bottom of wall and pressure compartments properly drain water from air cavity to exterior through weep holes. Turn up flashings 4 inches minimum and seal to substrate. Lap flashing end joints 6 inches minimum and seal watertight.
- C. Install assembly of thermal insulation, metal furring, and sheathing as detailed on Drawings and approved shop drawings.

3.3 CLADDING INSTALLATION

- A. Install cladding in accordance with manufacturer's instructions and approved shop drawings.
- B. Establish level lines for panel coursing and positioning of subframing elements.
- C. Attach aluminum sub-framing with engineered fasteners and anchors to accomplish performance requirements specified.
1. Attach aluminum sub-framing to substrate at a distance recommended by fabricator in accordance with lateral loads and system dead load requirements or as shown on drawings.
 2. Provide 1 to 2 inches space between ends of adjacent rails.
- D. Phenolic Panels: Starting at bottom of wall, fasten panels by fastening into vertical aluminum profile at location of predrilled holes in phenolic panels.
1. Layout work so as to avoid or minimize cuts. Factory fabricate phenolic panels using power saw with appropriate blade type to prevent broken corners, edges, and chips. Field cut in accordance with fabricator guidelines.
 2. Install phenolic panels with appropriate joint layout and configuration. Vertical and horizontal joints shall be open approximately 3/16 inch wide.
 3. Tolerances: Shim and align phenolic panels to provide these tolerances:
 - a. Deviations from level or plumb alignment: 1/4 inch in 20 feet maximum, non accumulative.

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3.4 CLEANING AND PROTECTION

- A. Remove and replace broken, chipped, stained, or otherwise damaged panels.
- B. Immediately after installing, wipe down work. Do not use wire brushes, metallic tools, or abrasives for cleaning.
- C. Protect cladding from roof run-off, splashed water, mud, sealants, bitumen, and other contaminants from remaining construction activities.
- D. Without damaging completed work, provide protective boards at exposed external corners, which may be damaged by construction activities.

END OF SECTION 074200

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SECTION 074213 - METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aluminum plate panels.

B. Related Sections:

1. Division 7 Section "Sheet Metal Flashing and Trim" for flashing and other sheet metal work that is not part of metal wall panel assemblies.

1.2 DEFINITION

- A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight wall system.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

- B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft.

- C. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft.

1. Water Leakage: As defined according to AAMA 501.1.

- D. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 of the span.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.

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- B. LEED Submittals:
 - 1. Product Data for Credit MR 4.1 and Credit MR 4.2: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
 - 2. Product Data for Credit MR 5.1 and Credit MR 5.2: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- C. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - b. Anchorage systems.
- D. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
 - 2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
 - 2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
 - 3. Accessories: 12-inch- long Samples for each type of accessory.
- F. Qualification Data: For Installer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- H. Maintenance Data: For metal wall panels to include in maintenance manuals.
- I. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).

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5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- C. Source Limitations: Obtain each type of metal wall panel from single source from single manufacturer.
- D. Preinstallation Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels, including installers of doors, windows, and louvers.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 7. Review temporary protection requirements for metal wall panel assembly during and after installation.
 8. Review wall panel observation and repair procedures after metal wall panel installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.
- E. Protect foam-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 foam-plastic insulation materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.8 COORDINATION

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

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.

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2. Warranty Period: 5 years.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years.
- C. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Metal Wall Panels: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
1. Dri-Design. (Basis of Design)
 2. CENTRIA Architectural Systems.
 3. AEP-Span.
 4. MBCI; Div. of NCI Building Systems.
 5. Architectural Building Components.
 6. Fabral.
 7. Or equal.

2.2 ALUMINUM PLATE PANELS

- A. Product: Aluminum panels by Dri-Design or equal.
1. Aluminum Plate: Alloy and temper as recommended by manufacturer for application and in compliance with manufacturers design requirements.
 2. Aluminum Material: Tension-leveled, flouropolymer PVDF factory painted finish, 3003-H14 manganese alloy.
 3. Thickness: 0.080 inch.
 4. Weight: Less than 2 lbs per sf.
 5. Panel Depth: 1-1/4 inch, nominal.
 6. Panel Size and joints: As indicated on Drawings.
 7. Code Approvals:
 - a. City of Los Angeles Research Report: RR26079.
 - b. Miami-Date County Building Code Compliance Office: Approved.

2.3 ACCESSORIES

- A. Wall panel system fasteners shall be #14 minimum diameter, self-tapping, with hex head.
1. Concealed fasteners shall be cadmium plated carbon steel or 300 series stainless steel with 5/8 inch bonded neoprene and galvanized or stainless steel washers.

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2. Exposed fasteners shall be 300 series stainless steel with 5/8 inch bonded neoprene and stainless steel washers coated to match the exterior panel color.
- B. Miscellaneous Framing Components, General: Cold-formed metallic-coated steel sheet, ASTM C 645, Grade 50, with ASTM A 653, G90 (Z180) hot-dip galvanized zinc coating.
1. Z- shaped furring members: 0.054-inch minimum.
- C. Closures shall be metal and/or foam as required. Foam shall be a pre-cut profile closure of cross-linked, closed cell foam. Metal closures shall be fabricated from the same material, gage, finish, and color as the exterior metal panel.
- D. Sealants:
1. Hidden sealant at all side laps, end laps, and flashing details shall be gun grade non-curing butyl or polymeric non-skinning butyl tape to ensure weather tightness.
 2. Exposed sealant shall be one-part moisture curing, gun grade polyurethane.

2.4 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

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- F. Wall panel system components shall be fabricated in the factory for field assembly to the greatest extent possible.

2.5 FINISH

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Concealed interior surface finish shall consist of a 0.2 mil primer and 0.3 mil backer coat.
- E. Exterior (exposed) metal panel material:
 - 1. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - a. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - 3. Verify that weather-resistant sheathing paper has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
 - 4. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

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- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION

- A. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Commence metal wall panel installation and install minimum of 300 sq. ft. Insert size in presence of factory-authorized representative.
 - 2. Shim or otherwise plumb substrates receiving metal wall panels.
 - 3. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
 - 4. Install screw fasteners in predrilled holes.
 - 5. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 6. Install flashing and trim as metal wall panel work proceeds.
 - 7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
 - 9. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 10. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
- B. Fasteners:
 - 1. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
 - 1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.

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- E. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
 6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
 7. At panel splices, nest panels with minimum 6-inch end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
- F. Exposed Fastener, Metal Wall Panels:
1. Conform to standard set forth in SMACNA architectural sheet metal manuals and approved shop drawings detailed for project.
 2. Install panels plumb, level, and straight with ribs parallel, conforming to design as indicated.
 3. Install panel system so it is watertight, without waves, warps, buckles or distortions, and allow for thermal movement considerations.
 4. Abrasive devices shall not be used to cut on or near wall panel system.
 5. Apply sealant tape or caulking as necessary at flashing and panel joints to prevent water penetration.
 6. Remove any strippable film immediately upon exposure to direct sunlight.
 7. Vapor retarder: Joints, perimeter, and openings shall be sealed per manufacturer's instructions to provide continuous vapor retarder.
- G. Zee Clips: Provide Zee clips of size indicated or, if not indicated, as required to act as standoff from subgirts for thickness of insulation indicated. Attach to subgirts with fasteners.

3.4 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

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1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 CLEANING AND PROTECTION

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

END OF SECTION 074213

SECTION 075500 - MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

- A. Provide all labor, equipment, and materials to install a complete roofing system over the properly prepared substrate.
- B. Contractor must submit certified applicator letter from roofing manufacturer with bid stating that roofing contractor is certified to install specified roofing system.

1.2 SUMMARY

- A. Section includes modified bituminous roofing system and accessories on all built up roofing sections
 - 1. Install specified insulation and crickets per plans and details with appropriate coverboard and attach per ASCE 7-05 wind uplift requirements. Coordinate with insulation specification. If no insulation is required on top of deck, mechanically fasten one layer of Type II base sheet – HPR Glasbase.
 - 2. Install two layers of Type IV felts – HPR Glasfelts- in Type III hot asphalt.
 - 3. Install an additional layer of Stressply EUV smooth sheet in hot asphalt in all base flashings, drains, and as a target sheet on all penetrations.
 - 4. Install Stressply Plus FR Mineral capsheet over the entire roof surface in Type III hot asphalt
 - 5. Install Stressply IV UV Plus Mineral Title 24 compliant torch sheet on all vertical walls and base flashings using roofer's torch to adhere. Torch applied sheet must be Title 24 compliant with no factory or field coating applied, Title 24 surface to be bright white minerals.
 - 6. New soft zinc ZinkJak flashings must be used in all drains and pipe penetrations, clamp and caulk per specification.
 - 7. Any mechanical units that sit on solid curbs need to be roofed up and over to make a complete watertight system and then have a new 22ga galvanized metal pan installed before the unit is set in place. All metal seams to be fully soldered.
 - 8. Once roofs are complete and inspected by District and Manufacturer, clean roofs thoroughly with blowers and brooms. Coat all roof sections 3 gallons per square using Pyramic Title 24 coating. Two coats at 1.5 gallons per coat, total of 3 gallons per square.
 - 9. Place all conduits on new redwood blocking and secure with clamps. Blocking should be adhered to a 1/2" thick walkpad from bottom side

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using mastic. Walkpads under blocking to free float on top of roofing system.

10. Install new 22ga Kynar coated metal for all coping and edge metal. Attach coping cap using continuous clip on outside perimeter and fastening inside edge every 24" O.C. with grommet screws. Metal must be supplied by the membrane manufacturer to qualify for the 30-year edge-to-edge warranty.
11. Related Sections:
 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.3 REFERENCES

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

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B. National Roofing Contractors Association (NRCA):

1. Roofing and Waterproofing Manual.

1.4 SUBMITTALS PRIOR TO AWARD

- A. Manufacturer's Installation Instructions: Submit installation instructions and recommendations indicating special precautions required for installing the membrane.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
3. Product Data for Credit IEQ 4.1 - Paintings and Coatings: Provide sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

- C. Manufacturer's Certificate: Certify that roof system furnished has a class A fire rating.
- D. Manufacturer's Certificate: Provide calculations by an engineer that the roof system is adhered/fastened properly to meet or exceed the requirements of ASCE 7-10 wind uplift requirements.
- E. Manufacturer's Certificate: Certify that materials are manufactured in the United States and conform to requirements specified herein, are chemically and physically compatible with each other, and are suitable for inclusion within the total roof system specified herein.
- F. Manufacturer's Certificate: Submit a certified copy of the roofing manufacturer's ISO 9001 compliance certificate.
- G. Test Reports: Submit test reports, prepared by an independent testing agency, for all modified bituminous sheet roofing, this testing must show that sheets meet all minimum tensile, tear, and elongation requirements set forth as the standard in this specification.
- H. Written certification from the roofing system manufacturer certifying the applicator is currently authorized for the installation of the specified roof system.

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- I. Written certification from roofing system manufacturer that all materials including miscellaneous items not supplied by said manufacturer will be fully covered under the 30 year NDL Edge to Edge warranty with no exceptions. This includes insulation, fasteners, and asphalt.
- J. Certification that roof coating surface is Title 24 compliant.
- K. Qualification data for firms and individuals identified in Quality Assurance Article below.
- L. Specimen Warranty: Provide an unexecuted copy of the 30-year NDL Edge to Edge warranty specified for this Project, identifying the terms and conditions required of the Manufacturer and the Owner. Warranty must be a no dollar limit warranty, must be non pro-rated, must cover both labor and all materials including insulation and all accessories including all metal flashings (coping, edge metal, counterflashing, etc), and must not have any renewal periods to achieve the full 30-year warranty period.
- M. Provide samples of warranties for all built up roofing, metal roofing, and metal wall panels from the same manufacturer. Provide a notarized letter from an officer of the manufacturing company stating that they will warranty all roof systems and cover all transitions between each roofing system.
- N. Notarized letter from an officer of the manufacturing company stating that they will provide daily inspections from a full time employee of the company for a minimum of 1 hour, three days per week with photographic reports daily to the owner.
- O. Provide documentation that the manufacture has been in business longer than the specified warranty period (30 years).

1.5 CONTRACT CLOSEOUT SUBMITTALS

- A. Special Project Warranty: Provide 30 year NDL Edge to Edge material and labor warranty as stated in 1.4, L for the Project, executed by the authorized agent of the Manufacturer.
- B. Roofing Maintenance Instructions. Provide a manual of manufacturer's recommendations for maintenance of installed roofing systems.
- C. Demonstration and Training Schedule: Provide a schedule of proposed dates and times for instruction of Owner's personnel in the maintenance requirements for completed roofing work. Refer to Part 3 for additional requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with not less than 30 years documented experience and have ISO 9001 certification.

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- B. Installer Qualifications: Company specializing in modified bituminous roofing installation with not less than 5 years experience and authorized by roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C. Installer's Field Supervision: Maintain a full-time Supervisor/Foreman on job site during all phases of roofing work while roofing work is in progress. Maintain proper supervision of workmen.
- D. Maintain a copy of the Contract Documents in the possession of the Supervisor/Foreman and on the roof at all times.
- E. Source Quality Control: Manufacturer shall have in place a documented, standardized quality control program such as ISO-9001.
- F. Manufacturer cannot be in or have been in bankruptcy (Chapter 7 or Chapter 11) in the last ten (10) years.
- G. Manufacturer must have been in business for as long as the warranty is to last (30 years).

1.7 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Roofing Conference: Convene a pre-roofing conference approximately two (2) weeks before scheduled commencement of modified bituminous roofing system installation and associated work.
- B. Require attendance of installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in and around roofing that must precede or follow roofing work (including mechanical work if any), Architect, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, testing agencies and governing authorities. Objectives of conference include:
 - 1. Review foreseeable methods and procedures related to roofing work, including set up and mobilization areas for stored material and work area.
 - 2. Tour representative areas of roofing substrates (decks), inspect and discuss condition of substrate, roof drains, curbs, penetrations and other preparatory work performed by others.
 - 3. Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
 - 4. Review roofing system requirements (drawings, specifications and other contract documents).
 - 5. Review required submittals both completed and yet to be completed.
 - 6. Review and finalize construction schedule related to roofing work and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

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7. Review required inspection, testing, certifying and material usage accounting procedures.
 8. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including possibility of temporary roofing (if not mandatory requirement).
 9. Record discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
 10. Review notification procedures for weather or non-working days.
- C. The intent of the conference is to resolve issues affecting the installation and performance of roofing work. Do not proceed with roofing work until such issues are resolved to the satisfaction of the Owner. This shall not be construed as interference with the progress of Work on the part of the Owner.

1.8 DELIVERY, STORAGE AND HANDLING

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

1.9 MANUFACTURER'S DUTIES

- A. When the Project is in progress, the roofing system manufacturer will provide the following to all interested parties including Owner, Architect, and Construction Manager:
 1. Report progress and quality of the work as observed.
 2. Provide job site inspections with photographic reports 5 days per week for a minimum of one hour when contractor is on site.

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3. Report to the Owner in writing any failure or refusal of the Contractor to correct unacceptable practices called to the Contractor's attention.
4. Confirm after completion that manufacturer has observed no application procedures in conflict with the specifications other than those that may have been previously reported and corrected.

1.10 PROJECT CONDITIONS

- A. Proceed with roofing work only when existing and forecasted weather conditions will permit a unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- B. Do not apply roofing insulation or membrane to damp deck surface.
- C. Do not expose materials subject to water or solar damage in quantities greater than can be weatherproofed during same day.
- D. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank one (1) inch cap nails, or screws and plates at a rate of one (1) fastener per ply (including the membrane) at each insulation stop. Place insulation stops at 16 feet on center. for slopes less than 3:12 and four (4) feet on center. for slopes greater than 3:12. On non-insulated systems, nail each ply directly into the deck at the rate specified above. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate backnailing. Install four (4) additional fasteners at the upper edge of the membrane when strapping the plies.

1.11 SEQUENCING AND SCHEDULING

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

1.12 WARRANTY

- A. Upon completion of installation, and acceptance by the Owner, the Manufacturer will supply to the Owner a 30 year No Dollar Limit Edge to Edge warranty, this warranty must cover all roofing, walls, flashings, metal edge, coping, and transitions in between each roof section. Warranty must be non-prorated and must cover all labor and all materials installed from the deck up. No renewals can be included, must be a full 30-year warranty.
- B. Installer will submit a five (5) year warranty to the membrane manufacturer with a copy directly to Owner to include installation of all components of the roofing system, including insulation and all metal flashing work.
- C. Same roofing manufacturer must warranty all built up roofing, metal roofing, and metal wall panels including all transitions.

PART 2 — PRODUCTS

2.1 PRODUCTS, GENERAL

- A. Basis of Design: Class A per CBC Chapter 15, materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.
- B. Substitutions: Products proposed as equal to the products specified in this Section shall be submitted in accordance the following and must include all items from Section 1.4 and 1.6.
1. Proposals shall be accompanied by a copy of the manufacturer's standard specification Section. That specification Section shall be signed and sealed by a professional engineer licensed in the state in which the installation is to take place. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
 2. Include a list of three (3) projects of similar type and extent, located within a one-hundred-mile radius from the location of the project. In addition, the three projects must be at least five (5) years old and be available for inspection by Owner or Owner's Representative.
 3. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance. A spread sheet comparing all items will need to be submitted with substitution request.
 4. The District's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.
 5. All substitution requests must be submitted 10 days before bids are due. This allows for all bidders the chance to bid the same substituted product and offers all bidders a fair bidding field. All substitutions submitted after this period will be rejected.

2.2 ACCEPTABLE MANUFACTURERS

- A. The basis of design is roofing systems engineered and manufactured by The Garland Company or District approved equal:

The Garland Company
3800 East 91st Street
Cleveland, Ohio 44105
Steve Lampman (949) 322-1770
Pete Cochran (949) 295-0447
Website: www.garlandco.com

2.3 DESCRIPTION

- A. Modified bituminous roofing work including but not limited to:
1. Type II base sheet: HPR Glasbase
 2. Minimum two (2) plies of HPR Glasfelt, ASTM D2178, Type IV glass fiber roofing felt bonded to prepared substrate with hot bitumen;
 2. Hot Bitumen: Trumbull, lo-odor Type III steep asphalt having the following characteristics:
 - a. Softening Point 185°F - 205°F
 - b. Flash Point 500°F
 - c. Penetration @ 77°F 15-35 units
 - d. Ductility @ 77°F 2.0 cm
 3. Base Flashing Ply: For base flashings and target sheets; One (1) ply of Stressply EUV; 115 mil SBS and SIS (Styrene-Butylene-Styrene and Styrene-Isoprene-Styrene) rubber modified roofing membrane incorporating post consumer recycled rubber, fire retardant characteristics and reinforced with a fiberglass and polyester composite scrim set in hot asphalt and covered by an additional layer of torch applied modified bitumen mineral surface (Stressply IV UV Plus Mineral) 195 mil membrane.
 4. Modified Base Flashing Capsheet Membrane: Stressply IV UV Plus Mineral; 195 mil SBS (Styrene-Butadiene- Styrene) mineral surfaced rubber modified roofing membrane with a fiberglass and polyester composite scrim. This membrane is designed for torch applications and has a burn-off backer that indicates when the material is hot enough to be installed. Title 24 compliant with no factory or field coating applied, Title 24 surface to be bright white minerals
 5. Modified Mineral Surface Capsheet Field Membrane: Stressply Plus FR Mineral - Environmentally Friendly; 155 mil SBS (Styrene-Butylene-Styrene) rubber modified roofing membrane incorporating recycled rubber, fire retardant characteristics and reinforced with a fiberglass and polyester composite scrim covered by an additional layer of mineral surface modified bitumen membrane.
 6. Surfacing: Pyramic acrylic coating; ASTM G26.

2.4 BITUMINOUS MATERIALS

- A. Asphalt Primer: Garla Prime; V.O.C. compliant, ASTM D41.
- B. Roofing Mastic: Flashing Bond, ASTM D 4586, Type II, Class I

- C. Interply Adhesive: ASTM D312, Type III, low odor

2.5 SHEET MATERIALS

- A. Felt Plies: HPR Glasfelts, ASTM D2178, Type IV
- B. Modified Base Flashing Torch Capsheet Membrane Properties (Finished Membranes): Stressply IV UV Plus Mineral; ASTM D6162, Type III Grade G
1. Tensile Strength (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 310 lbf/in CMD 310 lbf/in
 2. Tear Strength (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 510 lbf CMD 510 lbf
 3. Elongation at Maximum Tensile (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 6.0% CMD 6.0%
 4. Low Temperature Flexibility (ASTM D5147): Passes -40°F
 5. Title 24 compliant with no factory or field coating applied, Title 24 surface to be bright white minerals
- C. Modified Mineral Surface Capsheet Field Membrane; Properties (Finished Membranes): Stressply Plus FR Mineral; ASTM D6162, Type III Grade G
1. Tensile Strength (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 310 lbf/in CMD 310 lbf/in
 2. Tear Strength (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 500 lbf CMD 500 lbf
 3. Elongation at Maximum Tensile (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 3.5% CMD 3.5%
 4. Low Temperature Flexibility (ASTM D5147): Passes -30°F
 5. Pre consumer recycled content 11%
 6. Post consumer recycled content 0.3%
- D. Modified Base Flashing Ply Membrane: Properties (Finished Membranes): Stressply EUV; ASTM D6162, Type III
1. Tensile Strength (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 700 lbf/in CMD 750 lbf/in
 2. Tear Strength (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 1300 lbf CMD 1400 lbf
 3. Elongation at Maximum Tensile (ASTM D5147)
 - a. 2 in/min. @ 73.4 ± 3.6°F MD 6.0% CMD 6.0%
 4. Low Temperature Flexibility (ASTM D5147): Passes -30°F

2.6 SURFACINGS

- A. White Elastomeric Roof Coating: Pyramic; Energy Star approved white roof coating. Performance Requirements:
1. Weight/Gallon 12 lbs./gal. (1.44 g/cm³)
 2. Non-Volatile % (ASTM D 1644) 66 min
 3. Reflectance 81%

2.7 RELATED MATERIALS

- A. Flashing and Sheet Metal: Kynar Coated, steel
1. 22 gauge thick minimum to be provided by roofing membrane manufacturer to qualify for specified Manufacturer's edge-to-edge 30 year NDL warranty. Also see Division 7 Section "Sheet Metal Flashing and Trim" additional requirements.
- B. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one (1) inch diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one (1) inch diameter are used.
- C. Metal Discs: Flat discs or caps of zinc-coated sheet metal not lighter than twenty eight (28) gauge and not less than one (1) inch in diameter. Form discs to prevent dishing. Bell or cup shaped caps are not acceptable.
- D. Walkway Pads: Walkpads by WR Meadows; Factory formed, nonporous, with a slip-resisting surface texture, manufactured specifically for adhering to modified bituminous membrane roofing as a protection course for foot traffic, of the following thickness:
1. 1/2" thick
 2. To be installed around roof hatch and around all units unless shown in more locations on plans.
- E. Walkway Pad Adhesive: Flashing Bond mastic
- F. Glass Fiber Cant: Continuous triangular cross Section made of inorganic fibrous glass used as a cant strip as recommended by the membrane manufacturer.
- G. Drain Flashings and pipe jacks: ZincJak; should be new lead free soft sheet zinc formed and rolled. ZincJak info: zincjac@com-innov.com, 888-744-3439
1. Density 0.258 lbs/in
 2. Melting point 786 degrees F

3. Tensile Strength (ksi) 10-22

PART 3 — EXECUTION

3.1 EXECUTION, GENERAL

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

3.2 EXAMINATION

- A. Verify that deck surfaces and project conditions are ready to receive work of this Section.
- B. Verify that deck is supported and secured to structural members.
- C. Verify that deck is clean and smooth, free of depressions, projections or ripples, and is properly sloped to drains.
- D. Verify that adjacent roof substrate components do not vary more than ¼ inch in height.
- E. Verify that deck surfaces are dry
- F. Verify that openings, curbs, pipes, conduit, sleeves, ducts, and other items which penetrate the roof are set solidly, and that cant strips, wood nailing strips, and reglets are set in place.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Insurance/Code Compliance: Where required by code, install and test the roofing system to comply with governing regulation and specified insurance requirements.
- C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installation of the modified bituminous roofing system.
- D. Coordinate installation of roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets and insulation with two (2) plies of #15 organic roofing felt set in full moppings of bitumen and with joints and edges sealed with roofing cement. Remove cut-offs immediately before resuming work.
- E. Asphalt Bitumen Heating: Heat and apply bitumen in accordance with the Equisviscous Temperature (EVT) Method as recommended by National Roofing Contractors Association (NRCA). Do not raise temperature above minimum normal fluid-holding temperature necessary to attain EVT (plus 5°F at point of

application) more than one (1) hour prior to time of application. Determine flash point, finished blowing temperature, EVT, and fire-safe handling temperature of bitumen either from information by manufacturer or by suitable test. Do not exceed recommended temperature limits during bitumen heating. Do not heat to a temperature higher than twenty-five degrees (25°F) below flash point. Discard bitumen that has been held at temperature exceeding Finishing Blowing Temperature (FBT) for more than three (3) hours. Keep kettle lid closed except when adding bitumen.

- F. Asphalt Bitumen Mopping Rate:
 - 1. Interply Mopping: Apply bitumen at the rate of approximately twenty-five (25) lb.(11.3kg) of bitumen per roof square.
 - 2. Modified Membrane Mopping: Apply bitumen at the rate of approximately thirty (30) lb (13.6kg). of bitumen per roof square.
- G. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- H. Apply roofing materials as specified by manufacturer's instructions.
 - 1. Keep roofing materials dry before and during application.
 - 2. Complete application of roofing plies, modified sheet and flashing in a continuous operation.
 - 3. Begin and apply only as much roofing in one day as can be completed that same day.
- I. Cut-Offs (Waterstops): At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two (2) plies of #15 organic roofing felt set in full moppings of bitumen with joints and edges sealed.
- J. Broadcast minerals into the bleed out of bitumen while bitumen is at its recommended EVT temperature to achieve uniform color throughout.

3.4 FELT PLY INSTALLATION

- A. Fiberglass Plies: Install two (2) fiberglass ply sheets in twenty-five (25) lbs (11.3kg) per square of bitumen shingled uniformly to achieve two plies over the entire prepared substrate. Shingle in direction of slope of roof to shed water on each area of roof. Do not step on felt rolls until asphalt has cooled, fish mouths should be cut and patched.
- B. Lap ply sheet ends eight (8) inches (203mm). Stagger end laps twelve (12) inches (304mm) minimum.
- C. Lightly broom in fiberglass plies to assure complete adhesion.

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- D. Extend plies two (2) inches (50mm) beyond top edges of cants at wall and roof projections and equipment bases.

3.5 MODIFIED MEMBRANE APPLICATION

- A. Solidly bond the modified membrane to the base layers with specified asphalt at the rate of thirty (30) lbs. (11-13kg) per 100 square feet.
- B. The modified membrane roll must have asphalt slightly visible at all side laps. Exercise care during application to eliminate air entrapment under the membrane.
- C. Apply pressure to all seams to ensure that the laps are solidly bonded to substrate.
- D. Install subsequent rolls of modified membrane across the roof as above with a minimum of four (4) inch (101mm) side laps and eight (8) inch (203mm) end laps. Stagger the end laps. Apply the modified membrane in the same direction as the previous layers but stagger the laps so they do not coincide with the laps of the base layers.
- E. Extend membrane two (2) inches (50mm) beyond top edge of all cants in full moppings of the specified asphalt.

3.6 FLASHING MEMBRANE INSTALLATION

- A. Seal all curb, wall and parapet flashings with an application of mastic and mesh on a daily basis. Do not permit conditions to exist that will allow moisture to enter behind, around or under the roof or flashing membrane.
- B. Prime any concrete walls or curbs with 1 gallon per square of asphalt primer.
- C. Install base flashing ply covering entire wall and wrapped over the top of the parapet wall, extended to outside edge of wall, with six (6) inches on to field of the roof and set in hot asphalt. Nail membrane at eight (8) inches on center.
- D. Install a second ply of torch applied modified mineral surface base flashing capsheet membrane over the base flashing ply, nine (9) inches on to the field of the roof. Attach a termination bar attached every 16" on concrete walls and 8" on wood walls. Solidly adhere the entire sheet of flashing membrane to the substrate.
- E. Coordinate counter flashing, cap flashings, expansion joints, and similar work with modified bitumen roofing work.
- F. Coordinate roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices with the roofing system work as specified in other Sections.
- G. Coping Cap :
 - 1. Prime vertical wall at a rate of one hundred (100) square feet per gallon and allow to dry.

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2. Set cant in bitumen. Run all field plies over cant a minimum of two (2) inches.
3. Install base flashing ply covering entire wall and wrapped over top of wall to outside edge of exterior wall with six (6) inches on to field of the roof and set in hot asphalt. Nail membrane at eight (8) inches on center.
4. Install a torch applied modified mineral surface base flashing capsheet membrane over the base flashing ply, nine (9) inches on to the field of the roof.
5. Install coping cap with continuous outside clip and fasten on the inside edge every twenty-four (24) inches on center.

H. Equipment Support

1. Prime vertical concrete or gypsum board at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all field plies over cant a minimum of two (2) inches.
3. Install base flashing ply covering curb with six (6) inches on to field of the roof.
4. Install torch applied modified mineral surface base flashing capsheet membrane over the base flashing ply, nine (9) inches on to the field of the roof. Attach top of membrane to top of curb and fasten at eight (8) inches o.c. where unit can not be lifted. Roof up and over entire curb of HVAC units unless unit is a downdraft unit. Replace pans with new 22ga fully soldered galvanized metal.
5. Install new slip metal under existing curbs with equipment that is not to be lifted. Fasten at twelve (12) inches on center with fasteners and neoprene washers. All joints in metal shall be sealed to be water tight. Replace pans completely with new where specified elsewhere in this specification.

I. Exhaust Fan

1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all plies over cant a minimum of two (2) inches.
3. Install base flashing ply covering curb with six (6) inches on to field of the roof.
4. Install torch applied modified mineral surface base flashing capsheet membrane installed over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of curb and fasten at eight (8) inches on center.

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5. Install metal exhaust fan over the fasteners and flashing to act as counterflashing. Fasten per manufacturer's recommendation.

J. Passive Vent/Air Intake

1. Minimum curb height is eight (8) inches. Prime vertical at a rate of one hundred (100) square feet per gallon and allow to dry.
2. Set cant in bitumen. Run all plies over cant a minimum of two (2) inches.
3. Install base flashing ply covering curb with six (6) inches on to the field of the roof.
4. Install torch applied modified mineral surface base flashing capsheet membrane installed over the base flashing ply, nine (9) inches on to field of the roof. Attach top of membrane to top of curb and attach at eight (8) inches on center.
5. Install passive vent/air intake over the fasteners and flashing to act as counterflashing. Fasten per manufacturers recommendations.

K. Roof Drain

1. Plug drain to prevent debris from entering plumbing.
2. Run roof system plies over drain. Cut out plies inside drain bowl.
3. Set zinc flashing (thirty (30) inch square minimum) in (1/4) inch bed of mastic. Run zinc into drain a minimum of two (2) inches. Prime zinc at a rate of one hundred (100) square feet per gallon and allow to dry.
4. Install target sheet ply (forty (40) inch square minimum) in bitumen.
5. Install modified smooth membrane for field (forty-eight (48) inch square minimum) in bitumen.
6. Install clamping ring and assure that all plies are under the clamping ring.
7. On drain boxes, nail flange over target ply, staggered and primed. Do not create a dam at flange which would inhibit flow to drain. Run base plies short of drain and cap sheet to drain edge.
8. Install all new cast iron drain covers on all drains and overflows.

L. Plumbing Stack

1. Minimum stack height is twelve (12) inches.
2. Prime flange of new ZincJak flashing. Install properly sized ZinkJak set in (1/4) inch bed of roof cement over roof plies.

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3. Install target sheet ply in bitumen.
4. Install modified smooth membrane for field in bitumen.
5. Caulk the intersection of the membrane with elastomeric sealant.
6. Turn sleeve a minimum of one (1) inch down inside of stack or clamp at top, farrow out top edge, and seal with Tuff Stuff caulking.

M. Heat Stack

1. Minimum stack height is twelve (12) inches.
2. Prime flange of new sleeve. Install properly sized sleeves set in (1/4) inch bed of roof cement over roof plies.
3. Install target sheet ply in bitumen.
4. Install modified smooth membrane for field in bitumen.
5. Caulk the intersection of the membrane with elastomeric sealant.
6. Install new collar over cape. Weld collar or install stainless steel draw brand.

3.7 APPLICATION OF SURFACING

A. Reflective Coating:

1. Allow all cold applied mastics and coating to properly dry and cured before installing the coating. Mastic must cure for a minimum of 30 days. Roof must be clean, free of dirt, dust, debris and dry.
2. Coat entire roof with three (3) gallons of per square of Pyramic Title 24 coating using two (2) coats of 1.5 gallons per coat. Each coat to be applied perpendicular to each other and back rolled for an even finish.

3.8 FIELD QUALITY CONTROL

- A. Perform field inspection and testing as required
- B. Correct defects or irregularities discovered during field inspection.
- C. A copy of the specification should also be on site at all times.
- D. Perform following test:
 1. Flood Testing: Flood test roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary

- containment assemblies, plug or dam drains, and flood with potable water.
2. Perform tests before overlying construction is placed.
 3. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of base flashing.
 4. Flood each area for 24 hours.
 5. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.
 6. Testing agency shall prepare survey report indicating locations of initial leaks, if any, and final survey report.
 7. Flood testing limits to be approved by the structural engineer.

3.9 CLEANING

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

3.10 CONSTRUCTION WASTE MANAGEMENT

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

3.11 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with Contractor, Architect, installer, installer of associated work, Owner, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Walk roof surface areas of the building, inspect perimeter building edges as well as flashing of roof penetrations, walls, curbs and other equipment. List all items requiring correction or completion and furnish copy of list to each party in attendance.
- C. The roofing system manufacturer reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by the Roofing Contractor.
- D. If core cuts verify the presence of damp or wet materials, the Roofing Contractor shall be required to replace the damaged areas at his own expense.

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- E. Repair or replace deteriorated or defective work found at time above inspection as required to produce an installation which is free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F. Notify the Owner upon completion of corrections.
- G. Following the final inspection, provide written notice of acceptance of the installation from the roofing system manufacturer.
- H. Immediately correct roof leakage during construction. If the Contractor does not respond within twenty-four (24) hours, the Owner will exercise rights to correct the Work under the terms of the Conditions of the Contract.

END OF SECTION 075500

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sheet metal flashing and trim not specifically specified in other sections.

B. Related Sections:

1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
2. Division 7 Section "Modified Bituminous Membrane Roofing" for additional sheet metal flashing and trim for roofing requirements.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

- C. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:

1. Identification of 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 joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
4. Details of termination points and assemblies, including fixed points.

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5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

C. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

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1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sheet metal flashing and trim that fails in materials or workmanship within specified warranty period.
 - 1. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Galvanized Sheet Metal Flashing and Trim:
 - 1. Fry Reglet Corporation.
 - 2. Hickman, W. P. Company.
 - 3. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - 4. Or equal.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755.
 - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653, G90 coating designation; structural quality.
 - 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3. Color: As selected by Architect from manufacturer's full range.

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4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
5. Parapet Flashing Coping Cap metal to be fabricated from built up roofing manufacturer listed in Division 7 Section "Modified Bituminous Membrane Roofing" (The Garland Company) to be included in the roofing warranty coverage. The Garland Company

2.3 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 and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153 or ASTM F 2329 or Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 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, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 1. 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.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form 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.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

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- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

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 the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 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. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.

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- 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 SMACNA.
 - 1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
 - 2. Underlayment for Parapet Flashing Coping Cap: Where installing metal coping, install Carlisle WIP300HT self adhering underlayment (or equal) under all coping as shown on details.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and 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 each 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 Division 7 Section "Joint Sealants."
- F. 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 reduce pre-tinning where pre-tinned surface would show in completed Work.
 - 1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 - 2. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - 3. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
- G. Flashing corners shall be shop fabricated and fully soldered such that corner assemblies are single monolithic units for 18" in all directions from corners.

3.3 MISCELLANEOUS FLASHING INSTALLATION

- A. Overhead-Piping Safety Pans: Suspend pans independent from structure above as indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

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

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- D. 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 076200

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SECTION 076500 - FLEXIBLE SHEET FLASHING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Flexible sheet flashing for windows, doors, parapets, and other openings and where indicated on Drawings.

B. Related Sections include the following:

1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 SUBMITTALS

A. Concurrent Review Requirements: Submit submittals of this section with doors and windows sections.

B. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of flexible sheet flashing.

C. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
3. Product Data for Credit IEQ 4.1 - Paintings and Coatings: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

D. Shop Drawings: Show locations and extent of flexible sheet flashing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

E. Samples: For the following products:

1. 12-by-12-inch square of flexible sheet flashing.

F. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

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- G. Qualification Data: For Installer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for flexible sheet flashing.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Installer Qualifications: A firm that is acceptable to flexible sheet flashing manufacturer for installation of flexible sheet flashing required for this Project.
- C. Source Limitations: Obtain flexible sheet flashing materials through one source from a single manufacturer.
- D. 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 with doors and windows.
- E. 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 flexible sheet flashing including, but not limited to, the following:

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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 flashing to be coordinated with the finishing of doors and windows.
3. Review, discuss, and coordinate the interrelationship of flexible flashing with other exterior wall components. Include provisions for sealants and fasteners.
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.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by flexible sheet flashing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of flexible sheet flashing that fails in materials or workmanship within specified warranty period.
 1. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Flexible Sheet Flashing: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 1. WR Grace (Basis of Design).
 2. Carlisle Coatings & Waterproofing Inc., Div. of Carlisle Companies Inc.; CCW WIP 300HT.
 3. Henry Company; Blueskin PE200 HT.
 4. Metal-Fab Manufacturing, LLC; MetShield.
 5. Owens Corning; WeatherLock Metal High Temperature Underlayment.

6. Or equal.

2.2 FLEXIBLE SHEET FLASHING

- A. Product: Ultra by WR Grace or equal.
 1. Self-Adhering, High-Temperature Sheet: 30 to 40 mils thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 2. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
 3. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.
 4. Location: At eaves, rakes, valleys, penetrations, slope and direction changes, horizontal and soffit areas, in addition to where indicated on Drawings
 5. Method: Overlap with felt after putting down Self-Adhering sheet.

2.3 AUXILIARY MATERIALS

- A. Mastic, Joint Sealant, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by flexible sheet flashing manufacturer.
 1. Caulking, sealants, and adhesives applied on the interior of the building envelope shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 1. Verify that concrete has cured and aged for minimum time period recommended by flexible sheet flashing manufacturer.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install flexible sheet flashing in accordance with the manufacturer's written instructions, AAMA Publication 2400, and the applicable code.

END OF SECTION 076500

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Roof hatches.

B. Related Sections.

1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
2. Division 9 Section "Painting" for field finishes.

1.2 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. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

C. Warranty: Special warranty specified in this Section.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.

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8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. 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.

1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 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.

1.6 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.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of roof accessories that fails in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Period: 2 years.

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- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Roof Hatches: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 1. Bilco Company (The). (Basis of Design)
 2. Milcor Inc.; a Gibraltar Company.
 3. Nystrom, Inc.
 4. O'Keeffe's Inc.
 5. ThyCurb; Div of Thybar Corporation.
 6. Or equal.

2.2 METAL MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653, G90 coated and mill phosphatized for field painting.
 1. Comply with Division 9 Section "Painting" for field finishes.

2.3 ROOF HATCHES

- A. General: Fabricate roof hatches 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.
- B. Product: Type S or E depending on size by Bilco.
 1. Type: Galvanized steel single (S) or double-leaf (E) lid as indicated on Drawings.
 2. Size: As indicated on Drawings.
 3. Integral Curb and Framing Material: Galvanized steel sheet, 0.079 inch thick.
 4. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.
 5. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation. Bil-Guard Hatch Rail System or equal.
 6. Finish: Comply with Division 9 Section "Painting".

2.4 FINISH

- A. Galvanized Steel: Field finish per Division 9 Section "Painting".

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.
- 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.
 - 1. 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.
 - 2. 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.

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.

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3.4 CLEANING

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

END OF SECTION 077100

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SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, whether indicated on drawings or not, and other openings indicated.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Fire-Resistive Joint Systems."
 - 3. Division 7 Section "Joint Sealants" for non-fire-resistive joint sealants.

1.2 PERFORMANCE REQUIREMENTS

- A. General: For penetrations through the following fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are 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.
 - 1. Fire-resistance-rated walls including fire walls, fire partitions, fire barriers, and smoke barriers.
 - 2. Fire-resistance-rated horizontal assemblies including floors, floor/ceiling assemblies, and ceiling membranes of roof/ceiling assemblies.
- B. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:
 - 1. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - 2. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - a. Penetrations located outside wall cavities.
 - b. Penetrations located outside fire-resistance-rated shaft enclosures.
 - 3. L-Rated Systems: Provide through-penetration firestop systems with L-ratings of not more than 3.0 cfm/sq. ft at both ambient temperatures and 400 deg F.
- C. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.

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2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- D. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 2. EQc4.2, Low-Emitting Materials, Paints and Coatings. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: For each through-penetration firestop system, show each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item. Include firestop design designation of qualified testing and inspecting agency that evidences compliance with requirements for each condition indicated.
1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop system configuration for construction and penetrating items.
 2. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- D. Through-Penetration Firestop System Schedule: Indicate locations of each through-penetration firestop system, along with the following information:
1. Types of penetrating items.
 2. Types of constructions penetrated, including fire-resistance ratings and, where applicable, thicknesses of construction penetrated.
 3. Through-penetration firestop systems for each location identified by firestop design designation of qualified testing and inspecting agency.
- E. Qualification Data: For Installer.
- F. Product Test Reports: From a qualified testing agency indicating through-penetration firestop system complies with requirements, based on comprehensive testing of current products.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Installer Qualifications: A firm experienced in installing through-penetration firestop systems 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 through-penetration firestop system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

C. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.

D. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.

E. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

1. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, or another agency performing testing and

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follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1 Performance Requirements" Article. Provide rated systems complying with the following requirements:
 - a. Through-penetration firestop systems correspond to those indicated by reference to through-penetration firestop system designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

1.8 WARRANTY

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- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of through-penetration firestop system that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Through-Penetration Firestop Systems: Subject to compliance with requirements, provide one of the through-penetration firestop systems for each application that are produced by one of the following manufacturers.
 - 1. Hilti, Inc.
 - 2. Specified Technologies Inc.
 - 3. 3M; Fire Protection Products Division.
 - 4. Or equal.

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-/rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.
- C. Caulking, sealants, and adhesives applied on the interior of the building envelope shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.

2.3 FILL MATERIALS

- A. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - 2. Grade for Horizontal Surfaces: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - 3. Grade for Vertical Surfaces: Nonsag formulation for openings in vertical and other surfaces.

2.4 MIXING

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing through-penetration firestop systems to comply with firestop system 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 through-penetration firestop systems.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with through-penetration firestop systems. 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 through-penetration firestop system 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 through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop system's seal with substrates.

3.3 THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION

- A. General: Install through-penetration firestop systems to comply with Part 1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

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- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
- C. Install fill materials for firestop systems 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted. Include the following information on labels:
 - 1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Through-penetration firestop system manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified, independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
- B. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
- C. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system 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 through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM LOCATION

- A. Provide assemblies as indicated on Drawings. Provide following products for additional locations not identified on Drawings.
- B. For penetrations by non combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following materials are acceptable:
 - 1. Hilti FS 601 Elastomeric Firestop Sealant.
 - 2. Hilti FS ONE High Performance Intumescent Firestop Sealant.
 - 3. 3M Fire Stop Sealant 2000 4. 3M Fire Barrier CP25 WB.
 - 4. Tremco Tremstop Fyre Sil Sealant.
 - 5. Or equal.
- C. For penetrations by combustible items (penetrants consumed by high heat flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe (closed piping systems) the following materials are acceptable:
 - 1. Hilti FS ONE High Performance Intumescent Firestop Sealant.
 - 2. Hilti CP 618 Firestop Putty.
 - 3. Hilti CP 642 Firestop Jacket.
 - 4. Hilti CP 643 Firestop Jacket.
 - 5. 3M Fire Barrier CP25 WB.
 - 6. 3M Fire Barrier FS 195 Wrap/Strip.
 - 7. Tremco Tremstop WBM Intumescent Firestop Sealant.
 - 8. Or equal.
- D. For penetrations by combustible plastic pipe (open piping systems), the following materials are acceptable:
 - 1. Hilti CP 642 Firestop Jacket.
 - 2. Hilti CP 643 Firestop Jacket.
 - 3. Hilti FS ONE High Performance Intumescent Firestop Sealant.
 - 4. 3M Fire Barrier PPO Plastic Pipe Device.
 - 5. Or equal.
- E. For large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways' the following materials are acceptable:
 - 1. Hilti FS 635 Trowelable Firestop Compound.
 - 2. Hilti FIRE BLOCK.
 - 3. 3M Firestop Foam 2001.

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4. 3M Fire Barrier CS 195 Composite Sheet.
5. Or equal.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes fire-resistive joint systems for interruptions to fire rated assemblies, whether indicated on drawings or not, and other openings indicated.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Penetration Firestopping" for systems installed in openings in walls and floors with and without penetrating items.
 - 3. Division 7 Section "Joint Sealants" for non-fire-resistive joint sealants.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide fire-resistive joint systems that are 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 assembly in which fire-resistive joint systems are installed.
- B. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities and L-ratings indicated as determined by UL 2079.
 - 1. Load-bearing capabilities as determined by evaluation during the time of test.
- C. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. EQc4.2, Low-Emitting Materials, Paints and Coatings. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed; also show relationships to adjoining construction. Include fire-

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resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.
- D. Product Certificates: For each type of fire-resistive joint system, signed by product manufacturer.
- E. Qualification Data: For Installer.
- F. Field quality-control test reports.
- G. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.

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- B. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
- C. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
- D. Source Limitations: Obtain fire-resistive joint systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.
- E. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:
 - 1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
 - a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
 - b. Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

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- C. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fire-resistive joint systems that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fire-Resistive Joint Systems: Subject to compliance with requirements, provide one of the through-penetration firestop systems for each application that are produced by one of the following manufacturers.
 - 1. Hilti, Inc.
 - 2. Specified Technologies Inc.
 - 3. 3M; Fire Protection Products Division.
 - 4. Or equal.

2.2 FIRE-RESISTIVE JOINT SYSTEMS

- A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.
- C. Caulking, sealants, adhesives, and primers applied on the interior of the building envelope shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. 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 fire-resistive joint system 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 fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
- B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 - 3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: Engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.
- B. Testing Services: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.

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1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.
- C. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.
- D. Additional inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.5 CLEANING AND PROTECTING

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

3.6 FIRE-RESISTIVE JOINT SYSTEM LOCATION

- A. For fire rated construction joints and other gaps, the following materials are acceptable:
 1. FS 601 Elastomeric Firestop Sealant by Hilti.
 2. CP 601 s Elastomeric Firestop Sealant by Hilti.
 3. CP 606 Flexible Firestop Sealant by Hilti.
 4. CP 672 Firestop Joint Spray by Hilti.
 5. Firestop Sealant 2000 by 3M.
 6. Tremstop Fyre Sil Sealant by Tremco.
 7. Or equal.
- B. For openings between structurally separate sections of wall and floors. Top of walls, the following materials along with Thermafiber Safing are acceptable:
 1. FS 60t Elastomeric Firestop Sealant by Hilti.
 2. CP 601s Elastomeric Firestop Sealant by Hilti.
 3. CP 606 Flexible Firestop Sealant. by Hilti
 4. FS ONE High Performance Intumescent Firestop Sealant by Hilti.
 5. Fire Barrier CP 25 WB by 3M.
 6. Or equal.
- C. Firestopping at Electrical Boxes and Utility Outlets.
 1. CP 618 Firestop Putty Stick by Hilti.
 2. CP 617 and CP 617L Firestop Putty Pad by Hilti.
 3. Or equal.

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes joint sealants.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
 - 3. Division 7 Section "Penetration Firestopping" for systems installed in openings in walls and floors with and without penetrating items.

1.2 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. LEED Submittals:
 - 1. EQc4.2, Low-Emitting Materials, Paints and Coatings. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- F. Qualification Data: For Installer.
- G. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

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- H. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- I. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- C. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- D. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
- E. Preinstallation Conference: Conduct conference at Project site.

1.5 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.

1.6 WARRANTY

- A. 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: 2 years.
- B. 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.
- C. 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: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Joint Sealants: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
1. Sika Corporation
 2. Pecora Corporation.
 3. Bostik.
 4. Dow Corning Corp.
 5. GE Plastics.
 6. Sonneborn Building Products, ChemRex, Inc.
 7. Tremco, Inc.
 8. Or equal.

2.2 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.
- B. VOC Content of Interior Sealants: Provide interior sealants and sealant primers that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Colors of Exposed Joint Sealants:
 - 1. As selected by Architect from manufacturer's full range.
 - 2. Areas where concrete joint sealant will be adjacent to concrete other than standard gray, sealant color shall match adjacent color as approved by Architect.

2.3 MISCELLANEOUS MATERIALS

- 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:

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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.
 3. Remove laitance and form-release agents from concrete.
 - a. 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.
- 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. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.
- D. 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.
- E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- F. 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.

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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.
- G. 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.
- H. Installation of Preformed Tapes: Install according to manufacturer's written instructions.
- I. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- J. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping, taking care not to pull or stretch material, producing seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures where expansion of sealant requires acceleration to produce seal, apply heat to sealant in compliance with sealant manufacturer's written instructions.

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

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deterioration or damage at time of Substantial 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.

3.6 JOINT-SEALANT LOCATION

- A. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
 - 1. Products:
 - a. SikaFlex 1A or 15LM by Sika Corp
 - b. Dynatrol I-XL by Pecora.
 - 2. Color: Standard colors matching finished surfaces.
 - 3. Applications:
 - a. Control, expansion, and soft joints in masonry.
 - b. Joints between concrete and other materials.
 - c. Joints between metal frames and other materials.
 - d. Other exterior joints for which no other sealant is indicated.

- B. Exterior Metal Lap Joint Sealant: Silicone, Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
 - 1. Products:
 - a. SikaSil WS-795 Silicone by Sika Corp.
 - b. 895 Silicone or Sil-Span by Pecora.
 - 2. Color: Standard colors matching finished surfaces.
 - 3. Applications:
 - a. Concealed sealant bead in sheet metal work.
 - b. Concealed sealant bead in siding overlaps.

- C. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.
 - 1. Products:
 - a. AC-20 manufactured by Pecora.
 - 2. Color: Standard colors matching finished surfaces.
 - 3. Applications:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Other interior joints for which no other type of sealant is indicated.

- D. Bathtub/Tile Sealant: Silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.
 - 1. Products:
 - a. SikaSil GP or N+ Silicone Sealant by Sika Corp.
 - b. 898 Silicone Sanitary Sealant by Pecora.
 - 2. Color: Match adjacent color.
 - 3. Applications:
 - a. Joints between plumbing fixtures and floor and wall surfaces.
 - b. Joints between restroom countertops and wall surfaces.

- E. Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component latex sealant.

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1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 - c. Or equal.
 2. Acoustical Sealant for Concealed Joints:
 - a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
 - b. Pecora Corporation; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
 - d. Or equal.
- F. Interior Floor Joint Sealant: Polyurethane, chemically-curing, cold-applied, self-leveling elastomeric sealant; ASTM C 920, Grade P, Class 25, Uses T, M and A; two-part.
1. Products:
 - a. SikaFlex 2C SL or NS with TG Additive by Sika Corp.
 - b. NR-200 self-leveling polyurethane and/or DYNATRED non-sag, traffic-grade polyurethane sealants by Pecora.
 2. Primer: SikaFlex 429 Primer; P-150, P-75 or P-200.
 3. Color: Standard colors matching finished surfaces.
 4. Applications: Use for joints up to 1-1/2 inches.
 - a. Expansion joints in floors.
- G. Concrete Paving Joint Sealant: Polyurethane, chemically-curing, cold-applied, self-leveling elastomeric sealant; ASTM C 920, Class 25, Uses T, I, M and A; two-part.
1. Products:
 - a. NR-200 Urexpand and/or DYNATRED non-sag, traffic-grade polyurethane sealant by Pecora or equal.
 2. Primer: SikaFlex 429 Primer; P-150, P-75 or P-200.
 3. Color: Gray.
 4. Applications:
 - a. Joints in sidewalks and vehicular paving.
- H. Sanitary Sealants: Provide ASTM C920, Type S, Grade NS, Class 25, Use NT. When fully cured and washed, sealant shall meet the requirements of the Food and Drug Administration Regulation 21 CFR 177.2600 for use in areas where sealant comes in contact with food.
1. Color: As selected by Architect from manufacturer's full range.
 2. Backer Rod shall be closed-cell polyethylene rod stock, larger than joint width.
- I. Butyl Sealant: ASTM C 920, Grade NS, Class 12-1/2, Uses NT, M, A, G, O; single component, solvent release, non-skinning, non-sagging.
1. Products:
 - a. BC-158 sealant by Pecora.
 2. Color: Standard colors matching finished surfaces.
 3. Movement Capability: Plus and minus 12-1/2 percent.
 4. Service Temperature Range: -13 to 180 degrees F.
 5. Shore A Hardness Range: 10 to 30.
- J. Silicone Sealant: ASTM C 920, Grade NS, Class 25, Uses NT, A, G, M, O; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding.
1. Products:
 - a. SikaSil WS 290 or WS 295 by Sika Corp.
 - b. 864 LM Architectural silicone or 890 silicone sealant by Pecora.

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- c. 790 by Dow Corning Corporation.
2. Color: Standard colors matching finished surfaces.
3. Movement Capability: Plus and minus 25 percent.
4. Applications:
 - a. Interior or exterior for joints 1/8 to 1-1/2 inch wide.
 - b. Exterior use at expansion joints in masonry where substantial movement is expected.
 - c. Glazing application.

END OF SECTION 079200

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SECTION 079500 – EXPANSION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Expansion control for building interiors, exteriors.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Fire-Resistive Joint Systems" for liquid-applied joint sealants in fire-resistive building joints.
 - 3. Division 7 Section "Joint Sealants" for liquid-applied joint sealants.

1.2 SUBMITTALS

- A. Shop Drawings: Provide the following for each joint system specified:
 - 1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
 - 2. Architectural Joint System Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - a. Manufacturer and model number for each joint system.
 - b. Trim pieces.
 - c. Joint system location cross-referenced to Drawings.
 - d. Nominal joint width.
 - e. Movement capability.
 - f. Classification as thermal or seismic.
 - g. Materials, colors, and finishes.
 - h. Product options.
 - i. Fire-resistance ratings.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 - Paintings and Coatings: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include

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LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

- C. Samples for Initial Selection: For each type of joint system indicated.
 - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric seal material.
- D. Samples for Verification: For each type of architectural joint system indicated.
 - 1. Full width by 6 inches long, for each system required.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for current products.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- C. Source Limitations: Obtain interior architectural joint systems through one source from a single manufacturer.

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- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 1 Section "Product 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.
- E. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and ICC A117.1.
- F. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.

1.4 COORDINATION

- A. Coordinate installation of exterior wall joint systems with roof expansion assemblies to ensure that wall transitions are watertight.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of architectural joint systems that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Architectural Joint Systems: Subject to compliance with requirements, provide products by one of the following:
 - 1. Watson Bowman. (Basis of Design)
 - 2. MM Systems Corporation.
 - 3. Construction Specialties, Inc.
 - 4. JointMaster/InPro Corporation.
 - 5. Or equal.

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2.2 MATERIALS

- A. Product Data for Credit MR 4: For products and materials having recycled content, documentation indicating percentages by weight of post-consumer and pre-consumer recycled content. Include statement indicating cost for each product having recycled content.
- B. Aluminum: Alloys meeting ASTM B221-95a.
 - 1. Extrusions: 6063-T5 and 6005-T5 alloys.
 - 2. Plates: 6061-T6 alloy.
 - 3. Sheet: 5052-H32 alloy.
- C. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
 - 1. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
- D. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.
- E. Compression Seals: ASTM E 1612; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.
- F. Strip Seals: ASTM E 1783; preformed elastomeric membrane or tubular extrusions having an internal baffle system and secured in or over a joint by a metal locking rail.
- G. Moisture Barrier: Flexible elastomeric material. Provide one of the following.
 - 1. PVC, minimum 30 mils thick.
 - 2. EPDM, minimum 45 mils thick
 - 3. Santoprene.
 - 4. Elastoprene.
 - 5. Or equal.
- H. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, transitions, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.3 ARCHITECTURAL JOINT SYSTEMS, GENERAL

- A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
 - 1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where joint changes direction or abuts other materials.
 - 2. Include factory-fabricated closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint systems.

2.4 ARCHITECTURAL JOINT SYSTEMS

- A. As indicated on Drawings.

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2.5 FINISHES

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and blockouts where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to architectural joint system manufacturer's written instructions.
- B. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.
- C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.
- D. Cast-In Frames: Coordinate and furnish frames to be cast into concrete.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
 - 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.
 - 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - 4. Locate in continuous contact with adjacent surfaces.
 - 5. Heavy-Duty Systems: Repair or grout blockout as required for continuous frame support and to bring frame to proper level. Shimming is not allowed.

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6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 1. Provide in continuous lengths for straight sections.
 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer to both frame interfaces before installing compression seals.
- E. Foam Seals: Install with adhesive recommended by manufacturer.
- F. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
- G. Water Barrier: Provide water barrier at exterior joints and where called for on Drawings. Provide drainage fittings at a maximum of 50 feet or where indicated.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION 079500

SECTION 081113 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Standard hollow metal doors and frames.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 8 Section "Door Hardware" for door hardware for hollow metal doors.
 - 3. Division 9 Section "Painting" for field painting hollow metal doors and frames.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, and finishes.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 - Paintings and Coatings: Provide sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Other Action Submittals:
 - 1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference designation for details and openings as those on Drawings. Coordinate with door hardware schedule.

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- a. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
- b. Indicated specific model number of door and frame.
- c. Indicate steel sheet type (galvanized, non-galvanized, etc.)
- d. Indicate door and frame type (A, A1, B, C, etc.)
- e. Indicated hardware group.
- f. Indicate dimensions and locations of mortises and holes for hardware.
- g. Indicate dimensions and locations of cutouts.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

C. Preinstallation Conference: Conduct conference at Project site.

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1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

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

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of steel doors and frames that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Steel Doors and Frames: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Steelcraft; an Ingersoll-Rand company. (Basis of Design).
 - 2. Ceco Door Products; an Assa Abloy Group company.
 - 3. Curries Company; an Assa Abloy Group company.

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4. Or equal.

2.2 MATERIALS

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- B. Galvannealed (Metallic-Coated) Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B; with minimum A60 metallic coating for exterior doors and frames.
- C. Frame Anchors: ASTM A 591, Commercial Steel (CS), 40Z 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.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153.
- E. Powder-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.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Design: Flush panel.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Standard Core: Honeycomb, U-factor of 0.69, R-value of 1.45.
 - 3. Vertical Edges for Single-Acting Doors: Beveled edge.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
 - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
 - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from galvannealed (metallic-coated) steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush):
 - a. Face thickness: 16 gage (0.053 inch).
 - 1) Product: Series L16 by Steelcraft.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as full profile welded unless otherwise indicated.
 - 3. Frame: 16 gage (0.053-inch) thick steel sheet.
 - a. Product: F16 Series by Steelcraft.
- C. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.5 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.
 - 2. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.
- C. Provide Screw-In Top Cap for exterior doors.

2.7 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances:
 - 1. Standard doors and frames: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:

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1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- D. 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. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 4. 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 o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal-stud partitions.
 - b. Compression Type: Not less than two anchors in each jamb.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 5. Door Silencers: Except on weather-stripped doors, 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.
- E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
- G. 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: 0.3 cfm/sq. ft. of area at an inward test pressure of 1.57 lbf/sq. ft.
 2. Maximum Rate: 0.1 cfm/sq. ft. of area at an inward test pressure of 6.24 lbf/sq. ft.

2.8 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

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1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- B. Field-Applied Paint Finish: Comply with Division 9 Section "Painting".

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. For the record, 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. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, 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.

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- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
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. 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.
 - b. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - c. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - a. Post-installed expansion anchors shall comply with IR 19-1.
 - b. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 5. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 7. 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. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
- D. Install fire rated doors and frames as per their listing, NFPA #80 and manufacturer's recommendations.

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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.
- 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 Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

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SECTION 081216 - ALUMINUM FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes interior aluminum frames for doors and glazing installed in gypsum board partitions.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 8 Section "Flush Wood Doors" for wood doors installed in interior aluminum frames.
 - 3. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for aluminum-framed glass doors installed at exterior.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: Include the following:
 - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 2. Locations of reinforcements and preparations for hardware.
 - 3. Details of each different wall-opening condition.
 - 4. Details of anchorages, joints, field splices, and connections.
 - 5. Details of accessories.
 - 6. Details of moldings, removable stops, and glazing.
 - 7. Details of conduits and preparations for power, signal, and control systems.
- D. Samples for Initial Selection: For units with factory-applied finishes.
 - 1. Include similar Samples of seals, gaskets, and accessories involving color selection.
- E. Samples for Verification: For interior aluminum frames, prepared on Samples of size indicated below:
 - 1. Framing Member: 12 inches long.

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2. Corner Fabrication: 12-by-12-inch- long, full-size window corner, including full-size sections of extrusions with factory-applied color finish.
- F. Schedule: For interior aluminum frames. Coordinate with door hardware schedule and glazing.
- G. Maintenance Data: For interior aluminum frames to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Source Limitations: Obtain interior aluminum frames from single source from single manufacturer.

C. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver interior aluminum frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic. Store interior aluminum frames under cover at Project site.

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1.5 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Failure of operating components to function properly.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Wilson Partitions (Arcadia Inc. Family). (Basis of Design)
 - a. Series 525 with 2 inch trim.
 - 2. Western Integrated Materials, Inc.
 - 3. Modulex, Inc; Division of Pacific National Group.
 - 4. RACO Interior Products, Inc.
 - 5. Or equal.

2.2 COMPONENTS

- A. Recycled Content: Aluminum recycled content not less than 40 percent.
- B. Aluminum Framing: ASTM B 221, Alloy 6063-T5 or alloy and temper required to suit structural and finish requirements, not less than 0.062 inch thick.
- C. Door Frames: Extruded aluminum, reinforced for hinges, strikes, and closers.
- D. Glazing Frames: Extruded aluminum, for glazing thickness indicated; 1/4 inch thick tempered minimum.
- E. Ceiling Tracks: Extruded aluminum.
- F. Trim: Extruded aluminum, not less than 0.062 inch thick, with removable snap-in casing trim glazing stops and door stops without exposed fasteners.

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2.3 ACCESSORIES

- A. Fasteners: Aluminum, nonmagnetic, stainless-steel or other noncorrosive metal fasteners compatible with frames, stops, panels, reinforcement plates, hardware, anchors, and other items being fastened.
- B. Door Silencers: Manufacturer's standard continuous mohair, wool pile, or vinyl seals.
- C. Glazing Gaskets: Manufacturer's standard extruded or molded plastic, to accommodate glazing thickness indicated.
- D. Glazing: Comply with requirements in Division 8 Section "Glazing."
- E. Hardware: Comply with requirements in Division 8 Section "Door Hardware."

2.4 FABRICATION

- A. Provide concealed corner reinforcements and alignment clips for accurately fitted hairline joints at butted or mitered connections.
- B. Factory prepare interior aluminum frames to receive templated mortised hardware; include cutouts, reinforcements, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."
 - 1. Locate hardware as required by fire-rated label for assembly.
- C. Fabricate frames for glazing with removable stops to allow glazing replacement without dismantling frame.
 - 1. Locate removable stops on the inside of spaces accessed by keyed doors.
- D. Fabricate components to allow secure installation without exposed fasteners.

2.5 GENERAL FINISH REQUIREMENTS

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

2.6 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

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- C. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, floors, and ceilings, with Installer present, for conditions affecting performance of the Work.
- B. Verify that wall thickness does not exceed standard tolerances allowed by throat size indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install interior aluminum frames plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
- B. Set frames accurately in position and plumbed, aligned, and securely anchored to substrates.
- C. Install frame components in the longest possible lengths; components up to 72 inches long must be one piece.
 - 1. Fasten to suspended ceiling grid on maximum 48-inch centers, using sheet metal screws or other fasteners approved by frame manufacturer.
 - 2. Use concealed installation clips to produce tightly fitted and aligned splices and connections.
 - 3. Secure clips to extruded main-frame components and not to snap-in or trim members.
 - 4. Do not leave screws or other fasteners exposed to view when installation is complete.

3.3 CLEANING

- A. Clean exposed frame surfaces promptly after installation, using cleaning methods recommended by frame manufacturer and according to AAMA 609 & 610.

END OF SECTION 081216

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SECTION 081400 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes solid-core doors.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 8 Section "Steel Doors and Frames" for steel door frames.
 - 3. Division 8 Section "Aluminum Frames" for interior aluminum frames.

1.2 SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. LEED Submittals:
 - 1. MRc7, Certified Wood. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit IEQ 4.1 - Paintings and Coatings: Provider sealer VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Other Action Submittals:
 - 1. Schedule: Provide a schedule of flush wood door work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
 - a. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - b. Indicated specific model number of door and frame.
 - c. Indicated hardware group.
 - d. Indicate dimensions and locations of mortises and holes for hardware.
 - e. Indicate dimensions and locations of cutouts.
 - f. Indicate requirements for veneer matching.
 - g. Indicate doors to be factory finished and finish requirements.
- D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
 - 1. Faces of Factory-Finished Doors: Show the full range of colors available for stained finishes.

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- E. Samples for Verification:
1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
 2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- C. Quality Standard: Comply with NWWDA I.S.1-A, "Architectural Wood Flush Doors."
1. Performance duty Level: Extra Heavy Duty.
 2. Factory machined for door hardware and high density hardware blocking.
- D. Preinstallation Conference: Conduct conference at Project site.

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1.4 DELIVERY, STORAGE, AND HANDLING

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

1.5 PROJECT CONDITIONS

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

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) more than 1/4 inch top to bottom, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty:
 - a. Solid-Core Interior Doors: Life of installation.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Flush Wood Doors: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Signature Series by Marshfield-Algoma; Masonite Inc. (Basis of Design)
 - 2. Eggers Industries; Architectural Door Division.
 - 3. Maiman Company.
 - 4. Marlite.
 - 5. VT Industries Inc.
 - 6. Haley Brothers, Inc.
 - 7. Or equal.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Adhesives: Do not use adhesives containing urea formaldehyde.
- B. Doors for Transparent Finish:
 - 1. Grade: Custom (Grade A faces).

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2. Species and Cut: Maple, rotary cut.
3. Match between Veneer Leaves: Book match.
4. Assembly of Veneer Leaves on Door Faces: Running match.

2.3 SOLID-CORE DOORS

- A. Core:
 1. Stave Lumber Core: May be a combination of solid, low-density hardwood lumber blocks or strips not more than 2-1/2" wide of one species of wood between 6% to 9% moisture content. Joints to be tight and staggered in adjacent rows. Lumber density is 25 to 27 lbs. per cubic foot.
- B. Doors:
 1. Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- C. Veneer-Faced Doors:
 1. Construction: Five or seven plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

2.4 ACOUSTICAL DOORS

- A. Provide sound dampening core to achieve sound transmission class tested in accordance with ASTM E90 and ASTM E413.
 1. SCW swing door with a minimum mass 6lbs per sf.
- B. STC Rating: As scheduled on Drawings.
- C. Door Finish: Maple, rotary cut.
- D. Door Frame: As scheduled on Drawings.
- E. Acoustical Hardware: Manufacturer's standard gaskets, door bottom, threshold.
- F. Other Hardware: As specified in Division 8 Section "Door Hardware".

2.5 DOOR FRAMES

- A. Aluminum Frames: Comply with Division 8 Section "Aluminum Frames".
- B. Hollow Metal Frames: Comply with Division 8 Section "Steel Doors and Frames".

2.6 SLIDING BAR DOORS

- A. Comply with Division 10 Section "Customized Interior Prefabricated Walls" for hardware and jamb frame seals.

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2.7 FABRICATION

- A. Fabricate doors in sizes indicated for Project-site fitting.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.8 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing.
- B. Finish doors at factory for transparent finish.
- C. Transparent Finish:
 - 1. Grade: Custom.
 - 2. Finish: NWWDA I.S.1-A System TR-6 catalyzed polyurethane.
 - 3. Staining: Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

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- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or 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 081400

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Access doors and frames for walls and ceilings.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 8 Section "Door Hardware" for mortise or rim cylinder locks and master keying.
 - 3. Division 9 Section "Acoustical Panel Ceilings" for suspended acoustical tile ceilings.
 - 4. Division 9 Section "Painting" for field applied finishes.

1.2 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- D. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- E. Access Door and Frame Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
- F. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

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1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.

C. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL. Comply with CBC Section 715.4

1. NFPA 252 or UL 10B for vertical access doors and frames.
2. ASTM E 119 or UL 263 for horizontal access doors and frames.

D. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

1.4 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

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1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of access doors and frames that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Access Doors and Frames: Subject to compliance with requirements, provide products by one of the following:
 - 1. Karp Associates Inc. (Basis of Design)
 - 2. Acudor.
 - 3. Milcor Inc.
 - 4. Nystrom, Inc.
 - 5. MIFAB.
 - 6. Or equal.

2.2 STEEL MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
 - 1. ASTM A 123, for galvanizing steel and iron products.
 - 2. ASTM A 153, for galvanizing steel and iron hardware.
- B. Steel Sheet: Cold-rolled steel sheet substrate complying with ASTM A 1008, Commercial Steel (CS), exposed.
- C. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Factory Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Field Finish: Factory prime for field painting as specified in Division 9 "Painting".
- D. Drywall Beads: Edge trim formed from 0.0299-inch zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.
- E. Plaster Beads: Casing bead formed from 0.0299-inch zinc-coated steel sheet with flange formed out of expanded metal lath and in size to suit thickness of plaster.

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2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Recessed Door to Receive Drywall Type:
1. Fire-Rated: Model 450FR by Karp.
 2. Non-Fire-Rated: Model RDW by Karp.
 3. Frame shall be 14 gage steel and doors shall be 16 gage steel.
 4. Door shall be recessed 1 inch.
 5. Trim shall be galvanized steel dry wall bead.
 6. Hinge shall be concealed pivoting rod type.
 7. Locks shall be flush and screwdriver operated with stainless steel cam and studs, or shall be key operated cylinder lock with automatic dust shutter.
 8. Finish shall be prime coat of rust inhibitive electrostatic powder, baked grey coat.
 9. Door Sizes: As indicated on Drawings.
 10. Field Finish: Comply with Division 9 Section "Painting".
- B. Flange Type:
1. Fire-Rated: Model KRP-250 by Karp.
 2. Non-Fire-Rated: Model DSC-214M by Karp.
 3. Frame shall be 14 gage steel and doors shall be 16 gage steel.
 4. Flange: One-piece construction, 3/4 inch wide.
 5. Hinge shall be concealed continuous piano hinge.
 6. Locks shall be flush and screwdriver operated with stainless steel cam and studs, or shall be key operated cylinder lock with automatic dust shutter.
 7. Finish shall be prime coat of rust inhibitive electrostatic powder, baked grey coat.
 8. Door Sizes: As indicated on Drawings.
 9. Field Finish: Comply with Division 9 Section "Painting".

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
1. Exposed Flanges: Nominal 1 to 1-1/2 inches wide around perimeter of frame.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
1. For cylinder lock, furnish two keys per lock and key all locks alike.

2.5 FINISHES

- A. Field finish per Division 9 Section "Painting".

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

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SECTION 083323 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following types of motorized overhead coiling doors:
 - 1. Service doors.
 - 2. Counter doors.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
 - 3. Division 8 Section "Door Hardware" for lock cylinders and keying.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide overhead coiling doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - 1. Wind Load: Uniform pressure (velocity pressure) of 20 PSF, acting inward and outward.

1.3 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Summary of forces and loads on walls and jambs.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's product data.
 - 1. Provide anchorage requirements per 2013 CBC, Section 1405.12.
- D. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available for units with factory-applied finishes.

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- E. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Curtain Slats: 12 inches long.
 - 2. Bottom Bar: 6 inches long.
 - 3. Guides: 6 inches long.
 - 4. Brackets: 6 inches square.
 - 5. Hood: 6 inches square.
- F. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain overhead coiling doors through one source from a single manufacturer.
 - 1. Obtain operators and controls from overhead coiling door manufacturer.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of overhead coiling doors that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Overhead Coiling Doors: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Cornell - Cookson Company (Basis of Design).
 - 2. Overhead Door Corp.
 - 3. CHI.
 - 4. Or equal.

2.2 MATERIALS

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

2.3 OVERHEAD COILING DOORS

- A. Product:
 - 1. Model: ESD10 by Cornell or equal.
- B. Curtain:
 - 1. Slats: No. 5F, 22 gauge, Grade 40 steel, ASTM A 653 galvanized steel zinc coating.
 - 2. Bottom Bar: Two 2x2x1/8 inch structural steel angles.
 - 3. Fabricate interlocking sections with high strength nylon endlocks on alternate slats each secured with two 1/4 inch rivets.
 - 4. Curtain Configuration: Standard Curtain configuration.
 - 5. Bottom Bar Configuration:
 - a. Standard Bottom Bar Configuration.
- C. Guides: Fabricate with structural steel angles. Top of inner and outer guide angles to be flared outwards to form bellmouth for smooth entry of curtain into guides. Provide removable guide stoppers to prevent over travel of curtain and bottom bar.

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1. Top 16-1/2 inch of coil side guide angles to be removable for ease of curtain installation and as needed for future curtain service.
 2. Guide Configuration: Standard Guide Configuration.
- D. Counterbalance Shaft Assembly:
1. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot of width.
 2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs. Provide wheel for applying and adjusting spring torque.
- E. Brackets: Fabricate from minimum 3/16 inch steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures.
- F. Hood: 24 gauge galvanized steel with reinforced top and bottom edges. Provide minimum 1/4 inch steel intermediate support brackets as required to prevent excessive sag.
- G. Weatherstripping:
1. Bottom Bar: Replaceable, bulb-style, compressible EDPM gasket extending into guides.
 2. Guides: Vinyl strip sealing against fascia side of curtain.
 3. Lintel Seal: Nylon brush seal fitted at door header to impede air flow.

2.4 COUNTER DOORS

- A. Product: CD10 by Cookson or equal.
1. Type: Non-rated Counter doors with hand crank operation.
 2. Materials:
 - a. The door curtain shall be constructed of interconnected strip steel slats conforming to ASTM A-653. The curtain shall be constructed of 22 gauge No. 10 (1-1/4" high by 3/8" deep) slats.
 - b. The finish on the door curtain shall be Cookson FinalCote consisting of the following:
 - 1) Hot dipped galvanized G-90 coating consistent with ASTM A-653.
 - 2) Color: As selected by Architect from manufacturer's full range.
 - c. The bottom bar shall be constructed of tubular extruded aluminum measuring 1-5/16" deep by 2-1/4" high with a double vinyl astragal on the bottom edge. The bottom bar shall receive a 204-R1 clear anodized finish.
 - d. The guides shall be constructed of extruded aluminum and measures 1-3/4" square. Each side of the channel portion capturing the curtain shall contain wool pile weatherstripping. The guides shall receive a 204-R1 clear anodized finish.
 - e. The brackets shall be constructed of 3/16" thick die cast aluminum.
 - f. All gears shall be cast iron with teeth cast from machine cut patterns. The pinion gear shall not be less than a 3" pitch diameter. The gear ratio shall be designed for a maximum effort of not more than 30 pounds.
 - g. The barrel shall be steel tubing of not less than 4" in diameter. Oil tempered torsion springs shall be capable of correctly counter balancing the weight of the curtain. The barrel shall be designed to limit the maximum deflection to .03" per foot of opening width. The finish on the barrel shall be one (1) coat of bronze rust-inhibiting prime paint.

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- h. The hood shall be fabricated from 24 gauge galvanized steel and shall be formed to fit the square brackets. The finish on the hood shall be the Cookson FinalCote finish as indicated in the curtain section.
- i. Operation: Doors shall be operated by means of a hand crank with a removable operating arm.
- j. Locking Mechanisms: The crank operated doors shall be secured by means of a concealed sliding bolt deadlock in the bottom bar operated by cylinder lock.
- k. Integral Counter: Stainless steel.

2.5 MOTORIZED OPERATION

- A. Supply Cornell Model MG Electric Motor Operator, industrial duty - rated for a maximum of 20 cycles per hour, UL listed, Totally Enclosed Non Ventilated gear head operator(s) rated 1/3 hp as recommended by door manufacture for size and type of door. Provide complete with electric motor and factory pre-wired motor control terminals, maintenance free solenoid actuated brake, provisions for auxiliary push-up operation and control station(s). Motor shall be high starting torque, industrial type, protected against overload with an auto-reset thermal sensing device. Primary speed reduction shall be heavy-duty, lubricated gears with mechanical braking to hold the door in any position. Operator shall be equipped with an emergency manual chain hoist assembly that safely cuts operator power when engaged. A disconnect chain shall not be required to engage or release the manual chain hoist. Operator drive and door driven sprockets shall be provided with #50 roller chain. Operator shall be capable of driving the door at a speed of 8 to 9 inches per second (20 to 23 cm/sec). Fully adjustable, driven linear screw type cam limit switch mechanism shall synchronize the operator with the door. The electrical contractor shall mount the control station(s) and supply the appropriate disconnect switch, all conduit and wiring per the overhead door wiring instructions.
 - 1. Control Station: Surface mounted, "Open/Close" key switch with "Stop" push button; NEMA 3R.
 - 2. Provide operator to function with constant pressure close operation to meet UL325-2010 listing standard requirements.

2.6 MANUAL OPERATION

- A. Operation: Chain operated doors shall open and close with a maximum of 30 pounds of effort utilizing an endless chain and cast iron reduction gears.

2.7 FINISH

- A. Factory Finish: Coating System and phosphate treatment followed by baked-on polyester powder coat
 - 1. Minimum 2.5 mils cured film thickness; ASTM D-3363 pencil hardness: H or better.
 - 2. Color: As selected by Architect from manufacturer's standard color range, minimum 32 colors.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install coiling doors and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports.

3.2 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust doors to operate easily, free of warp, twist, or distortion and with weathertight fit around entire perimeter.

3.3 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 083326 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Electric-motor-operated overhead coiling grilles.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
 - 3. Division 8 Section "Door Hardware" for lock cylinders and keying.
 - 4. Division 26 Sections for electrical service and connections for powered operators, and accessories.

1.2 DEFINITIONS

- A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.3 PERFORMANCE REQUIREMENTS

- A. Operation-Cycle Requirements: Provide overhead coiling grille components and operators capable of operating for not less than 20,000 cycles and for 10 cycles per day.

1.4 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling grille and accessory.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's product data.

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- D. Samples for Initial Selection: Manufacturer's color charts showing full range of colors available for units with factory-applied finishes.
- E. Samples for Verification: Of each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Grille Curtain: 12-inch- square assembly with rods, spacers, and vertical links.
 - 2. Bottom Bar: 6 inches long.
 - 3. Guides: 6 inches long.
 - 4. Brackets: 6 inches square.
 - 5. Hood: 6 inches square.
- F. Qualification Data: For Installer.

1.5 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain overhead coiling grilles through one source from a single manufacturer.

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1. Obtain operators and controls from overhead coiling grille manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of overhead coiling grilles that fails in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Overhead Coiling Grilles: Subject to compliance with requirements, provide products by one of the following:
1. Cookson / Cornell Iron Works Inc.
 2. Overhead Door Corp.
 3. Raynor.
 4. Or equal.

2.2 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

- A. General: Fabricate overhead coiling grille curtain consisting of a network of horizontal rods, or rods covered with tube spacers, spaced as indicated. Interconnect rods by vertical links approximately 5/8 inch wide, spaced as indicated and rotating on rods.
1. Rod diameter: 5/16-inch.
 2. Space rods: 1-1/2 inches o.c.
 3. Space links: 3 inches apart.
 4. Pattern: Brick pattern.
 5. Curtain Material:
 - a. Aluminum: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.
- C. Bottom Bar: Manufacturer's standard continuous channel, tubular shape, or two angles, finished to match grille.

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1. Astragal: Provide a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene; for placement between angles or fitted to shape, as a cushion bumper for grille.
 2. Provide motor-operated grilles with combination bottom astragal and sensor edge.
- D. Grille Curtain Jamb Guides: Manufacturer's standard extruded-aluminum shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

2.3 HOODS AND ACCESSORIES

- A. Hood: Form to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Provide closed ends for surface-mounted hoods, and provide fascia for any portion of between-jamb mounting projecting beyond wall face. Provide intermediate support brackets as required to prevent sagging.
1. Fabricate hoods for steel grilles of minimum 0.028-inch- thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653.
 2. Provide removable metal soffit of same material and finish as curtain if hood is mounted above ceiling, unless otherwise indicated.
- B. If grille curtain is power operated, provide safety interlock switch to disengage power supply when grille is locked.

2.4 COUNTERBALANCING MECHANISM

- A. General: Counterbalance grille curtain by means of adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to grille curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up grille curtain without distortion of curtain and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Provide spring balance of one or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of grille curtain, with uniform adjustment accessible from outside barrel. Provide cast-steel barrel plugs to secure ends of springs to barrel and shaft.
- D. Fabricate torsion rod for counterbalance shaft of cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Provide mounting brackets of manufacturer's standard design, either cast iron or cold-rolled steel plate.

2.5 ELECTRIC GRILLE OPERATORS

- A. General: Provide electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operation-cycle requirements specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.
- B. Comply with NFPA 70.
- C. Disconnect Device: Provide hand-operated disconnect or mechanism for automatically engaging chain and sprocket operator and releasing brake for emergency manual operation while disconnecting motor, without affecting timing of limit switch. Mount disconnect and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- D. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.
- E. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V, ac or dc.
- F. Grille-Operator Type: Provide wall-, hood-, or bracket-mounted, jackshaft, gear-head hoist-type grille operator unit consisting of electric motor, enclosed worm-gear running-in-oil primary drive, and chain and sprocket secondary drive; with auxiliary chain hoist and floor-level disconnect.
- G. Electric Motors: Provide high-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1; with overload protection; sized to start, accelerate, and operate grille in either direction from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or service factor.
 - 1. Type: Polyphase, medium-induction type.
 - 2. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - 3. Coordinate wiring requirements and electric characteristics of motors with building electrical system.
 - 4. Provide totally enclosed, nonventilated or fan-cooled motor, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.
- H. Remote-Control Station: Provide momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - 1. Provide interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - 2. Provide exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type; NEMA ICS 6, Type 4 enclosure, key operated.
- I. Obstruction Detection Device: Provide each motorized grille with indicated external automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.
 - 1. Sensor Edge: Provide each motorized grille with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor

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immediately stops and reverses downward grille travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

- a. Provide electrically actuated automatic bottom bar.
- J. Limit Switches: Provide adjustable switches, interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.
- K. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.
- L. Emergency Egress Release: Provide grille with flush, wall-mounted handle mechanism, for ADA-compliant egress feature, not dependent on electric power, that allows grille to open to permit passage and automatically resets motor drive, without affecting limit switches, with return of handle to original position.

2.6 FINISHES, GENERAL

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install grilles and operating equipment, complete with necessary hardware, according to Shop Drawings, manufacturer's written instructions, and as specified.

3.2 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust grilles to operate easily, free of warp, twist, or distortion and with tight fit around entire perimeter.

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3.3 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 083326

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SECTION 083327 – SIDE-FOLDING GRILLES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Manually-operated side-folding grilles.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for miscellaneous steel supports.
 - 2. Division 8 Section "Door Hardware" for lock cylinders and keying.

1.2 SUBMITTALS

- A. Product Data: For each type and size of side-folding grille and accessory.
 - 1. Summary of forces and loads on walls and jambs.
- B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's product data.
- C. Qualification Data: For Installer.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.

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15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

C. Source Limitations: Obtain side-folding grilles through one source from a single manufacturer.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of side-folding grilles that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: 2 years.

B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Side-Folding Grilles: Subject to compliance with requirements, provide products by one of the following:

1. Overhead Door Corp. (Basis of Design)
2. Cookson Company.
3. Cornell Iron Works Inc.
4. Raynor.
5. Or equal.

2.2 MATERIALS

A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

B. Recycled Content: Aluminum recycled content not less than 40 percent.

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2.3 SIDE-FOLDING GRILLE

- A. Product: Series 681 by Overhead Door or equal.
1. Type: Open-air.
 2. Curtain Frame: Truss-Like Aluminum Top and Bottom Plates.
 3. Frame Thickness: 1/8".
 4. Panel Width:
 - a. 7" standard body.
 - b. 11-1/4" wide body.
 5. Trolley Assembly: 1-1/8".
 - a. Height: 1-5/8"
 - b. Width: 1-3/8"
 6. Vertical Adjustment: 1" Up/Down without Curtain Removal.
 7. Track - Top-mounted, heavy-duty aluminum sections.
 8. Standard Track Curves: As indicated on Drawings.
 9. Post Types:
 - a. Lead Post: Hook Lock and Wall Channel; Bi-Part; Top and Bottom Shoot Bolts Intermediate Post
 - b. Bottom Shoot Bolt.
 - c. Trailing End Post: Traveling; Fixed; Hook Lock and Wall Jamb; Top and Bottom Shoot Bolts; Carrier.
 10. Locking Mechanisms:
 - a. Lead Post: Concealed Cylinder-Operated Hook Lock Accessible From Interior and Exterior.
 - b. Intermediate Post: Concealed Cylinder-Operated Shoot Bolt Accessible From One Side Only.
 11. Trailing End Post: Attached 10' Max Height Protection Plate Self-Locking into a Steel V-Stop
 12. Standard Factory Finish: Clear Anodized Finish.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install grilles and operating equipment, complete with necessary hardware, according to Shop Drawings, manufacturer's written instructions, and as specified.

3.2 ADJUSTING

- A. Lubricate bearings and sliding parts; adjust grilles to operate easily, free of warp, twist, or distortion and with tight fit around entire perimeter.

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain side-folding grilles.

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END OF SECTION 083327

SECTION 083520 - FIRE-RATED FOLDING DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Fire-rated folding doors with pocket doors.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for support of and blocking for partition tracks, jamb conditions, pocket doors, motor operators, and controls; and for prepunching metal support members.
 - 2. Division 26 Sections for electrical service and connections and for fire-alarm and activating signaling systems.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for folding doors. Include plans, elevations, details of components, attachments to other work, operating clearances, electronic operating and control mechanisms, access requirements, pockets and pocket doors, and accessory items. Show blocking to be provided by others.
 - 1. Fire-Release System: Describe system, including testing and resetting instructions.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Setting Drawings: For embedded items and cutouts required in other work, including support beam punching template.
- D. Samples for Initial Selection: For each type of finish, covering, or facing indicated.
- E. Samples for Verification: For each type of finish, covering, or facing indicated.
- F. Folding Door Schedule: Use same designations indicated on Drawings.
- G. Product Certificates: For each type of fire-rated folding door, signed by product manufacturer.
- H. Qualification Data: For Installer.
- I. Material Test Reports: For each type of finish, covering, or facing indicated.
- J. Material Certificates: For each type of finish, covering, or facing for folding doors, signed by manufacturers.
- K. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-rated folding doors.

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- L. Research/Evaluation Reports: For fire-rated folding doors.
- M. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:
 - 1. Finishes, coverings, or facings for folding doors including finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - 2. Hardware, track, carriers, seals, fire release, and other operating components.
 - 3. For electric operator.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: A firm or individual authorized, approved, or licensed by fire-rated folding door manufacturer to install manufacturer's products.
- C. Fire-Test-Response Characteristics: Provide folding doors with the following fire-test-response characteristics, 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: As follows, per ASTM E 84:

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- a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
- D. Fire-Rated Folding Doors: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify folding door openings and storage arrangements by field measurements before fabrication and indicate measurements on Shop Drawings.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fire-rated folding doors that fails in materials or workmanship within specified warranty period.
- 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 1 year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fire-Rated Folding Doors: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
- 1. FireGuard by Won-Door Corporation. (Basis of Design)
 - 2. McKeon Rolling Steel Door Company, Inc.
 - 3. Or equal.

2.2 MATERIALS

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.

2.3 FIRE-RATED FOLDING DOORS

- A. General: Provide electrically operated, automatic- or self-closing, UL- or ITS-listed, folding fire-rated assembly; top supported from overhead track or dual tracks without floor guides; complete

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with hardware, seals, track, closing devices, releasing devices, controls, pocket doors, and accessories necessary for intended operation and complying with the following requirements:

1. Remains in normal open (stacked) position. Signal from fire-alarm system initiates self-closing operation.
 2. Controls allow manual operation in either conventional or emergency mode. When opened manually during emergency mode, control mechanism automatically closes assembly.
- B. Fire Rating: As indicated on Drawings.
- C. Panel Construction: Formed-steel sheet panels connected by formed-steel hinges.
- D. Fire Insulation:
1. Cover interior surface of both series of panels in parallel panel doors with continuous fire-resistive blanket secured to each panel with metal clip system.
 2. Extend fire insulation from bottom edge of panels to tracks and meet at interior centers of fixed jamb and lead post, forming an effective fire barrier.
- E. Perimeter Seals and Closures: Provide manufacturer's standard vinyl or neoprene vertical seals, horizontal top and bottom seals, and closures identical to products tested for fire rating indicated and forming an effective smoke and draft seal.
- F. Track and Trolley System: One track or 2 parallel steel tracks on 8-inch centers, with ball-bearing roller trolleys and adjustable steel hanger rods for overhead support; designed for type of operation, size, and weight of fire-rated folding door indicated. Provide a continuous system of track sections and accessories identical to products tested for fire rating indicated, to accommodate configuration and layout indicated for door operation and storage.
- G. Lead Posts: Formed from not less than 0.026-inch thick steel sheet, connected to door panels by specially adapted panels and equipped with manufacturer's standard handle on each side.
- H. Electric Operators and Controls:
1. Operators: Factory-assembled power drive unit consisting of motor, control panel, limit switches, torque-limiting devices, clutch, reversing magnetic motor operator, leading-edge obstruction detectors, and key-switch control for conventional operation.
 - a. Motor: 1/2 hp, controlled by reversing magnetic starter and equipped with overload protection.
 - b. Limit Switches: To prevent overtravel.
 - c. Roller Chain or Cable: Connected to lead posts by means of vertical stabilizer bar assembly.
 - d. Drive Mechanism: Protected by torque limiter and emergency clutch.
 - e. Travel Speed: 18 inches per second maximum; 6 inches per second, minimum.
 2. In case of fire, closing system is activated by building's fire and smoke detection equipment and automatically closes fire-rated folding doors.
 3. Electrical Service: Equip for 120-V, single-phase, 60-cycle ac.
 4. Battery: Electrical current connects through relay to battery charger that continuously charges 12-V dc battery and automatically maintains battery at capacity. Automatic audible signal device sounds off if battery falls below or exceeds proper charge, if power loss has occurred, or if high-ac line voltage has been experienced.
 5. Leading-Edge Obstruction Detector:
 - a. Equip with pressure-sensitive leading edge that on contact with an obstruction causes door to stop and pause before attempting to re-close.

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- b. Disable leading-edge obstruction detector until fire-rated folding door has opened pocket door.
- 6. Fire-rated folding doors can be manually opened at any time by pushing against leading edge.
- 7. Audible alarm sounds at automatic closing of door.
- I. Accessories:
 - 1. Exit Hardware shall be located on both sides of each fire door. In emergency mode a slight pressure on the hardware will cause the door to open a minimum of 32 inches, pause for 3 seconds, then automatically close. The hardware shall be field programmable to allow automatic opening distances of up to the entire opening width. In the conventional mode, the hardware is used to open the door and move it back into the storage pocket.
- J. Finishes:
 - 1. Baked-enamel finish for panels and hinges in colors selected by Architect from manufacturer's full range.
 - 2. Manufacturer's standard finish for handles.
- K. Pocket Door:
 - 1. Material and Face Finish: As indicated on Drawings.
 - 2. Magnetic Catch: Holding force of no more than 30 lbf.
 - 3. Maximum Opening Force: 50 lbf.
 - 4. Provide bumper on interior side of pocket door as required by fire-rated folding door manufacturer to prevent interference with opening or retracting operation of fire-rated folding door.
 - 5. Coordinate pocket door sizes with fire-rated folding door manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of folding doors, and the following:
 - 1. Verify that headers are level with finished floor to within plus or minus 1/16-inch tolerance over the entire length of opening.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. For folding doors supported by or anchored to permanent construction, advise installers of specific requirements for placement of anchorage devices. Furnish installers of other work with templates and drawings showing locations of anchorage devices and similar items.
- B. In path of fire-rated folding doors, level floor with header to tolerance of plus or minus 1/16 inch across opening; grind or fill floor as necessary.

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3.3 INSTALLATION

- A. General: Install folding doors to comply with manufacturer's written installation instructions. Install track in one piece.
 - 1. Comply with NFPA 80 for installing fire-rated folding doors.
- B. Standard Floor Clearances: 1/4 to 3/4 inch maximum (above floor finish).
 - 1. Comply with NFPA 80 for clearances required for fire-rated folding doors.
- C. Coordinate provisions for electrical service, sensing devices, and final connections for fire-rated folding doors.

3.4 ADJUSTING

- A. Adjust units as necessary to ensure smooth, quiet operation without warping or binding. Check and readjust operating hardware so latches engage accurately and securely without forcing or binding.
 - 1. Fire-Rated Folding Doors: Verify that all operations are functional and meet requirements of authorities having jurisdiction.
- B. Pocket Doors: Adjust to operate smoothly and easily, without binding or warping. Check and readjust operating hardware. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-rated folding doors.

END OF SECTION 083520

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Aluminum-framed storefronts.
 - 2. Manual-swing aluminum doors.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
 - 3. Division 8 Section "Glazing" for glass requirements.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum-framed systems, including anchorage, capable of withstanding, without failure, the effects of the following:
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - 4. Dimensional tolerances of building frame and other adjacent construction.
 - 5. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units to function properly.
- B. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Seismic Loads: As indicated on Drawings.
- C. Deflection of Framing Members:
 - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

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- D. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
 - 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity but not less than 10 seconds.
- E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft.
- F. Water Penetration Under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.
- G. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- H. Average Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having average U-factor of not more than 0.69 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
- I. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having minimum STC 32 according to ASTM E 413 and an OITC 26 according to ASTM E 1332, as determined by testing according to ASTM E 90.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Provide anchorage requirements per CBC, Section 1405.12.

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2. Include details of provisions for system expansion and contraction and for draining moisture occurring within the system to the exterior.
 3. For entrances, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- F. Fabrication Sample: Of each vertical-to-horizontal intersection of systems, made from 12-inch lengths of full-size components and showing details of the following:
1. Joinery.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.
- G. Welding certificates.
- H. Qualification Data: For Installer.
- I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems.
- J. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- K. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.

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13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: Capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
1. Engineering Responsibility: Preparation of data for aluminum-framed systems including Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' 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.
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.
- D. Accessible Entrances: Comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
- E. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."
- F. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical wall area as shown on Drawings.
 2. Field testing shall be performed on mockups according to requirements in Part 3 "Field Quality Control" Article.
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems 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 dimensions and proceed with fabricating aluminum-framed systems

without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Complete system for failure to meet specified requirements, including ability to exclude exterior moisture from interior.
 - e. Failure of operating components to function properly.
 - 2. Warranty Period: 10 years.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 20 years.
- C. Installer's Warranty: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Entrance and Storefronts: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Arcadia Inc. (Basis of Design)
 - 2. Wausau.
 - 3. CR Laurence.
 - 4. Or equal.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Structural Profiles: ASTM B 308.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10.

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- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011.

2.3 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- D. Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials. Form exposed flashing from sheet aluminum finished to match framing and of sufficient thickness to maintain a flat appearance without visible deflection.
- E. Framing System Gaskets and Sealants: Manufacturer's standard recommended by manufacturer for joint type.
- F. Product: TC 670 as specified in Division 8 Section "Glazed Aluminum Curtain Walls".
- G. Product: TC470 Thermal Series by Arcadia or equal.
 - 1. Type: 2-1/4 by 4-1/2 inch offset captured glazed system.
 - 2. Framing members, transition members, mullions, adaptors, and mounting: Extruded 6063-T6 aluminum alloy (ASTM B221 – Alloy G.S. 10a T6).
 - 3. Screws, fastening devices, and internal components: Aluminum, stainless steel, or zinc-plated steel in accordance with ASTM.A-164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from aluminum.
 - 4. Glazing Gasket (Silicone Compatible)
 - a. Compression-type design, replaceable, molded or extruded santoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
 - b. Shall be of type that locks securely into the glazing reglet to prevent glazing gaskets from disengaging.
 - 5. 1 inch insulated glazing in-fills as specified in Division 8 "Glazing".

2.4 GLAZING SYSTEMS

- A. Glazing: Insulating-glass units as specified in Division 9 Section "Glazing".
- B. Glazing Gaskets: Manufacturer's standard compression types, replaceable, molded or extruded, that maintain uniform pressure and watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric types.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

2.5 DOORS AND FRAMES

- A. Product: MS362 HD Series, Medium Stile, Heavy Duty Door by Arcadia.
 - 1. Frame thickness: 1-3/4 inches.
 - 2. Vertical Stiles: 3-1/2 inches.
 - 3. Top Rail: 3-5/8 inches.
 - 4. Bottom Rail: 10-1/2 inches.
 - 5. Glazing Stops: Square snap-in type.
 - 6. Glazing: 1 inch insulated glazing in-fills as specified in Division 8 "Glazing".
 - 7. Glazing Gasket: Compression-type design.
 - 8. Major portions of the door stiles a nominal .188 inches and glass stops .050 inches thick.
 - 9. Door members: Extruded 6063-T6 aluminum alloy (ASTM B221-Alloy G.S. 10a T6).
 - 10. Screws, fastening devices, and internal components: Aluminum, stainless steel, or zinc plated steel in accordance with ASTM A-164. Shall be aluminum or steel, providing the steel is properly isolated from aluminum.
 - 11. Stiles and rails shall be tubular sections accurately joined, flush and hairline at corners with heavy concealed reinforcement brackets secured with machine bolts, with optional MIG weld. Exposed screws not permitted.
 - 12. Each door leaf equipped with an adjusting mechanism, located in the top rail near the lock stile.
 - 13. Prepare internal reinforcement for door hardware.
- B. Door Hardware: Factory hardware and as specified in Division 8 Section "Door Hardware."
 - 1. Door hardware supplier shall be responsible for furnishing physical hardware to the entrance manufacturer prior to fabrication, and for coordinating hardware delivery requirements with the hardware manufacturer, the general contractor and the entrance manufacturer to insure the building project is not delayed. Coordinate master-keyed requirements.

2.6 ACCESSORY MATERIALS

- A. Insulating Materials: As specified in Division 7 Section "Building Insulation."
- B. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 7 Section "Joint Sealants."

2.7 FABRICATION

- A. Form aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from interior.
 - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing (without projecting stops).
- E. Door Frames: Reinforce as required to support loads imposed by door operation and for installing hardware.
 - 1. At exterior doors, provide compression weather stripping at fixed stops.
 - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
 - 3. Provide reinforcing at frame jamb frame to accept continuous door hinge.
- F. Doors: Reinforce doors as required for installing hardware.
 - 1. At pairs of exterior doors, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
 - 3. Provide reinforcing at door jamb to accept continuous door hinge.
- G. Hardware Installation:
 - 1. Factory install hardware to the greatest extent possible. Cut, drill, and tap for factory-installed hardware before applying finishes.
 - 2. Hardware supplier shall furnish hardware to door manufacturer prior to fabrication and coordinate hardware delivery with door manufacturer to insure project is not delayed.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

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

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- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Color: Match curtainwall as approved by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - 6. Seal joints watertight, unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, without warp or rack.
- F. Entrances: Install to produce smooth operation and tight fit at contact points.

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1. Exterior Entrances: Install to produce tight fit at weather stripping and weathertight closure.
 2. Field-Installed Hardware: Install surface-mounted hardware according to hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- G. Install insulation materials as specified in Division 7 Section "Building Insulation."
- H. Install perimeter joint sealants as specified in Division 7 Section "Joint Sealants" and to produce weathertight installation.
- I. Erection Tolerances: Install aluminum-framed systems to comply with the following maximum tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
 3. Diagonal Measurements: Limit difference between diagonal measurement to 1/8 inch.

3.3 ADJUSTING

- A. Entrances: Adjust operating hardware for smooth operation according to hardware manufacturers' written instructions.
1. For doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch measured to the leading door edge.

END OF SECTION 084113

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes aluminum clad of the following:
 - 1. Fire-rated aluminum-framed storefronts.
 - 2. Fire-rated manual-swing aluminum doors.
- B. Related Sections include the following:
 - 1. Division 7 Section "Flexible Sheet Flashing" for flashing windows, door, and other openings.
 - 2. Division 7 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
 - 3. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.

1.2 SUBMITTALS

- A. Product Data: Submit latest edition of manufacturer's product data providing product descriptions, technical data, Underwriters Laboratories, Inc. listings and installation instructions.
- B. Shop Drawings:
 - 1. Include plans, elevations and details of product showing component dimensions; framing opening requirements, dimensions, tolerances, and attachment to structure
 - 2. Provide templates for the location of embeds and anchor locations required for any adjoining work.
- C. Samples For following products:
 - 1. Glass sample-as provided by manufacturer.
 - 2. Sample of frame.
 - 3. Verification of sample of selected finish.
- D. Glazing Schedule: Use same designations indicated on drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- E. Warranties: Submit manufacturer's warranty.
- F. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements.
 - 1. Separate certification will not be required for glazing materials bearing manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Testing Agency Qualifications: Qualifications according to

1. International Accreditation Service for a Type A Third-Party Inspection Body (Field Services ICC-ES Third-Party Inspections Standard Operating Procedures, 00-BL-S0400 and S0401)
2. International Accreditation Service for Testing Body-Building Materials and Systems Fire Testing:
 - a. ASTM Standards E 119.
 - b. CPSC Standards 16 CFR 1201.
 - c. NFPA Standards 251, 252, 257.
 - d. UL Standards 9, 10B, 10C, 1784, UL Subject 63.
 - e. BS 476; Part 22: 1987.
 - f. EN 1634-1.
 - g. CAN Standards S 101, S 104, S 106.

C. Installer Qualifications:

1. An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and who employs glass installers for this Project who

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are certified under the National Glass Association Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).

2. An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance
Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are classified and labeled by UL, for fire ratings indicated, based on testing according to NFPA 257.

- D. Listings and Labels - Fire Rated Assemblies: Under current follow-up service by Underwriters Laboratories® maintaining a current listing or certification. Label assemblies accordance with limits of manufacturer's listing.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle under provisions specified by manufacturer.

1.5 PROJECT CONDITIONS

- A. Obtain field measurements prior to fabrication of frame units. If field measurements will not be available in a timely manner coordinate planned measurements with the work of other sections.
 1. Note whether field or planned dimensions were used in the creation of the shop drawings.
- B. Coordinate the work of this section with others effected including but not limited to: other interior components and door hardware beyond that provided by this section

1.6 WARRANTY

- A. Pilkington Pyrostop® and Fireframes® standard five-year manufacturer warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fire-Rated Entrance and Storefronts: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 1. TGP. (Basis of Design):
 - a. Manufacturer Glazing Material: "Pilkington Pyrostop®" fire-rated glazing as manufactured by the Pilkington Group and distributed by Technical Glass Products.
 - b. Frame System: "Fireframes Aluminum Series" fire-rated frame system as manufactured and supplied by Technical Glass Products.
 2. Or equal.

2.2 PERFORMANCE REQUIREMENTS

- A. System Description:

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1. Steel fire-rated glazed wall and/or window system, aluminum cover cap format.
 - a. Fire Rating: As indicated on Drawings.

B. Design Requirements

1. Design and size the system to withstand structural forces placed upon it without damage or permanent set when tested in accordance with ASTM E330 using load 1.5 times the design wind loads and of 10 seconds in duration at +/- 10 PSF.

2.3 MATERIALS - GLASS

- A. Fire Rated Glazing: Composed of multiple sheets of Pilkington Optiwhite™ high visible light transmission glass laminated with an intumescent interlayer.
- B. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201(Cat. I and II).
- C. Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, manufacture, testing laboratory (UL), fire rating period, safety glazing standards, and date of manufacture.
- D. Glazing Accessories: Manufacturer's standard compression gaskets, standoff, spacers, setting blocks and other accessories necessary for a complete installation.

2.4 ALUMINUM FRAMES

A. Aluminum Framing System.

1. Steel Frame: Made of two halves, nom. 1.9 in. wide with a nom. minimum depth of 1.38 inch with lengths cut according to glazing size.
2. Aluminum Trim: Supplied with the steel framing members. Nom. 2 inch wide with a nom. depth of 1.54 inch with lengths cut according to glazing size.
3. Stainless Steel Standoffs: Supplied with the steel framing members. Nom 5/16 inch diameter with a nom. minimum depth of 1-1/8 inch with depth adjusted to match Pilkington Pyrostop® Panel thickness.
4. Stainless Steel Moment and Connecting Braces: — Supplied with the steel framing members. Nom 3/8 inch thick with a nom. minimum depth of 1-1/8 inch with depth adjusted to match Pilkington Pyrostop® Panel thickness.
5. Framing Member Fasteners: Supplied with the steel framing members. Screws are M6 x16mm Button Head Socket Cap Screws for frame assembly and #6 x 1" Pan Head Sheet Metal Screws for door installation.
6. Glazing Gasket: Supplied with the steel framing members. Nom. 3/4 inch by 3/16 inch black applied to the steel framing members to cushion and seal the glazing material when installed.

2.5 FABRICATION

- A. Obtain reviewed shop drawings prior to fabrication.
- B. Fabrication Dimensions: Fabricate fire-rated assembly to field dimensions.

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- C. Factory prepared, fire-rated steel door assemblies by TGP to be prehung, prefinished with hardware preinstalled for field mounting.
- D. Field glaze door and frame assemblies.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish frames after assembly.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable. Noticeable variations in the same piece are not acceptable.

2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Examine substrates and members to which the work of this section attaches or adjoins prior to frame installation are acceptable for product installation in accordance with manufacturer's instructions. Provide openings plumb, square and within allowable tolerances. The manufacturer recommends 3/8 inch shim space at all walls
- B. Do not proceed until such conditions are corrected.

3.2 INSTALLATION

- A. Install per manufacturer's written instructions.

3.3 REPAIR AND TOUCH UP

- A. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged.

3.4 PROTECTION AND CLEANING

- A. Protect 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.
 - 1. Do not clean with astringent cleaners. Use a clean "grit free" cloth and a small amount of mild soap and water or mild detergent.
 - 2. Do not use any of the following:
 - a. Steam jets.
 - b. Abrasives.
 - c. Strong acidic or alkaline detergents, or surface-reactive agents.
 - d. Detergents not recommended in writing by the manufacturer.
 - e. Do not use any detergent above 77 degrees F.
 - f. Organic solvents including but not limited to those containing ester, ketones, alcohols, aromatic compounds, glycol ether, or halogenated hydrocarbons.
 - g. Metal or hard parts of cleaning equipment must not touch the glass surface.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Wash glass as recommended by glass manufacturer.

END OF SECTION 084114

SECTION 084229 - AUTOMATIC ENTRANCE DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes sliding, power-operated automatic entrances:
 - 1. Biparting.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 26 Sections for electrical connections including conduit and wiring for automatic entrance operators.

1.2 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- C. Safety Device: Device that, to avoid injury, prevents a door from opening or closing.
- D. For automatic door terminology, refer to BHMA A156.10 for definitions of terms.

1.3 SYSTEM DESCRIPTION

- A. Automatic and power-assisted doors shall comply with CBC Section 11B-404.3.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Automatic entrances shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1. Seismic Loads: As indicated on Drawings.
 - 2. Wind Loads: As indicated on Drawings.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- C. Operating Temperature Range: Provide automatic entrances that operate within minus 20 to plus 122 deg F.

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- D. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. of fixed entrance system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.
- E. Opening-Force Requirements:
 - 1. Power-Operated Doors: Not more than 50 lbf required to manually set door in motion if power fails, and not more than 15 lbf required to open door to minimum required width.
 - 2. Breakaway Device for Power-Operated Doors: Not more than 50 lbf required for a breakaway door or panel to open.
 - 3. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- F. Entrapment Force Requirements:
 - 1. Power-Operated Sliding Doors: Not more than 30 lbf required to prevent stopped door from closing.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic entrances. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
 - 2. Activation and safety devices.
 - 3. Include hardware schedule and indicate hardware types, functions, quantities, and locations.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- F. Qualification Data: For Installer.
- G. Product Certificates: For each type of emergency-exit automatic entrance, from manufacturer.

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- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for automatic entrances.
- I. Maintenance Data: For automatic entrances, safety devices, and control systems to include in maintenance manuals.
- J. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Manufacturer Qualifications: A manufacturer with company certificate issued by AAADM.
- C. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.
 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- D. Certified Inspector Qualifications: Certified by AAADM.

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- E. Source Limitations for Automatic Entrances: Obtain automatic entrances from single source from single manufacturer.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Power-Operated Door Standard: BHMA A156.10.
- H. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for automatic entrances serving as a required means of egress.
- I. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to automatic entrances including, but not limited to, the following:
 - a. Structural load limitations.
 - b. Construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Coordination with electrical, glazing, and other trades.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings to receive automatic entrances by field measurements before fabrication.

1.8 COORDINATION

- A. Templates: Obtain templates for doors, frames, and other work specified to be factory prepared for installing automatic entrances, and distribute to parties involved. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.
- B. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrances with hardware required for rest of Project.
- C. Electrical System Roughing-in: Coordinate layout and installation of automatic entrances with connections to power supplies.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of automatic entrances that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Faulty operation of operators, controls, and hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

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2. Warranty Period: 2 years.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years.

C. Installer's Warranty: 2 years.

1.10 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of automatic entrance Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper automatic entrance operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

1. Engage a certified inspector to perform safety inspection after each adjustment or repair and at end of maintenance period. Furnish completed inspection reports to Owner.
2. Perform maintenance, including emergency callback service, during normal working hours.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sliding, Power-Operated Automatic Entrance System: Subject to compliance with requirements, provide either the named product or an equal automatic entrance door system by one of the other manufacturers specified:

1. Horton Automatics. (Basis of Design)
 - a. ProSlide Series 2003 Belt Drive-Type 110 Biparting (O-SX-SX-O).
2. Besam Automated Entrance Systems, Inc.; an ASSA ABLOY Group company.
3. DORMA Automatics; Div. of DORMA Group North America.
4. Sierra Automatic Doors, Inc.
5. Stanley Access Technologies; Div. of The Stanley Works.
6. Tormax Technologies, Inc.
7. Or equal.

2.2 MATERIALS

A. Recycled Content: Aluminum recycled content not less than 40 percent.

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- B. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 2. Sheet and Plate: ASTM B 209.
- C. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011.
- D. Glazing: As specified in Division 8 Section "Glazing."
- E. Sealants and Joint Fillers: As specified in Division 7 Section "Joint Sealants."
- F. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout; complying with ASTM C 1107; of consistency suitable for application.
- G. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil thickness per coat.
 - 1. Caulking and sealants applied on the interior of the building envelope shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.
- H. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.3 SLIDING AUTOMATIC ENTRANCES

- A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.
- B. Door Units:
 - 1. Include operator, header and track, jambs, sliding door, threshold and sidelight if required.
 - 2. Structural aluminum sections shall be 6063T-5 alloy not less than .125 inch thickness with safety radius corners on all vertical rails.
 - 3. Continuous extruded header section shall conceal the four, high quality, ball bearing wheels on nylon-covered support track.
 - 4. Concealed guides shall stabilize bottom of door.
 - 5. Anti-derailing means shall be continuous extrusion full length of door travel.
 - 6. Track must be replaceable without having to remove the operator.
 - 7. Adjustable astragal with double mohair weather-strip shall be provided on all strike rails.
 - 8. Joining vertical panel rails shall have complementing mohair weather-stripping, while horizontal rails shall be weather-stripped with mohair type fabric.
 - 9. Door panel construction shall be by means of tongue-and-groove key fitted gussets that have two tempered bolts in each corner section to assure against racking failure.

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10. Sliding door (and swinging sidelight) shall include a spring to re-close the door if pushed open.
- C. Unit Type:
1. The swing-slide panel shall be installed to the exterior of the fixed sidelight.
 2. Swing-slide panel(s) (SX) shall swing out 90 degrees from any position of slide movement, and shall be UL listed as an exit way.
- D. Hardware:
1. Sliding panel (X or SX) shall have Adams Rite Maximum Security Lock MS1853A505 31/32" with 1-5/32" standard size cylinder.
 2. Type SX with UL listing has 6410 Thumb Turn inside and standard cylinders outside.
 3. Biparting SX doors are provided with two point dead-lock hook bolt for panel and drop bolt into the threshold.
- E. Operator:
1. Electromechanical, utilizing a 1/8 Hp, DC permanent magnet motor with gear transmission and belt drive.
 2. Header mounted and concealed with a securely attached hinged cover.
 3. Belt shall be nylon reinforced neoprene 3/4" (17 mm) wide.
 4. Opening speed, closing speed, back check and latch check shall be fully and independently adjustable.
 5. Programmable, fully adjustable partial opening in steps of 1". This shall be accomplished by utilizing operator's microprocessor C2150 master control, which will include programming for aforementioned functions, as well as time-delay.
 6. Control shall include an alpha-numeric display for diagnostic testing of electrical and mechanical functions and full digital adjustment capabilities to provide precise door control and braking.
 7. Control shall include auto seal feature, which provides a door check every 11 seconds to guarantee doors are closed.
 8. Revolution counter shall be used to memorize and continuously recheck the door's position and to issue instruction for functions of partial opening (optional) and to check door's speed.
 9. Serial communication port shall be provided.
 10. Operator shall reverse when maximum force of 28 lbs. is exerted to prevent the door from closing.
 11. Reverser shall be field adjustable to meet job conditions.
 12. For protection in case of electrical power failure, operator shall revert to free manual operation of the door.
 13. Power ON/OFF switch shall be located on inside of header and shall serve second function as "hold open" for door when in OFF position.
- F. Control Switches:
1. Each sliding door unit shall include two C1185 photoelectric beams (C1304 set) mounted in vertical rails of sidelight at heights of 24" and 48".
 2. Each shall parallel door opening and serve as door hold-open when interrupted.
 3. Actuation shall include motion detector mounted on each side of door for detection of traffic in each direction.

2.4 FABRICATION

- A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
 - 1. Form aluminum shapes before finishing.
 - 2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 - 3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match framing.
 - a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - b. Reinforce members as required to receive fastener threads.
 - 4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

- B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
 - 1. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support required loads.
 - 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
 - 3. Form profiles that are sharp, straight, and free of defects or deformations.
 - 4. Provide components with concealed fasteners and anchor and connection devices.
 - 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
 - 6. Fabricate exterior components to drain water passing joints and condensation and moisture occurring or migrating within system to the exterior.
 - 7. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
 - 8. Allow for thermal expansion of exterior units.

- C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

- D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

- E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."

- F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.
 - 1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors and breakaway sidelites.

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. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Color: Match curtainwall as approved by Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

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- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
 - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 - 2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
 - 3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
 - 4. Level recesses for recessed thresholds using nonshrink grout.
 - 5. Provide thresholds at exterior doors and where indicated.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.
- D. Activation and Safety Devices: Install and adjust devices to provide detection field and functions indicated.
- E. Glazing: Install glazing as specified in Division 8 Section "Glazing."
- F. Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants" to provide weathertight installation.
 - 1. Set thresholds, bottom-guide track system, framing members and flashings in full sealant bed.
 - 2. Seal perimeter of framing members with sealant.
- G. Signage: Apply signage on both sides of each door and breakaway sidelight as required by referenced door standards.
- H. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 ADJUSTING

- A. Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure; comply with requirements in BHMA A156.10.
- B. Lubricate operating hardware and other moving parts as recommended by manufacturer.
- C. Readjust door operators and controls after repeated operation of completed installation equivalent to 3 days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.
- D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

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3.4 CLEANING AND PROTECTION

- A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
 - 1. Comply with requirements in Division 8 Section "Glazing" for cleaning and maintaining glass.

3.5 DEMONSTRATION

- A. Engage a certified inspector to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrances.

END OF SECTION 084229

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SECTION 084413 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes conventionally glazed aluminum curtain wall system.
- B. Related Sections include the following:
 - 1. Division 7 Section "Building Insulation" for insulation materials field installed with glazed aluminum curtain-wall systems.
 - 2. Division 7 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain-wall systems and for sealants to the extent not specified in this Section.
 - 3. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrance and storefront systems installed with glazed aluminum curtain-wall systems.
 - 4. Division 8 Section "Glazing" for Electrochromic insulating-glass requirements.

1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide glazed aluminum curtain-wall systems, including anchorage, capable of withstanding, without failure, the effects of the following:
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 4. Dimensional tolerances of building frame and other adjacent construction.
 - 5. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferred to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
- B. Uniform Load: Static air design load of 40 psf shall be applied in positive and negative direction in accordance with ASTM E330. There shall be no deflection in excess of $L/175$ of span of any framing member at design load. At structural test load equal to 1.5 times specified design load, no glass breakage or permanent set in framing members in excess of 0.2% of their clear spans shall occur.
- C. Seismic: When tested to AAMA 501.4, system must meet design displacement of $0.010 \times$ story height and ultimate displacement of $1.5 \times$ design displacement.

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- D. Air Infiltration: Provide glazed aluminum curtain-wall systems with maximum air leakage of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft.
- E. Water Penetration Under Static Pressure: Provide aluminum glazed curtain-wall systems that do not evidence water penetration when tested according to ASTM E 331 at a minimum differential static pressure of 15 psf as defined in AAMA 501.
- F. Water Penetration Under Dynamic Pressure: Provide glazed aluminum curtain-wall systems that do not evidence water leakage when tested according to AAMA 501.1 under dynamic
- G. Condensation Resistance: Provide glazed aluminum curtain-wall systems with condensation-resistance factor (CRF) when tested according to AAMA 1503.
- H. Sound Transmission: Provide glazed aluminum curtain-wall systems with minimum STC according to ASTM E 90.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product indicated.
- B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of glazed aluminum curtain-wall systems.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of systems, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- F. Welding certificates.
- G. Qualification Data: For Installer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for glazed aluminum curtain-wall systems.
- I. Preconstruction Testing Program: Developed specifically for Project.
- J. Preconstruction Test Reports: For glazed aluminum curtain-wall systems.

- K. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.

1. Engineering Responsibility: Preparation of data for glazed aluminum curtain-wall systems including the following:
 - a. Shop Drawings based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project and submission of reports of tests performed on manufacturer's standard assemblies.
 - b. Shop Drawings, Project-specific preconstruction-testing program development, and comprehensive engineering analysis by a qualified professional engineer.

C. Testing Agency Qualifications: An independent agency qualified according to ASTM E 699 for testing indicated.

D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate

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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.

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.
- E. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."
- F. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical wall area as shown on Drawings.
 2. Field testing shall be performed on mockups according to requirements in Part 3 "Field Quality Control" Article.
- G. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to glazed aluminum curtain-wall systems including, but not limited to, the following:
1. Review structural load limitations.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain-wall systems 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 dimensions and proceed with fabricating glazed aluminum curtain-wall systems without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain-wall systems that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Complete system for failure to meet specified requirements, including ability to exclude exterior moisture from interior.
 - e. Failure of operating components to function normally.
 2. Warranty Period: 10 years.

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- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - 1. Warranty Period: 20 years.
- C. Installer's Warranty: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Glazed aluminum curtain walls: subject to compliance with requirements, provide either the preferred product or an approved equal product by one of the other manufacturer's specified.
 - 1. ARCADIA INC. T500 OPG -1900 (BASIS OF DESIGN AND DISTRICT PREFERRED PRODUCT)
 - 2. APPROVED EQUAL PRODUCTS, SEE 2.2 FOR PROCESS:
 - a. WAUSAU 7250 SUPERWALL, 2-1/2"x7-1/4" FRAMING, FULLY CAPTURED, OUTSIDE GLAZED
 - b. CR LAURENCE SERIES 3250, 2-1/2"x7" FRAMING, FULLY CAPTURED, OUTSIDE GLAZED
- B. Glazed aluminum curtain walls: subject to compliance with requirements, provide either the preferred product or an approved equal product by one of the other manufacturer's specified.
 - 1. ARCADIA INC. T500 OPG -3000 (BASIS OF DESIGN AND DISTRICT PREFERRED PRODUCT)
 - 2. APPROVED EQUAL PRODUCTS, SEE 2.2 FOR PROCESS:
 - a. WAUSAU 10250 SUPERWALL, 2-1/2"x10-1/4" FRAMING, FULLY CAPTURED, OUTSIDE GLAZED
 - b. CR LAURENCE SERIES 3250, 2-1/2"x10" FRAMING, FULLY CAPTURED, OUTSIDE GLAZED
- C. Glazed aluminum window walls: subject to compliance with requirements, provide either the preferred product or an approved equal product by one of the other manufacturer's specified.
 - 1. ARCADIA INC. TC670 (BASIS OF DESIGN AND DISTRICT PREFERRED PRODUCT)
 - 2. APPROVED EQUAL PRODUCTS, SEE 2.2 FOR PROCESS:
 - a. WAUSAU 6250 SUPERWALL, 2-1/2"x6-1/4" FRAMING, FULLY CAPTURED, OUTSIDE GLAZED
 - b. CR LAURENCE SERIES 3250, 2-1/2"x6" FRAMING, FULLY CAPTURED, OUTSIDE GLAZED

2.2 SPECIAL APPROVED EQUAL DSA APPROVAL PROCESS AND REQUIREMENTS

- A. Basis of Design product has been approved by DSA. If Contractor elects to provide one of the approved equal products listed above, it is solely responsible for obtaining all necessary approvals and all costs associated with obtaining the approval of DSA, including all Architectural and Engineering fees for coordinating with DSA related to the approved equal product proposed by the Contractor, are the sole responsibility of the Contractor. Do not

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commence installation until all approvals have been obtained. The District is not responsible for any costs or delays (including any costs related to delays, schedule impacts, etc.), including any delays or costs caused by or related to DSA or any other governmental agency having jurisdiction over the project, arising from, or related in any manner to, the Contractor electing to provide one of the approved equal products listed above.

B. Submittals:

1. Submit required submittal to Architect within 35 calendar days from the date of issuance of Notice to Proceed, and before any materials are delivered to the job site. Contractor is solely responsible for obtaining all necessary approvals. Do not commence installation of any approval item until all DSA approvals have been obtained.
2. Product Data: Submit manufacturer's specifications and certified test reports made by an independent testing organization for each type and class of material to show compliance with code requirements and obtain approval of DSA.
3. Shop Drawings: Submit complete shop drawings including dimensioned plans, elevations, and all details of typical sections and connections. Shop drawings shall show design loads and all details of the installation. Title sheet of shop drawings shall list testing requirements and shall state that a licensed engineer shall review and certify the completed installation is in accordance with the approved shop drawings. Shop drawings shall be stamped, dated and signed by a professional engineer licensed in the State of California as evidence of his or her responsibility for the work.
4. Shop drawings:
 - a. Format: 30" x 42" sheet format with border and title block identifying, at a minimum, the project name, project number, project location, date, contractor and structural engineer of record.
 - b. 1 set of reproducible shop drawings each submittal review.
 - c. 1 set of reproducible shop drawings for each plan check review.
 - d. 1 set of reproducible shop drawings approved by DSA.
5. Calculations: Submit calculations prepared by a professional engineer licensed in the State of California. Engineer shall sign, date and stamp calculations as evidence of his or her responsibility for the work.
6. Submittals shall be approved first by the Architect, then by the DSA.

2.3 FRAMING SYSTEMS

- A. Product: T500 Series: Pressure plate glazed system by Arcadia or approved equal per paragraph 2.1.
1. OPG-1900 Thermal, 2-1/4" x 7".
 2. OPG-3000 Thermal, 2 1/4" X 10" for 1" Glass.
 3. Framing Materials and Accessories:
 - a. Framing members, transition members, mullions, adaptors, and mounting: Extruded 6063-T6 aluminum alloy (ASTM B221 – Alloy G.S. 10a T6).
 - b. Screws, fastening devices, and internal components: Aluminum, stainless steel, or zinc-plated steel in accordance with ASTM.A-164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from aluminum.
 4. STC with 1 inch insulating glass: 32.
- B. Product: TC 670 by Arcadia or equal per paragraph 2.1.
1. Type: 2-1/4 x 6 inch captured offset glazed system for 1 inch glass.

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2. Design Requirements: Framing system suitable for outside or inside glazing. Glass shall be forward of frame. Provides for two-color capability. With optional structural silicone support at verticals.
3. Performance Requirements:
 - a. Limit air leakage through assembly to 0.06 CFM/min/sq. ft. of wall area at 6.24 PSF as measured in accordance with ASTM E283.
 - b. Water Resistance: No water leakage when measured in accordance with ASTM E331 with a static test pressure of 12 PSF.
 - c. Dynamic Water Resistance: No water leakage, when measured in accordance with AAMA 501.1-94 with a dynamic test pressure of 12 PSF.
 - d. Limit mullion windload deflection of L/175 with full recovery of glazing materials, when measured in accordance with ASTM E 330.
 - e. System shall not deflect more than 1/8" at the center point, or 1/16" at the center point of a horizontal member, once dead-load points have been established.
 - f. System shall accommodate expansion and contraction movement due to surface temperature differential of 180 degrees F.
 - g. Seismic testing shall conform to AAMA recommended static test method for evaluating performance of curtain walls and storefront wall systems due to horizontal displacements associated with seismic movements and building sway.
 - h. Thermal performance: When tested in accordance with AAMA 1503.1, and 1502.7, the following results should be attained: U. maximum .63/CRF – minimum of 59.
 - i. National Fenestration Rating Council (NFRC) specific application evaluation.
 - j. STC with 1 inch insulating glass: 33.
- C. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 1. Structural Shapes, Plates, and Bars: ASTM A 36.
 2. Cold-Rolled Sheet and Strip: ASTM A 611.
 3. Hot-Rolled Sheet and Strip: ASTM A 570.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 1. Where fasteners are subject to loosening or turn out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads.
 4. Finish exposed portions to match framing system.
 5. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
- F. Anchors: Three-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

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- G. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- H. Framing Gaskets: As recommended by manufacturer for joint type.
- I. Framing Sealants: As recommended by manufacturer for joint type.

2.4 SYSTEM FABRICATION

- A. Form aluminum shapes before finishing.
- B. Fabricate components that, when assembled, have the following characteristics:
 - 1. Sharp profiles, straight and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to prevent glazing-to-glazing contact and to maintain required glazing edge clearances.
- C. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- E. Provisions shall be made at all sealed horizontals to keep moisture accumulation to the exterior.
- F. System shall provide for two-piece horizontal framing so that all fasteners at intersection of horizontal and vertical members will be concealed.
- G. There shall be no exposed fasteners at perimeter sections.

2.5 GLAZING SYSTEMS

- A. Glazing: Insulating-glass units as specified in Division 9 Section "Glazing".
- B. Glazing Gasket: Compression-type design, replaceable, molded or extruded santoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
- C. Glazing Sealants: As recommended by manufacturer for joint type.

2.6 SUN SHADES

- A. Profile: As indicated on Drawings.
- B. Members: Extruded from 6063-T6 aluminum alloy.

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- C. Finish: Same as curtain wall system.

2.7 ACCESSORY MATERIALS

- A. Break metal: Minimum .120 inch thick aluminum brake metal provided by curtain wall manufacturer and finish to match curtain wall.
- B. Perimeter Fire-Containment Systems (Safing Insulation): Specified in Division 7 Section "Fire-Resistive Joint Systems."
- C. Insulating Materials: Specified in Division 7 Section "Building Insulation."
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.8 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.

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5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 7. Seal joints watertight, unless otherwise indicated.
- B. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified Division 8 Section "Glazing."
- F. Install sealants as specified in Division 7 Section "Joint Sealants."
- G. Install insulation materials as specified in Division 7 Section "Building Insulation."
- H. Install perimeter fire-containment systems (safing insulation) as specified in Division 7 Section "Fire-Resistive Joint Systems."
- I. Erection Tolerances: Install glazed aluminum curtain-wall systems to comply with the following maximum tolerances:
1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or greater, limit offset from true alignment to 1/4 inch.
 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

END OF SECTION 084413

SECTION 085113 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes aluminum-framed windows.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Flexible Sheet Flashing" for flashing windows, door, and other openings.
 - 3. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.
 - 4. Division 8 Section "Glazing" for glazing requirements for aluminum windows.
 - 5. Division 8 Section "Glazed Aluminum Curtain Walls" for incorporating aluminum windows into glazed curtain walls and for coordinating finish among aluminum fenestration units.

1.2 DEFINITIONS

- A. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Commercial (C).
- 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.

1.3 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. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED

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- Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
1. Mullion details, including reinforcement and stiffeners.
 2. Joinery details.
 3. Expansion provisions.
 4. Flashing and drainage details.
 5. Weather-stripping details.
 6. Thermal-break details.
 7. Glazing details.
 8. Window cleaning provisions.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
1. Include similar Samples of hardware and accessories involving color selection.
- E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.
- F. Qualification Data: For Installer and manufacturer.
- G. Product Test Reports: 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.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.

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13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- C. 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.
- D. Source Limitations: Obtain aluminum windows through one source from a single manufacturer.
- E. 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.
- F. 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.
- G. 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 or WDMA-certified aluminum windows with an attached label.
- H. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- I. Preinstallation Conference: Conduct conference at Project site. 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 color and finish matching.

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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.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify aluminum window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 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.
 - f. Complete system for failure to meet specified requirements, including ability to exclude exterior moisture from interior.
 2. Warranty Period:
 - a. Window: Two years.
 - b. Glazing: Five years.
 - c. Metal Finish: 10 years.
- B. Installer's Warranty: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Aluminum Windows: Subject to compliance with requirements, provide products by one of the following:
 1. Arcadia Windows. (Basis of Design)
 2. EFCO Corporation.
 3. Kawneer; an Alcoa Company.
 4. TRACO.
 5. Wausau Window and Wall Systems.
 6. Or equal.

2.2 MATERIALS

- A. Recycled Content: Aluminum recycled content not less than 40 percent.
- B. Aluminum Extrusions: Alloy and temper recommended by aluminum window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than 0.062-inch thickness at any location for the main frame and sash members.
- C. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.
 - 1. Reinforcement: Where fasteners screw anchor into aluminum less than 0.125 inch thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, splined grommet nuts.
 - 2. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- F. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when aluminum window is closed.
 - 1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.
- G. Replaceable Weather Seals: Comply with AAMA 701/702.
- H. Sealant: For sealants required within fabricated windows, provide window manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOWS

- A. Product: 200 Series windows by Arcadia or equal.
 - 1. Framing members: .125 minimum wall thicknesses.
 - 2. Type: Fixed and operable as indicated on Window Schedule on Drawings.
 - 3. Tested and engineered to meet or exceed AAMA 101/I.S. 2-97/NAFS 2.
 - 4. Overall Frame Depth: 2 inch.
 - 5. 1 inch insulated glazing in-fills as specified in Division 8 "Glazing".

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2.4 GLAZING

- A. Glass:
 - 1. Refer to Division 8 Section "Glazing" for insulated glass and glazing requirements applicable to glazed aluminum window units.

2.5 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. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. 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.
- F. 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.

2.6 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.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating:

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manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.

1. Color: Match curtainwall as approved by Architect.

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 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, 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.

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- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. 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.

END OF SECTION 085113

SECTION 086210 - TUBULAR SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Tubular skylights, consisting of skylight dome, reflective tube, and diffuser assembly; configuration as indicated on the drawings.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 PERFORMANCE REQUIREMENTS

- A. Completed skylight assemblies shall be capable of meeting the following performance requirements:
 - 1. Air Infiltration Test: Air infiltration will not exceed .30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.
 - 2. Water Resistance Test: No uncontrolled water leakage at 16.5 psf pressure differential when tested in accordance with ASTM E 331.
 - 3. Uniform Load Test: No breakage, permanent damage to fasteners, hardware parts, or damage to make tubular skylight inoperable, or cause permanent deflection of any section in excess of 1 percent of its span at either a maximum Positive or Negative Load of 100 psf for the 10 inch and 14 inch units and 35 psf for the 21 inch unit. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.

1.3 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. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings.

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- D. Samples for Initial Selection: For selection of lower glazing.
- E. Verification Samples: As requested by Architect.
- F. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.4 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Manufacturer Qualifications: Engaged in manufacture of tubular skylights for minimum 10 years.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

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1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of tubular skylights that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tubular Skylights: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Solatube International, Inc (Basis of Design)
 - 2. Natural Light.
 - 3. Or equal.

2.2 TUBULAR SKYLIGHTS

- A. General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces. All components made and assembled by one manufacturer.
- B. Code Compliance Research Report: Intertek CCRR-0131.
- C. Product: SolaMaster Series: Solatube Model 21-C Penetrating Ceiling, 21 inch Daylighting System:
 - 1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - 2. LightTracker Reflector, made of aluminum sheet, thickness 0.015 inch with Spectralight Infinity. Positioned in the dome to capture low angle sunlight.
 - 3. Roof Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.
 - a. Base Material: Sheet steel, corrosion resistant conforming to ASTM A653 or ASTM A 463, 0.028 inch thick.
 - b. Flashing Insulator: Type F1, Thermal isolation material for use under flashing.
 - c. PVC Boot: Type P, White PVC for flashing to flat PVC roof surfaces.
 - d. Dome Edge Protection Band: Type PB, for fire rated roofs. Galvanized steel. Nominal thickness of 0.039 inches.

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4. Roof Flashing Turret Extensions: Provide manufacturer's standard extensions for applications.
5. Dome Ring: Attached to top of base section; 0.090 inch nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.
6. Dome Seal: Polypropylene Fiber Pile weatherstrip 0.27 inch by 0.27 inch.
7. Reflective Tube: Aluminum sheet, thickness 0.018 inch.
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
 - b. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
8. Reflective 30 degree Adjustable Tube: Aluminum sheet, thickness of 0.018 inch.
 - a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 93 percent.
9. Diffuser Assemblies for Tubes Penetrating Ceilings: Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube, with compression seal to minimize condensation and bug or dirt infiltration; 23.8 by 23.8 inches square frame to fit standard suspended ceiling grids or hard ceilings.
 - a. Round to square transition box made of opaque polymeric material, classified as CC2, Class C, 0.110 inch thick.
 - b. Lens: Type L1 OptiView Fresnel lens design to maximize light output and diffusion with extruded aluminum frame. Visible Light Transmission shall be 90 percent at 0.022 inch thick.
 - c. Seal: Closed cell foam, 3 pounds per cubic foot.
 - d. Secondary Diffuser: Type SS, Acrylic plastic classified as CC2 material. Thickness shall not be less than 0.100 inches.
10. Accessories:
 - a. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required.

2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.

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- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

3.4 PROTECTION

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

END OF SECTION 086210

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SECTION 086300 - UNIT SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes factory-assembled unit skylights for installation in flat roof areas.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Loads: Provide unit skylights, including glazing and anchorage, capable of withstanding the effects of the following design loads:
 - 1. Deflection: Skylight framing members shall not exceed L/175 when subject to a uniform load deflection test in accordance with ASTM E330.
- B. Water Penetration: No water penetration shall occur when system is tested in accordance with ASTM E331. Water penetration is defined as the appearance of uncontrolled water other than condensation on the interior surface of any part of the skylight.
 - 1. Drain to the exterior all water entering at joints or glazing reveals as well as all condensation occurring within unit construction.
- C. Air Infiltration: Air infiltration through the skylight assembly when tested in accordance with ASTM E283 shall not exceed 0.06 cubic feet per minute per square foot of fixed area.
- D. Thermal Movement: Skylight assembly shall be so designed and anchored that there will be no objectionable distortion or stresses in fastening and joinery due to expansion and contraction when subjected to temperature variance.

1.3 SUBMITTALS

- A. Product Data: For unit skylights. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

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- C. Shop Drawings: For unit skylights. Include plans, elevations, sections, details, and attachments to other Work.
- D. Submit written documentation that the product submitted complies with California Building Code Section 2603.7 Requirements:
 - 1. Maximum roof live load is 20 pounds per square foot (958 Pa).
 - 2. Maximum roof wind-uplift load is 13 pounds per square foot (622 Pa).
 - 3. Meets seismic requirements indicated on Drawings.
- E. Samples for Initial Selection: For units with factory-applied color finishes.
- F. Samples for Verification: For each type of exposed finish required, in a representative section of each unit in manufacturer's standard size.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- B. Fire-Test Response Characteristics of Plastic Glazing: Provide plastic glazing sheets identical to those tested for fire-exposure behavior per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

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1. Self-Ignition Temperature: 650 deg F or greater for plastic sheets in thickness indicated when tested per ASTM D 1929.
2. Smoke Production Characteristics: Comply with either requirement below:
 - a. Smoke-Developed Index: 450 or less when tested per ASTM E 84 on plastic sheets in manner indicated for use.
 - b. Smoke Density: 75 or less when tested per ASTM D 2843 on plastic sheets in thickness indicated for use.
3. Relative-Burning Characteristics: Tested per ASTM D 635.
 - a. Acrylic Glazing: Class CC2, burning rate of 2.5 inches per minute or less for nominal thickness of 0.060 inch or thickness indicated for use.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 1. Uncontrolled water leakage.
 2. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 3. Yellowing of acrylic glazing.
 4. Warranty Period: 5 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Unit Skylights: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 1. Bristolite Skylights. (Basis of Design)
 2. Sunoptics.
 3. Or equal.

2.2 UNIT SKYLIGHTS

- A. General: Factory-assembled units that include glazing, extruded-aluminum glazing retainers, gaskets, and inner frames and that are capable of withstanding design loads indicated.
- B. Product: Tufflite by Bristolite or equal.
 1. Size: As indicated on Drawings.
 2. Dome Shape: Bubble.
 3. Double Glazing:
 - a. Outer glazing: Clear polycarbonate.
 - b. Inner glazing: Multi-wall polycarbonate panel, 16 mm thick Insulair.
 4. Dome Material: Tested to and pass:
 - a. UBC-26-7 and ASTM D635 achieving minimum CC1 rating.
 - b. ASTM D2843.

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- c. ASTM D1929.
- d. FM 4431 (hail test).
- 5. ICC-ES Evaluation Report: ESR 3177.

- C. Site-Built Curb.
- D. Flashing: As specified in Division 7 Section "Sheet Metal Flashing and Trim."

2.3 INSTALLATION MATERIALS

- A. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers, formulated for 15-mil dry film thickness per coating.
- B. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- C. Elastomeric Sealant: ASTM C 920; Type S; Grade NS; Class 25; and Uses NT, G, A, and (as applicable to joint substrates indicated) O; recommended by unit skylight manufacturer and compatible with joint surfaces.
- D. Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate unit skylight installation with installation of substrates, vapor retarders, roof insulation, roofing, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
 - 1. Unless otherwise indicated, install unit skylights according to construction details of NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Coordinate installation of unit skylight with site built curbs.
- C. Where metal surfaces of units will contact incompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by unit skylight manufacturer.
- D. Anchor unit skylights securely to supporting substrates.
- E. Set unit skylight flanges in thick bed of roofing cement to form a seal, unless otherwise indicated.
- F. Where cap flashing is indicated, install to produce waterproof overlap with roofing or roof flashing. Seal with thick bead of mastic sealant except where overlap is indicated to be left open for ventilation.

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3.2 CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 086300

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SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door hardware, including electric hardware.
2. Storefront and entrance door hardware.

1.2 REFERENCES:

A. Use date of standard in effect as of Bid date.

1. American National Standards Institute
 - a) ANSI 156.18 – Materials and Finishes.
2. BHMA – Builders Hardware Manufacturers Association
3. 2016 California Building Code
 - a) Chapter 11B – Accessibility To Public Buildings, Public Accommodations, Commercial Buildings and Public Housing
4. DHI – Door and Hardware Institute
5. NFPA – National Fire Protection Association
 - a) NFPA 80 2016 Edition – Standard for Fire Doors and Other Opening Protectives.
 - b) NFPA 105 – Smoke and Draft Control Door Assemblies
 - c) NFPA 252 – Fire Tests of Door Assemblies
6. UL – Underwriters Laboratories
 - a) UL10C – Positive Pressure Fire Tests of Door Assemblies.
 - b) UL 305 – Panic Hardware
7. WHI – Warnock Hersey Incorporated State of California Building Code
8. Local applicable codes
9. SDI – Steel Door Institute
10. WI – Woodwork Institute
11. AWI – Architectural Woodwork Institute
12. NAAMM – National Association of Architectural Metal Manufacturers

B. Abbreviations

1. Manufacturers: see table at 2.1.A of this section
2. Finishes: see 2.7 of this section.

1.3 SUBMITTALS & SUBSTITUTIONS

- A. SUBMITTALS: Submit six copies of schedule per D. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information:

1. Type, style, function, size, quantity and finish of hardware items.
 2. Use BHMA Finish codes per ANSI A156.18.
 3. Name, part number and manufacturer of each item.
 4. Fastenings and other pertinent information.
 5. Location of hardware set coordinated with floor plans and door schedule.
 6. Explanation of abbreviations, symbols, and codes contained in schedule.
 7. Mounting locations for hardware.
 8. Door and frame sizes, materials and degrees of swing.
 9. List of manufacturers used and their nearest representative with address and phone number.
 10. Catalog cuts.
 11. Point-to-point wiring diagrams.
 12. Manufacturer's technical data and installation instructions for electronic hardware.
- B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.
- C. Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.
- D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.
- E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
- F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.
- G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

1.4 QUALITY ASSURANCE:

- A. Qualifications:
1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.
 - a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.
- B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.

- D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.
- E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.
- F. Pre-Installation Meetings: Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
 - 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.
- B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:
 - 1. Location of embedded and attached items to concrete.
 - 2. Location of wall-mounted hardware, including wall stops.
 - 3. Location of finish floor materials and floor-mounted hardware.
 - 4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.

5. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
 6. Coordinate: back-up power for doors with automatic operators.
 7. Coordinate: flush top rails of doors at outswinging exteriors, and throughout where adhesive-mounted seals occur.
 8. Manufacturers' templates to door and frame fabricators.
- C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
- D. Environmental considerations: segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

1.7 WARRANTY:

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties.
- B. Include factory order numbers with close-out documents warranty information:
- C. Minimum warranties:
- | | |
|---------------------------------------|---|
| 1. Locksets: | Three years |
| 2. Extra Heavy Duty Cylindrical Lock: | Seven Years |
| 3. Exit Devices: | Three years mechanical
One year electrical |
| 4. Closers: | Thirty years mechanical
Two years electrical |
| 5. Hinges: | One year |
| 6. Other Hardware | Two years |

1.8 COMMISSIONING:

- A. Conduct these tests prior to request for certificate of substantial completion:
1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
 2. With installer, access control contractor and electrical contractor present, test electrical, electronic and electro-pneumatic hardware systems for satisfactory operation.

With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release

1.9 REGULATORY REQUIREMENTS: code citations are CBC 2016

- B. Locate latching hardware between 34 inches to 44 inches above the finished floor, per 2016 California Building Code, Section 11B-404.2.7.
1. Panic hardware: locate between 36 inches to 44 inches above the finished floor.
- C. Handles, pull, latches, locks, other operable parts:

1. Readily operable from egress side with one hand and without tight grasping, tight pinching, or twisting of the wrist to operate. 2016 California Building Code Section 11B-309.4.
 2. Force required to activate the operable parts: 5.0 pounds maximum, per 2016 California Building Code Section 11B-309.4.
- D. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2016 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
1. Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.
- E. Low-energy powered doors: comply with ANSI/BHMA A156.19. Reference: 2016 California Building Code Section 11B-404.2.9, Exception 2.
1. Where powered door serves an occupancy of 150 or more, provide back-up battery power or stand-by generator power, capable of supporting a minimum of 150 cycles.
 2. Actuators, vertical bar type: minimum 2-inches wide, 30-inches high, bottom located minimum 5-inches above floor or ground, top located minimum 35-inches above floor or ground. Displays International Symbol of Accessibility, per 2016 California Building Code Section 11B-703.7.
 3. Actuators, plate type: use two at each side of the opening. Minimum 4-inches diameter or 4-inches square. Displays International Symbol of Accessibility, per 2016 California Building Code Section 11B-703.7. Locate centerline of lower plate between 7- and 8-inches above floor or ground, and upper plate between 30- and 44-inches above floor or ground.
 4. Actuator location: conspicuously located, clear and level floor/ground space for forward or parallel approach.
- F. Door closing speed shall be as follows: CBC 11B-404.2.8
1. Closer shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum
 2. Spring hinges shall be adjusted so that the required time to move a door from an open position of 70 degrees to the closed position is 1.5 seconds minimum
- G. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2016 California Building Code Section 11B-404.2.10.
1. Applied kickplates and armor plates: bevel the left and right edges; free of sharp or abrasive edges.
 2. Tempered glass doors without stiles: bottom rail may be less than 10 inches if top leading edge is tapered 60 degrees minimum.

- H. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2016 California Building Code Section 11B-404.2.3.
 - 2. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24 inches in depth, may have the clear opening width reduced to 20 inches. Example: shallow closets.
 - 3. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2016 California Building Code 11B-307.4.
- I. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway, per 2016 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). 2016 California Building Code Section 11B-303.2 & ~.3.
- J. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).
- K. Pairs of doors with independently-activated hardware both leaves: limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2016 California Building Code Section 11B-703.4.2.1
- L. Door and door hardware encroachment: when door is swung fully-open into means-of-egress path, the door may not encroach/project more than 7 inches into the required exit width, with the exception of door release hardware such as lockset levers or panic hardware. These hardware items must be located no less than 34-inches and no more than 48-inches above the floor/ground. 2016 California Building Code, Section 1005.7.1.
 - 4. In I-2 occupancies, latch release hardware is not permitted to project in the required exit width, regardless of its mounting height, per 2016 California Building Code, Section 1005.7.1 at Exception 1.
- L. Hardware (including panic hardware) shall not be provided with "night latch" (NL) function for any accessible doors or gates unless the following conditions are met per DSA interpretation 10-08 DSA/AC (external), revised 4/28/09. Such conditions must be clearly demonstrated and indicated in the specifications:
 - 1. Such hardware has dogging feature
 - 2. It is dogged during the time the facility is open
 - 3. Such dogging operation is performed only by employees as their job function (non-public use)

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: these will be considered; submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE ALTERNATE:
Hinges	(IVE) Ives	Bommer
Continuous Hinges	(IVE) Ives	Pemko
Key System	(MED) Medico	Owner standard
Mechanical Locks	(SCH) Schlage	Owner standard
Electronic Locks	(SCE) Schlage Electronics	Owner standard
Exit Devices	(VON) Von Duprin	Owner standard
Closers	(LCN) LCN	Owner standard
Auto Flush Bolts	(IVE) Ives	DCI
Coordinators	(IVE) Ives	DCI
Silencers	(IVE) Ives	Rockwood, Trimco
Push & Pull Plates	(IVE) Ives	Rockwood, Trimco
Kickplates	(IVE) Ives	Rockwood, Trimco
Stops & Holders	(IVE) Ives	Rockwood, Trimco
Overhead Stops	(GLY) Glynn-Johnson	ABH
Thresholds	(ZER)Zero	NGP, Reese
Seals & Bottoms	(ZER)Zero	NGP, Reese
Key Cabinets	(LUN) Lund	TelKee
Aluminum Door Locks	(ADA) Adams Rite	None

2.2 HINGING METHODS:

A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.

B. Doors 3'6" or wider use 5" X 41/2" heavy weight hinges

- C. Doors 8'0" use 4 hinges and add 1 hinge for every foot thereafter
- D. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.
- E. Conventional Hinges: Steel or stainless steel pins and approved bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.
 - 1. Outswinging exterior doors: stainless steel hinges with non-removable (NRP) pins and security studs.
 - 2. Stainless steel material exteriors and at doors subject to corrosive atmospheric conditions.
- F. Continuous Hinges:
 - 1. Geared-type aluminum.
 - a) Use wide-throw units where needed for maximum degree of swing, advise architect if commonly available hinges are insufficient.
 - b) If units are used at storefront openings, color-coordinate hinge finish with storefront color. Custom anodizing and custom powdercoat finishes subject to Architect approval.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS:

- A. Mortise Locksets and Latchsets: as scheduled.
 - 1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 - 2. Universal lock case – 10 functions in one case.
 - 3. Floating mounting tabs automatically adjusts to fit a beveled door edge.
 - 4. Latchbolts: 0.75 inch throw stainless steel anti-friction type.
 - 5. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
 - a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
 - b) Inside lever applied by screwless shank mounting – no exposed trim mount screws.
 - c) Levers rotate up or down for ease of use.
 - d) Vandalgard locks: Use on exterior Locked lever freely rotates down while remaining securely locked. This feature prevents damage to internal lock components when subjected to excessive force.
 - 6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
 - 7. Turnpieces: accessible offset turn-lever design not requiring pinching or twisting motions to operate.
 - 8. Deadbolts: stainless steel 1-inch throw.
 - 9. Electric operation: Manufacturer-installed continuous duty solenoid.
 - 10. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

11. Scheduled Lock Series and Design: Schlage L series, Design to be determined
12. Certifications:
 - a) ANSI A156.13, 1994, Grade 1 Operational,
 - b) ANSI/ASTM F476-84 Grade 31 UL Listed.
13. Accessibility: Require not more than 5 lb to retract the latchbolt or deadbolt, or both, per CBC 2016 11B-404.2.7 and 11B-309.4.

2.4 EXIT DEVICES / PANIC HARDWARE

A. General features:

1. Independent lab-tested 1,000,000 cycles.
2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
3. Deadlocking latchbolts, 0.75 inch projection.
4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
5. No exposed screws to show through glass doors.
6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-pound maximum operating force per UBC Standard 10-4, and with 32-pound maximum pressure under 250-pound load to the door.
8. Lever design to match locksets
9. Accessibility: Require not more than 5 lb to retract the latchbolt, per CBC 2016 11B-404.2.7 and 11B-309.4.
 - a) Mechanical method: where touchpad directly retracts the latchbolt with 5 lb or less of force.
 - b) Electrical method: where lightly pressing the touchpad with 5 lb or less of force closes an electric switch, activating quiet electric latch retraction.

B. Specific features:

1. Non-Fire Rated Devices: cylinder dogging.
2. Lever Trim: breakaway type, forged brass or bronze escutcheon min. 0.130 inch thickness, compression spring drive, match lockset lever design.
3. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware". Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.
4. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.
5. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

2.6 CLOSERS

A. Surface Closers: 4040-XP

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2016 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
 - a) Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leaves or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid, will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.

2.7 OTHER HARDWARE

- A. Automatic Flush Bolts: Low operating force design.
- B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
- D. Door Stops: Provide stops to protect walls, casework or other hardware.
 1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
 2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.
- E. Automatic door bottoms: low operating force units.
 1. Include automatic type door bottoms, as opposed to fixed sweeps, at stairs and elevator lobbies to allow fine-tuning of pressurization systems.
- F. Thresholds: As scheduled and per details. Comply with CBC 2016 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.

2. Saddle thresholds: 0.125 inches minimum thickness.
 3. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Minimum 0.25 inch diameter fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors. National Guard Products' "COMBO" or Pemko Manufacturing's "FHSL".
 4. Fire-rated openings, 90-minutes or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, include a 0.25in high 5in wide saddle in the bid, and request direction from Architect.
 5. Fire-rated openings, 3-hour duration: Thresholds, where scheduled, to extend full jamb depth.
 6. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.
 7. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
 8. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- G. Through-bolts: Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.
1. Exception: surface-mounted overhead stops, holders, and friction stays.
- H. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Leave no unfilled/uncovered pre-punched silencer holes. Intent: door bears against silencers, seals make minimal contact with minimal compression – only enough to effect a seal. Provide where seals are not used
- I. Wall- & Floor-mounted electromagnetic door holders: LCN's SEM series or approved equivalent. Incorporate into U.L. listed fire & life-safety system, doors release to allow closure and latching when door's zone is in alarm state. Use minimum projection required to allow door to open as widely as allowed by wall conditions and projection of door hardware.

2.8 FINISH:

1. Generally: BHMA 626 Satin Chromium Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.
- J. Door closers: factory powder coated to match other hardware, unless otherwise noted.

2.9 KEYING REQUIREMENTS:

- A. KEYING REQUIREMENTS:

- B. Existing Medico M3 grand master key system. Contractor to coordinate with campus locksmith to determine keying requirements
- C. Contractor to provide temporary cylinders for all locks during construction
- D. Contractor to install permanent cylinders

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS:

- A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION:

- A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.
- B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 - 1. Notify Architect of code conflicts before ordering material.
 - 1. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 11B-404.2.7.
 - 2. Locate panic hardware between 36 inches to 44 inches above the finished floor.
 - 3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

3.3 INSTALLATION

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.
 - 1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
 - 2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
 - 3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.

4. Replace fasteners damaged by power-driven tools.
- B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.
- C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.
- D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.
- E. Drill pilot holes for fasteners in wood doors and/or frames.
- F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

3.4. ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
 1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.
 2. Adjust doors to fully latch with no more than 1 pound of pressure.
 - a) Door closer valves: turn valves clockwise until at bottom – do not force. Turn valves back out one and one-half turns and begin adjustment process from that point. Do not force valves beyond three full turns counterclockwise.
 3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
 4. Adjust door closers per 1.9 this section.
- B. Inspection of fire door assemblies and means-of-egress panic-hardware doors: Per 2016 NFPA-80 5.2.1: hire an independent third-party inspection service to prepare a report listing these doors, and include a statement that there are zero deficiencies with the fire-rated assemblies and the openings with panic hardware. Certification, Testing and Quality Control shall be in accordance with Division 01 45 23 Testing and Inspection services. All doors hardware and installation will be inspected by a third party selected by the architect/owner
 Div 01 45 23:
 1. Per 2016 NFPA-80 5.2.1: Use a third party inspector not associated with the construction, supply or installation of this project to develop a field survey of the doors and hardware. Survey is to be done by a member certified as a FDAI (Fire Door Assembly Inspector), Certified AHC (Architectural Hardware Consultant) or a certified testing laboratory: UL or Intertek. Certified Inspectors may be found at DHI.org, Intertek, or CAFDI.org.
- C. Fire-rated doors:
 1. Wood doors: adjust to 0.125 inches clearance at heads, jambs, and meeting stiles.
 2. Steel doors: adjust to 0.063 inches minimum to 0.188 inches maximum clearance at heads, jambs, and meeting stiles.

3. Adjust wood and steel doors to 0.75 inches maximum clearance (undercut) above threshold or finish floor material under door.
- D. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:
1. Has re-adjusted hardware.
 2. Has evaluated maintenance procedures and recommend changes or additions, and instructed Owner's personnel.
 3. Has identified items that have deteriorated or failed.
 4. Has submitted written report identifying problems.

3.5 DEMONSTRATION:

- A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

- A. See door schedule in drawings for hardware set assignments.

HW SET: 002

1	EA	CONTINUOUS HINGE	224XY	628	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8300 4" X 16"	630	IVE
1	EA	CLOSER	4041-DA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 010

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE	L9010 06A	626	SCH
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

HW SET: 022

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY W/INDICATOR	L9440-L583-363-L283-722 06A	626	SCH
1	EA	CLOSER	4041-DA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED		B/O

HW SET: 022.1

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY W/INDICATOR	L9440-L583-363-L283-722 06A	626	SCH
1	EA	CLOSER	4041-DA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE

HW SET: 030

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050L L583-363 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

HW SET: 030.5

3	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050L L583-363 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

HW SET: 032

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050L L583-363 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 033

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	L9050L L583-363 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

HW SET: 050

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 052

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 072

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

PROVIDE 2 PUSHBUTTONS AT DOOR J202B. PUSHBUTTON ON EXTERIOR SIDE TO BE USED AS A BUZZER. ON THE INTERIOR SIDE IS FOR EMERGENCY LOCKDOWN

HW SET: 072.1

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE

1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE

CARD READER AND WIRING BY OTHERS

HW SET: 072.2

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 072.3

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRONIC LOCK	AD-300-MD-40-MS-RHO-JD	626	SCE
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

HW SET: 072.5

1	EA	ELECTRIC HINGE	3CB1HW 5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 073

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 073.1

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 073.5

1	EA	ELECTRIC HINGE	3CB1HW 5 X 4 TW8-CON	652	IVE
3	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 092

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE

3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 092.1

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 122

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	PRIVACY W/INDICATOR	L9440-L583-363-L283-722 06A	626	SCH
1	EA	CLOSER	4041-DA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED		B/O

HW SET: 153

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER

HW SET: 172.1

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN

1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE

CARD READER AND WIRING BY OTHERS

HW SET: 172.2

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
2	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
2	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 183.1

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	EXIT DEVICE	AX-98-L-NL-F-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR BOTTOM	369AA WD	CL	ZER

HW SET: 193

3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-F-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 251

6	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
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1	SET	CONST LATCHING BOLT	FB51/61 AS REQ'D	626	IVE
1	EA	DUST PROOF STRIKE	DP1/2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
2	EA	OVERHEAD HOLDER	90H	630	GLY
1	EA	ASTRAGAL	44STST X 188	600	ZER
2	EA	SILENCER	SR64	GRY	IVE

HW SET: 253

6	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB51/61 AS REQ'D	626	IVE
1	EA	DUST PROOF STRIKE	DP1/2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	COORDINATOR	COR2-COMPLETE	628	IVE
2	EA	CLOSER	4040XP S-CUSH	689	LCN
2	EA	KICK PLATE	8400 12" X 1" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	ASTRAGAL	44STST X 188	600	ZER

HW SET: 351.5

8	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB51/61 AS REQ'D	626	IVE
1	EA	DUST PROOF STRIKE	DP1/2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
2	EA	CLOSER	4040XP S-CUSH	689	LCN
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	ASTRAGAL	44STST X 188	600	ZER

HW SET: 442

1	EA	CONTINUOUS HINGE	224XY	628	IVE
1	EA	CLASSROOM LOCK	L9070L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	DOOR POSITION SWITCH	7764		SCE

HW SET: 452R

1	EA	CONTINUOUS HINGE	224XY	628	IVE
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1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	DOOR POSITION SWITCH	7764		SCE

HW SET: 453R

1	EA	CONTINUOUS HINGE	224XY	628	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	DOOR POSITION SWITCH	7764		SCE

HW SET: 472

1	EA	CONTINUOUS HINGE	224XY TWP	628	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

CARD READER AND WIRING BY OTHERS

PROVIDE 2 PUSHBUTTONS AT DOOR J130A. PUSHBUTTON ON EXTERIOR SIDE TO BE USED AS A BUZZER. ON THE INTERIOR SIDE IS FOR EMERGENCY LOCKDOWN

HW SET: 472.5

1	EA	CONTINUOUS HINGE	224XY TWP	628	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER

1	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

CARD READER AND WIRING BY OTHERS

HW SET: 472R

1	EA	CONTINUOUS HINGE	224XY TWP	628	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

CARD READER AND WIRING BY OTHERS

PROVIDE 2 PUSHBUTTONS AT DOOR J130A. PUSHBUTTON ON EXTERIOR SIDE TO BE USED AS A BUZZER. ON THE INTERIOR SIDE IS FOR EMERGENCY LOCKDOWN

HW SET: 473R

1	EA	CONTINUOUS HINGE	224XY TWP	628	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

CARD READER AND WIRING BY OTHERS

HW SET: 483R

1	EA	CONTINUOUS HINGE	224XY	628	IVE
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-F-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE

1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	DOOR POSITION SWITCH	7764		SCE

HW SET: 492

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS18S	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

CARD READER AND WIRING BY OTHERS

METHOD OF OPERATION: OUTSIDE OPERATION. DOOR CAN BE OPENED WITH THE CARD READER FOR ENTRY. CARD READER CAN BE TOGGLED TO KEEP THE DOOR OPEN TO BE USED AS A PUSH PULL. DOORS CAN ALSO BE LEFT OPEN USING AN OPTIONAL TIMER BOARD IN THE POWER SUPPLY. MECHANICAL KEY OVERRIDE IS FOR EMERGENCY ENTRANCE ONLY. INSIDE OPERATION. WHEN PANIC BAR IS PUSHED SLIGHTLY THE ELECTRONICS WILL RETRACT THE LATCHBOLT. INSIDE EGRESS IS ALWAYS FREE
ONE SIDE OF RX-2 SWITCH USED WHEN TOUCHBAR IS DEPRESSED IT ELECTRONICALLY RETRACTS LATCHBOLT TO MEET 5LBS RELEASING FORCE REQUIRED BY CODE

PROVIDE 2 PUSHBUTTONS AT DOOR J120B. PUSHBUTTON ON EXTERIOR SIDE TO BE USED AS A BUZZER. ON THE INTERIOR SIDE IS FOR EMERGENCY LOCKDOWN

HW SET: 498

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	AUTO. OPERATOR	9540 SERIES	628	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	FLOOR STOP	FS18S	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	AUTO DOOR BOTTOM	355A	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
2	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	POWER SUPPLY	PS906-2-AO X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

1 EA DOOR POSITION SWITCH 7764

SCE

CARD READER AND WIRING BY OTHERS

METHOD OF OPERATION: OUTSIDE OPERATION. DOOR CAN BE OPENED WITH THE CARD READER FOR ENTRY. CARD READER CAN BE TOGGLED TO KEEP THE DOOR OPEN TO BE USED AS A PUSH PULL. DOORS CAN ALSO BE LEFT OPEN USING AN OPTIONAL TIMER BOARD IN THE POWER SUPPLY. MECHANICAL KEY OVERRIDE IS FOR EMERGENCY ENTRANCE ONLY. INSIDE OPERATION. WHEN PANIC BAR IS PUSHED SLIGHTLY THE ELECTRONICS WILL RETRACT THE LATCHBOLT. INSIDE EGRESS IS ALWAYS FREE
ONE SIDE OF RX-2 SWITCH USED WHEN TOUCHBAR IS DEPRESSED IT ELECTRONICALLY RETRACTS LATCHBOLT TO MEET 5LBS RELEASING FORCE REQUIRED BY CODE

PROVIDE 2 PUSHBUTTONS AT DOOR J120B. PUSHBUTTON ON EXTERIOR SIDE TO BE USED AS A BUZZER. ON THE INTERIOR SIDE IS FOR EMERGENCY LOCKDOWN

HW SET: 552

2	EA	CONTINUOUS HINGE	224XY	628	IVE
1	SET	CONST LATCHING BOLT	FB51/61 AS REQ'D	626	IVE
1	EA	DUST PROOF STRIKE	DP1/2 AS REQ'D	626	IVE
1	EA	STOREROOM LOCK	L9080L 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	COORDINATOR	COR2-COMPLETE	628	IVE
2	EA	CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 12" X 1" LDW	630	IVE
2	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
2	EA	DOOR SWEEP	339AA	AL	ZER
1	EA	ASTRAGAL	44STST X 188	600	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
2	EA	DOOR POSITION SWITCH	7764		SCE

HW SET: 572

1	EA	CONTINUOUS HINGE	224XY	628	IVE
1	EA	CONTINUOUS HINGE	224XY TWP	628	IVE
1	SET	CONST LATCHING BOLT	FB51/61 AS REQ'D	626	IVE
1	EA	DUST PROOF STRIKE	DP1/2 AS REQ'D	626	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	COORDINATOR	COR2-COMPLETE	628	IVE
2	EA	CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 12" X 1" LDW	630	IVE
2	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
2	EA	DOOR SWEEP	339AA	AL	ZER
1	EA	ASTRAGAL	44STST X 188	600	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE

2	EA	DOOR POSITION SWITCH	7764		SCE
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HW SET: 592R

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	KR9954	689	VON
1	SET	MULLION SEAL	8780	CHA	ZER
2	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-F-PA-996L-06	626	VON
2	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	IC MORT CYL	M3 LFIC FOR MULLION	626	MED
2	EA	CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
2	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
2	EA	AUTO DOOR BOTTOM	355A HM	AL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS906-2 X 900-4RL FA		SCE
2	EA	PUSHBUTTON	621AL	630	SCE
2	EA	DOOR POSITION SWITCH	7764		SCE

PUSHBUTTON ON EXTERIOR SIDE TO BE USED AS A BUZZER. ON THE INTERIOR SIDE IS FOR EMERGENCY LOCKDOWN

HW SET: 925

1	EA	ELECTRIC HINGE	3CB1 4.5 X 4 TW8-CON	652	IVE
3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	DUTCH DOOR BOLT	55	626	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

CARD READER AND WIRING BY OTHERS

HW SET: 926

4	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	DUTCH DOOR BOLT	55	626	IVE
1	EA	OFFICE LOCK	L9050L L583-363 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE

1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 947

ALL HARDWARE BY DOOR MANUFACTURER B/O

HW SET: 960

ALL HARDWARE BY ROLL UP DOOR MANUFACTURER B/O

HW SET: 962

ALL HARDWARE BY DIRTT MANUFACTURER B/O

HW SET: 963

2	EA	MORTISE CYLINDER	M3 LFIC	626	MED
			BALANCE OF HARDWARE BY DOOR MANUFACTURER		B/O

HW SET: 964

ALL HARDWARE BY POCKET DOOR MANUFACTURER B/O

HW SET: 965

1	EA	DOOR LOOP KIT	4840-459	689	LCN
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	KICK PLATE	8400 12" X 2" LDW	630	IVE
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE

ALL ELECTRONICS MUST BE WEATHER SEALED

HW SET: 966

1	EA	DOOR LOOP KIT	4840-459	689	LCN
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
			BALANCE OF HARDWARE BY GATE MANUFACTURER		B/O
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE

HW SET: 967

1	EA	EXIT DEVICE	AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED

BALANCE OF HARDWARE BY GATE MANUFACTURER
ALL ELECTRONICS MUST BE WEATHER SEALED

HW SET: 973

ALL HARDWARE BY GATE MANUFACTURER B/O

HW SET: 974

2	EA	EXIT DEVICE	AX-98-L-NL-PA-996L-06	626	VON
2	EA	IC RIM CYLINDER	M3 LFIC	626	MED

BALANCE OF HARDWARE BY GATE MANUFACTURER B/O

GATE MUST HAVE CENTER POST FOR PANICS TO LATCH

HW SET: A072.1

1	EA	CONTINUOUS HINGE	224XY TWP	628	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A073

1	EA	CONTINUOUS HINGE	224XY TWP	628	IVE
1	EA	ELECTRIC LOCK	L9092L-RX 06A	626	SCH
1	EA	MORTISE CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	POWER SUPPLY	PS902 X 900-4RL		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A082

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
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1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
DOORS MUST BE WIDE STILE TO MOUNT PANIC HARDWARE

HW SET: A092

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A093

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A292.5

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	5654	628	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-BE-PA-996L-06	626	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-PA-996L-06	626	VON

1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
2	EA	CLOSER	4040XP	689	LCN
2	EA	MOUNTING PLATE	4040-18	689	LCN
2	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	EA	POWER SUPPLY	PS906-2 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A392

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	KR9954	689	VON
2	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-L-NL-F-PA-996L-06	626	VON
2	EA	IC RIM CYLINDER	M3 LFIC	626	MED
2	EA	CLOSER	4040XP	689	LCN
2	EA	MOUNTING PLATE	4040-18	689	LCN
2	EA	DOME STOP	FS436/438 AS REQ'D	626	IVE
1	EA	POWER SUPPLY	PS906-2 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A398.1

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	KR9954	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-EO-F	626	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP-F	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
2	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	AUTO. OPERATOR	9550 SERIES	628	LCN
2	EA	FLOOR STOP	FS18S	626	IVE
2	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	BATTERY BACKUP BOARD	900-BB		SCE
1	EA	POWER SUPPLY	PS906-2-AO X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A492

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
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DOOR HARDWARE
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Johnson Student Center
07/30/18

1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A493

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS906 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A498.1

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	AUTO. OPERATOR	9540 SERIES	628	LCN
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	INGRESSR BOLLARD	BPS SM-1NG 54	630	WIK
1	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	BATTERY BACKUP BOARD	900-BB		SCE
1	EA	POWER SUPPLY	PS906-AO X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE

1	EA	DOOR POSITION SWITCH	7764		SCE
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SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A498.5

1	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
1	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	AUTO. OPERATOR	9540 SERIES	628	LCN
1	EA	FLOOR STOP	FS441/442 AS REQUIRED	626	IVE
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	INGRESSR BOLLARD	BPS SM-1NG 54	630	WIK
1	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	BATTERY BACKUP BOARD	900-BB		SCE
1	EA	POWER SUPPLY	PS906-AO X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
1	EA	DOOR POSITION SWITCH	7764		SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A593

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	5654	628	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-EO	626	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
2	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
2	EA	CLOSER	4040XP S-CUSH	689	LCN
2	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	POWER SUPPLY	PS906-2 X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
2	EA	DOOR POSITION SWITCH	7764		SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A598

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	5654	628	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-EO	626	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
2	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	AUTO. OPERATOR	9550 SERIES	628	LCN
2	EA	FLOOR STOP	FS18S	626	IVE
1	EA	THRESHOLD	AS DETAILED	AL	ZER
1	EA	INGRESSR BOLLARD	BPS SM-1NG 54	630	WIK
1	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	BATTERY BACKUP BOARD	900-BB		SCE
1	EA	POWER SUPPLY	PS906-2-AO X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
2	EA	DOOR POSITION SWITCH	7764		SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A598.1

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	5654	628	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-EO	626	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
2	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	AUTO. OPERATOR	9550 SERIES	628	LCN
2	EA	FLOOR STOP	FS18S	626	IVE
1	EA	THRESHOLD	AS DETAILED	AL	ZER
2	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	BATTERY BACKUP BOARD	900-BB		SCE
1	EA	POWER SUPPLY	PS906-2-AO X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
2	EA	DOOR POSITION SWITCH	7764		SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

HW SET: A598R

2	EA	CONTINUOUS HINGE	224XY EPT	628	IVE
2	EA	POWER TRANSFER	EPT-10	689	VON
1	EA	MULLION	KR9954	689	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-EO-F	626	VON
1	EA	ELECTRIC EXIT DEVICE	EL-RX-AX-98-NL/OP-F	626	VON
1	EA	IC RIM CYLINDER	M3 LFIC	626	MED
1	EA	IC MORT CYL	M3 LFIC FOR MULLION	626	MED
2	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	AUTO. OPERATOR	9550 SERIES	628	LCN
2	EA	FLOOR STOP	FS18S	626	IVE
1	EA	THRESHOLD	AS DETAILED	AL	ZER
2	EA	FULL LENGTH ACTUATOR	8310-836T	630	LCN
1	EA	BATTERY BACKUP BOARD	900-BB		SCE
1	EA	POWER SUPPLY	PS906-2-AO X 900-4RL FA		SCE
1	EA	PUSHBUTTON	621AL	630	SCE
2	EA	DOOR POSITION SWITCH	7764		SCE

SEALS AND SWEEPS BY DOOR MANUFACTURER
CARD READER AND WIRING BY OTHERS

END OF SECTION

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. This 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. Windows.
 - 2. Doors.
 - 3. Glazed curtain walls.
 - 4. Glazed entrances.
 - 5. Storefront framing.
 - 6. Translucent film.

- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 8 Section "Fire-Rated Aluminum-Framed Entrances and Storefronts" for fire-rated glass.

1.2 DEFINITIONS

- A. Sealed Insulating Glass Unit Surfaces & Coating Orientation:
 - 1. Surface 1 – Exterior surface of outer pane (surface facing outdoors of outboard lite).
 - 2. Surface 2 – Interior surface of outer pane (surface facing indoors of outboard lite).
 - 3. Surface 3 – Exterior surface of inner pane (surface facing outdoors of inboard lite).
 - 4. Surface 4 – Room side surface of inner pane (surfacing facing indoors of inboard lite).
 - 5. For the electrochromic glass which is laminated insulating glass, there are 6 surfaces (two for each surface of 3 lites of glass) numbered sequentially from one starting from the exterior surface of the outer ply.

- B. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

- C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

- D. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for 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.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300.

1.4 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples: For each glazing products, in the form of 12-inch- square Samples for glass and of 12-inch- long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
 - 1. Insulating glass for each designation indicated.
 - 2. Fire-rated glazing.
- D. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
 - 1. List by windows and door types scheduled on Drawings.
- E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
 - 1. For solar-control low-e-coated glass, provide documentation demonstrating that manufacturer of coated glass is certified by coating manufacturer.
- F. Qualification Data: For installers.
- G. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

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- H. Product Test Reports: For each types of glazing products specified.

1.5 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

- B. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this Project; whose work has resulted in glass installations with a record of successful in-service performance; and 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 glazing products through one source from a single manufacturer for each glass type as practical.

- D. Electrochromic Glass supplier qualifications: An experienced electrochromic manufacturer that has had EC products successfully installed and operating in at least 5 different buildings for at least 5 years.

- E. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

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- F. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- G. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- H. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- I. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- J. Safety Glazing Products: Comply with testing requirements in 2016 CBC, Section 2406 and CPSC 16 CFR 1201.
 - 1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- K. 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. GANA Publications:
 - a. GANA's "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."
- L. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
 - 1. Insulating Glass Certification Council.
 - 2. Associated Laboratories, Inc.
 - 3. For electrochromic glass, the manufacturer must also provide documentation that the IG weathering testing to E2190 was carried out on insulating glass units containing all the

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constituents of the standard EC product including, but not limited to EC coatings and EC device components such as wires and bus bars.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.7 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 liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.8 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.
 - 2. For EC coatings, warranty period: 5 years
- 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.
- C. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Non-Fire-Rated Glass Manufacturers: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Vitro Architectural Glass (formally PPG) (Basis of Design).
 - 2. Oldcastle BuildingEnvelope.

3. Guardian.
4. Pilkington.
5. Visteon.
6. Or equal.

- B. Non-Fire-Rated Glazing Fabricators: Subject to compliance with requirements, provide either the named fabricator or an equal fabricator by one of the other fabricators specified.
1. Viracon. (Basis of Design)
 2. Oldcastle Building Envelope.
 3. Guardian.
 4. Or equal.

2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- B. Heat-Treated Float Glass (Safety Glass): ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, kind, and condition indicated.
1. For uncoated glass, comply with requirements for Condition A.
 2. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 3. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.
 - a. Class II tempered safety glazing per CBC 2406.3 and Table 2406.1.
- C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.
- D. Tinted Insulating-Glass Units: Place reflective coating on No.2 surface within the unit.
1. Product: Solarban 60 by Vitro Architectural Glass (Basis of Design).
 - a. Transmittance:
 - 1) Ultraviolet: 19%.
 - 2) Visible: 35%.
 - 3) Total Solar Energy: 33%.
 - b. Reflectance:
 - 1) Visible Light: 6%.
 - 2) Total Solar Energy: 30%.
 - c. U-Value:
 - 1) Winter Nighttime: 0.29.
 - 2) Summer Daytime: 0.27.
 - d. Shading Coefficient (SC): 0.29.
 - e. Solar Heat Gain Coefficient (SHGC): 0.25.
 - f. Light to Solar Gain (LSG): 1.4.
 - g. Low Emissivity Coating: $e=0.05$.
 2. Overall Unit Thickness: 1 inch.
 3. Outdoor Lite: 1/4 inch, Class 1 (tinted solar gray) HS glass.
 4. Interspace Content: 1/2 inch, Air.
 5. Indoor Lite: 1/4 inch, Class 1 (clear) HS glass.
 6. Tempered glass where required.

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- E. Laminated-Tinted Insulating-Glass Units (Alternate #4): Place low-e reflective coating on No.4 surface within the unit.
 - 1. Product: Solarban 60 by Vitro Architectural Glass (Basis of Design).
 - a. Transmittance:
 - 1) Ultraviolet: 0%.
 - 2) Visible: 39%.
 - 3) Total Solar Energy: 18%.
 - b. Reflectance:
 - 1) Visible Light: 7%.
 - 2) Total Solar Energy: 10%.
 - c. U-Value:
 - 1) Winter Nighttime: 0.29.
 - 2) Summer Daytime: 0.27.
 - d. Shading Coefficient (SC): 0.30.
 - e. Solar Heat Gain Coefficient (SHGC): 0.26.
 - f. Light to Solar Gain (LSG): 1.5.
 - g. Low Emissivity Coating: e=0.05.
 - 2. Overall Unit Thickness: 1-1/8 inch.
 - 3. Outdoor Lite:
 - a. 3/16 inch, Class 1 (tinted solar gray) HS glass.
 - b. Clear laminate: 0.030 inch PVB interlayer.
 - c. 3/16 inch, Class 1 (clear) HS glass.
 - 4. Interspace Content: 1/2 inch, Air.
 - 5. Indoor Lite: 1/4 inch, Class 1 (clear) HS glass.

2.3 FIRE-RATED GLAZING PRODUCTS

- A. Comply with fire-rated glazing specified in Division 8 Section "Fire-Rated Aluminum-Framed Entrances and Storefronts".
- B. Wire glass is not acceptable.

2.4 TRANSLUCENT FILM

- A. Product: Crystal - dusted white-7725se-314 by 3M or equal.
 - 1. Self-adhered translucent polyester film, 3.2 mil thickness.

2.5 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of material complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - 1. Silicone complying with ASTM C 1115.

2.6 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:

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1. **Compatibility:** Select 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.
- B. **Elastomeric Glazing 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.
- C. **Glazing Sealants for Fire-Resistive Glazing Products:** Identical to products used in test assemblies to obtain fire-protection rating.

2.7 GLAZING TAPES

- A. **Back-Bedding Mastic Glazing Tapes:** Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800.
- B. **Expanded Cellular Glazing Tapes:** Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive.

2.8 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.
 1. Silicone complying with ASTM C 1115.
- D. **Spacers:** Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 1. Silicone complying with ASTM C 1115.
- E. **Edge Blocks:** Elastomeric material of hardness needed to limit glass lateral movement (side walking).
 1. Silicone complying with ASTM C 1115.

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- 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.
 - 1. Silicone complying with ASTM C 1115.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to glaze 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. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing glazing, 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 system.
 - 3. Minimum required face or 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.

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. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- 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

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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 sealant-substrate 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 as follows:
 - 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.

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 just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant where indicated.
- 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. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. 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.
- D. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.8 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, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended 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.

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- 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 Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 088754 – VANDAL RESISTANT FILM

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes vandal resistant film applied to the following surfaces:
 - 1. Windows.
 - 2. Mirrors.

1.2 SUBMITTALS

- A. Product Data: For each vandal resistant film material indicated.
- B. Samples: For vandal resistant film, in the form of 12-inch-square sample and sample film applied to glass 12-inch square.
- C. Product Test Reports: For each types of glazing products specified.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.

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19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect film materials according to manufacturer's written instructions and as needed to prevent damage to film materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.5 WARRANTY

- A. Manufacturer's Special Warranty for vandal resistant film products:
 1. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Vandal Resistant Film:
 1. Graffiti Removal Inc. (Basis of Design)
 - a. Box 2991, La Habra, CA. 90632.
 2. Or equal.

2.2 VANDAL RESISTANT FILM

- A. Product: Vandal Shield® by Graffiti Removal Inc.
- B. Description: Optically clear, distortion-free sacrificial film, which when applied to glass, provides a significant resistance to etching and scratching of the underlying surface.
- C. Construction: Multi-layered, 6-mil laminate of polyester film. The 6-mil patented safety film product utilizes multi-layers of plastic films laminated together and a special mounting adhesive.
 1. Facestock: Optically clear 150 μ multi-ply polyester film with scratch resistant coating offering excellent dimensional stability and chemical resistance.
 2. Adhesive: Pressure-sensitive acrylic adhesive which is strong, water clear and offers long term clean removability from glass.
 3. Release liner: A 25 μ clear silicone coated polyester liner designed to ensure adhesive smoothness.
- D. Application: If vandalized, the film can be peeled back and removed to eliminate the unsightly look of etched-in graffiti. A new piece of film can simply be reapplied for continued protection.

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PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean glazing surfaces receiving vandal resistant film per manufacturer's written instructions.

3.2 VANDAL RESISTANT FILM INSTALLATION

- A. Install vandal resistant film per manufacturer's written instructions.

END OF SECTION 088754

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SECTION 092116 - GYPSUM BOARD SHAFT-WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gypsum board shaft-wall assemblies for the following:
 - 1. Shaft-wall enclosures.
 - 2. Stair enclosures.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board shaft-wall assemblies.
 - 3. Division 9 Section "Non-Load-Bearing Steel Framing for framing requirements.
 - 4. Division 9 Section "Gypsum Board" for gypsum board requirements.

1.2 SUBMITTALS

- A. Product Data: For each gypsum board shaft-wall assembly indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 Low-Emitting Materials - Adhesive and Sealants: Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).

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4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.
- C. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures for installing gypsum board shaft-wall assemblies including, but not limited to, the following:
1. Fasteners proposed for anchoring nonstructural steel framing to building structure.
 2. Sprayed fire-resistive materials applied to structural steel framing.
 3. Elevator equipment, including hoistway doors, elevator call buttons, and elevator floor indicators.
 4. Wiring devices in shaft-wall assemblies.
 5. Doors and other items penetrating shaft-wall assemblies.
 6. Items supported by shaft-wall-assembly framing.
 7. Mechanical work enclosed within shaft-wall assemblies.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.
- B. 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.

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- C. Stack panels flat on leveled supports off floor or slab to prevent sagging.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with 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, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of gypsum shaft-wall assemblies that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Shaftwall System: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. United States Gypsum Company. (Basis of Design)
 - 2. National Gypsum Company.
 - 3. Georgia Pacific.
 - 4. Or equal.

2.2 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

- A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
 - 1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
 - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.
 - 3. All components shall be from one manufacturer for unit responsibility and constructed in accordance with UL Design

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2.3 GYPSUM BOARD SHAFT-WALL ASSEMBLY

- A. Fire-Resistance Rating: As indicated.
- B. STC Rating: As indicated.
- C. Studs: USG C-H or E-studs. Flanges holding 1" liner panel to be continuous. No Tab systems. Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Depth: As indicated.
 - 2. Minimum Base-Metal Thickness: As indicated.
- D. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in depth matching studs.
 - 1. Minimum Base-Metal Thickness: As indicated and not less than 24 gauge.
- E. Firestop Tracks: Top runner system to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; Supply UL HW-D design specifically tested for shaftwall construction and the installed shaftwall system. Thickness not less than indicated for studs and in width to accommodate depth of studs.
- F. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0329 inch thick. USG Jamb Strut or equal.
- G. UL Assembly: UL 415.
- H. ER Reports: Comply with each manufacturer's tested assembly.
 - 1. National Gypsum: ICBO ER-3579.
 - 2. US Gypsum: NER-258.
- I. Room-Side Finish: As indicated.
- J. Shaft-Side Finish: As indicated.
- K. Gypsum Liner Panels: Comply with ASTM C 442.
 - 1. Type X: Manufacturer's proprietary liner panels with moisture-resistant paper faces.
 - a. Core: 1 inch thick.
 - b. Long Edges: Double bevel.
 - c. Products
 - 1) National Gypsum, Fire-Shield Shaftliner.
 - 2) USG Shaftwall Liner, UL labeled "SLX".
 - 3) Or equal.
 - d. Recycled Content: Gypsum wallboard face paper shall be no less than 100 percent recycled content.
 - e. Regional Content: Gypsum wallboard shall be manufactured within 500 miles of the jobsite. Gypsum materials shall be extracted within 500 miles of the jobsite.
- L. Gypsum Board: As specified in Division 9 Section "Gypsum Board." Use proper thickness and core as indicated in UL Fire test description

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2.4 NON-LOAD-BEARING STEEL FRAMING

- A. As specified in Division 9 Section "Non-Load-Bearing Steel Framing".

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 9 Section "Gypsum Board" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- C. Gypsum Board Joint-Treatment Materials: As specified in Division 9 Section "Gypsum Board."
- D. Laminating Adhesive: Adhesive or joint compound recommended by manufacturer for directly adhering gypsum face-layer panels to backing-layer panels in multilayer construction.
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).
- E. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- F. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- H. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

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- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 - 1. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
 - 2. Division 9 Section "Gypsum Board" for applying and finishing panels.
- B. Do not bridge architectural or building expansion joints with shaft-wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
 - 1. At elevator hoistway entrance door frames, provide jamb struts on each side of door frame.
 - 2. Where handrails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch minimum thickness of base (uncoated) metal, accurately positioned and secured behind at least 1 gypsum board face-layer panel.
- D. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.
- E. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, and similar items.
- F. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- G. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- H. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect, while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.
- I. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with manufacturer's written instructions, whichever are more stringent.
- J. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 4 inches of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2- or

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5/8-inch- thick, gypsum board cants covering tops of projections. No recesses allowed (at steel beams especially).

1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft-wall framing.
2. Where steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft-wall framing.

K. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 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, or mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and 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 092116

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SECTION 092216 - NON-LOAD-BEARING STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes non-load-bearing steel framing members for the following applications:
 - 1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
 - 2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.

1.2 SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Deflection track: List location of use.
- D. Certification of Materials: For steel framing materials.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).

5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, 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.
- D. Construction Standards: Construction not on Drawings or referenced shall be as detailed in Technical Library by SSMA Technical Services.
- E. Deflection Limits: Maximum deflection of following at 5 psf.
1. Gypsum board assemblies: L/240.
 2. Ceramic tile: L/360.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of non-load bearing steel framing that fails in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Non-Load-Bearing Steel Framing: Subject to compliance with requirements, provide products by one of the following manufacturers.
1. California Expanded Metal Products Company (CEMCO).
 2. Clark Steel Framing Systems.
 3. Consolidated Systems, Inc.
 4. Dale/Incor.
 5. Dietrich Industries, Inc.
 6. Unimast, Inc.
 7. Western Metal Lath & Steel Framing Systems.
 8. Or equal.

2.2 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 2. Protective Coating: ASTM A 653, G40, hot-dip galvanized zinc coating, unless otherwise indicated.

2.3 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, 18 gage minimum.
- B. Wire Hangers: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106 inch (12 gage) diameter.
- C. Hanger Attachments to Concrete:
1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (16 gage) and minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings, but not less than 1-1/2 inch.

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- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Depth: As indicated on Drawings.
 - 2. Minimum Base Metal Thickness: As indicated on Drawings, but not less than 0.0296 thick (20 gage).

- F. Resilient Furring Channels: 1/2-inch deep members designed to reduce sound transmission.
 - 1. Leg Configuration: As indicated on Drawings.
 - 2. Minimum Base Metal Thickness: As indicated on Drawings, but not less than 0.0296 thick (20 gage).

- G. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Contract has the option of using manufactured grid suspension system for ceilings instead of above components.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Drywall Grid Systems by Armstrong World Industries, Inc.
 - b. Drywall Grid System by Chicago Metallic Corporation.
 - c. Drywall Suspension System by USG Corporation.
 - d. Or equal.

2.4 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C 645; of size and properties necessary to comply with ASTM C 754 for the spacing indicated.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings.
 - 2. Depth: As indicated on Drawings

- B. Slip-Type Head Joints:
 - 1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) VertiTrack VTD by Steel Network Inc.
 - 2) Superior Flex Track System (SFT) by Superior Metal Trim.
 - 3) Sliptrack by Dietrich Industries.
 - 4) Or equal.

- C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings, but not less than 0.0179 inch (25 gage).

- D. Cold-Rolled Channel Bridging: 0.0538-inch (16 gage) bare-steel thickness, with minimum 1/2-inch- wide flanges.
 - 1. Depth: As indicated on Drawings.
 - 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

- E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - 1. Depth: As indicated on Drawings.

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2. Minimum Base Metal Thickness: As indicated on Drawings, but not less than 0.0296 thick (20 gage).
- F. Resilient Furring Channels: 1/2-inch deep members designed to reduce sound transmission.
1. Leg Configuration: As indicated on Drawings.
 2. Minimum Base Metal Thickness: As indicated on Drawings, but not less than 0.0296 thick (20 gage).
- G. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness (16 gage), with minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch (20 gage).

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

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 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
1. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 2. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.

- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - 7. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.

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- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 - 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches o.c.
- D. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 092216

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SECTION 092423 - PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
1. Exterior three-coat portland cement plasterwork (stucco) on metal lath system.
 2. Plaster work on concrete or masonry.
 3. Integral colored finish coat.
- B. Related Sections include the following:
1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 2. Division 6 Section "Sheathing" for weather resistive barriers.
 3. Division 7 Section "Building Insulation" for thermal insulations included in portland cement plaster assemblies.
 4. Division 7 Section "Flexible Sheet Flashing" for flashing windows, door, and other openings.
 5. Division 7 Section "Joint Sealants" for acoustical sealants and sealants installed with exterior portland cement plaster (stucco).

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings:
1. Showing details of construction for framing, reinforcement, and trims; including locations where each type material, mix, coating thickness, material sizes and thicknesses, and fastenings will be used.
 2. Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.
 3. Include details of penetration and termination, flashing details, joint locations and configurations, fastening and anchorage details including mechanical fasteners, and connections to other work.

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4. Show locations and extent of weather-barrier (building paper and flashing sheet). Include details for substrate joints and cracks, counterflashing strip, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - a. Include details of interfaces with other materials that form part of weather barrier.
 - b. Include details of mockups.

- D. Coordination Drawings:
 1. Comprehensive, completely integrated set of plans, sections, elevations, and details, drawn to scale, of separate trades work, indicating interface support/connections, and relationships between materials, and products, on which the following items are shown and coordinated with each other, based on input from fabricators and installers of the items involved:
 - a. Framing, including backing, blocking, strapping, and similar accessory/sub-framing materials.
 - b. Sheathing, including building paper.
 - c. Portland cement plaster, including trim and self-adhering flashing sheet.
 - d. Other materials and products that occur in, on, adjacent to, or contiguous with above work.
 2. At a minimum, indicate the following
 - a. Locations/spacing of plaster trim moldings.
 - b. Locations/dimensions of self-adhering flashing sheet (underlying trim moldings).
 - c. Locations/spacings of connections/fastenings of:
 - 1) Sheathing
 - 2) Metal lath.
 - 3) Plaster trim moldings
 - d. Sequence of installation of:
 - 1) Building paper.
 - 2) Flexible flashing.
 - 3) Metal lath, and plaster trim moldings.

- E. Samples for Initial Selection: For each type of factory-prepared finish coat indicated with texture and color.

- F. Samples for Verification: For each type of factory-prepared finish coat indicated; 12 by 12 inches, and prepared on rigid backing with color selected.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.

8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. 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 DSA.
- C. Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Comprehensive, completely integrated mockups of separate trades work, indicating interface connections, transitions, relationships between materials and finishes, and quality of workmanship. Coordinated mockups shall include, but is not limited to, the following:
 - a. Work of this Section.
 - b. Framing, including backing, blocking, strapping, and similar accessory/sub-framing materials.
 - c. Sheathing, including building paper.
 - d. Sealants.
 - e. Penetrations of portland cement plaster assemblies.
 - f. Other materials and finishes that are within indicated area of coordinated mockups, including barrier/backing/support for above work.
 2. Install mockups for each type of finish indicated.
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 4. Use of self-furring lath is subject to satisfactory jobsite demonstration for each project of lath installation, with approval by Inspector of Record.
- D. Preinstallation Conference: Conduct conference at Project site.

1.4 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.

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1.5 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork:
 - 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - 2. Apply plaster when ambient temperature is greater than 40 deg F.
 - 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cement plaster system that fail in materials within specified warranty period. Failure includes, but is not limited to, blistering, peeling, flaking, delaminating, rusting, checking, crazing, fading beyond manufacturer's published limits, or chipping as a result of manufacturing defects.
 - 1. Warranty Period: 3 years.
- B. Special Waterproof Warranty: Submit cement plaster system manufacturer's warranty certifying that work of this Section has been properly applied in strict accordance with system manufacturer's recommended procedures, instructions, and systems current applicable specifications; has been properly integrated into building construction in accordance with sound design and building construction practices; and will remain resistant to water penetration for specified warranty period.
 - 1. Warranty Period: 3 years.
- C. Weather Resistive Barriers: 10 years.
- D. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Finish-Coat Plaster: Subject to compliance with requirements, provide products by one of the following manufacturers.
 - 1. ColorTek by Omega. (Basis of Design)
 - 2. LaHabra Stucco.
 - 3. Merlex.
 - 4. Sto.
 - 5. Or equal.

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- B. Metal Lath: Subject to compliance with requirements, provide products by one of the following manufacturers.
 - 1. Alabama Metal Industries Corporation (AMICO).
 - 2. California Expanded Metal Products Company (CEMCO).
 - 3. Dale/Incor.
 - 4. Unimast, Inc.
 - 5. Clark Western Metal Lath & Steel Framing Systems.
 - 6. Structa Wire Corp.
 - 7. Or equal.

- C. Zinc-Coated (Galvanized) Steel Accessories: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Stockton Products. (Basis of Design)
 - 2. Fry Reglet Corp.
 - 3. Alabama Metal Industries Corporation (AMICO).
 - 4. California Expanded Metal Products Company (CEMCO).
 - 5. Dietrich Industries, Inc.
 - 6. Brand X Metals.
 - 7. Or equal.

- D. Aluminum Trim and Reveals: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Fry Reglet Corp. (Basis of Design)
 - 2. Flannery, Inc.
 - 3. Gordon, Inc.
 - 4. Pittcon Industries.
 - 5. Brand X Metals, Inc.
 - 6. Or equal.

2.2 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653, G60, hot-dip galvanized zinc coating.
 - 1. Diamond-Mesh Lath: Self-furring.
 - a. Weight: 3.4 lb/sq. yd.
 - b. Use: Vertical and horizontal solid support surfaces, such as unit masonry, concrete, or sheathing. Horizontal open framing up to 16 inches on center.
 - 2. Diamond-Mesh Lath: Non-self-furring.
 - a. Weight: 3.4 lb/sq. yd.
 - b. Use: Attached with fastener when enforcing authority prohibit use of self-furring types.
 - 3. 3/8-Inch Rib Lath (High Rib):
 - a. Weight: 3.4 lb/sq. yd.
 - b. Use: Horizontal open framing 24 inches on center.

- B. Wire Lath: ES Report, ESR-2017, ASTM C847 with ASTM A641, Class 1 galvanized coating.
 - 1. Mega Lath: Self-furring.
 - a. Use: Vertical and horizontal solid support surfaces.
 - 2. V Truss Wall & Ceiling Lath : Rib Lath
 - a. Use: Vertical and horizontal open framing.

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2.3 WEATHER-RESISTANT BARRIER

- A. Comply with Division 6 Section "Sheathing".

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.
- B. Zinc-Coated (Galvanized) Steel Accessories: Fabricated from hot-dip galvanized steel sheet, ASTM A 653 G90 zinc coating.
1. Foundation Weep Screed.
 2. Cornerite: Fabricated.
 3. External-Corner Reinforcement.
 4. Cornerbeads.
 - a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
 - b. Small nose cornerbead with perforated flanges; use on curved corners.
 - c. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.
 - d. Bull nose cornerbead, radius 3/4 inch minimum, with expanded flanges; use at locations indicated on Drawings.
 5. Casing Beads: Square-edged style; with expanded flanges.
 6. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 7. Expansion Joints: Folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
 - a. Internal Corners: Double-V, narrow reveal type ("No. 30").
 8. Two-Piece Expansion Joints: Formed to produce slip-joint and square-edged reveal that is adjustable from 1/4-to-5/8-inch wide; with perforated flanges.
 9. Stucco Reglet:
 - a. Product: "ST" Stucco Reglet by Fry Reglet.
 - b. Thickness: 24 gage.
 10. Surface Mounted Reglet:
 - a. Product: "SM" Surface Mount Reglet by Fry Reglet.
 - b. Thickness: 24 gage.
 11. Flashing System:
 - a. Product: Springlok Flashing System by Fry Reglet.
 - b. Thickness: 24 gage.
 12. Continuous Soffit Vents: Perforated screeds, with expanded flanges.
 - a. Product: Model SVR Reveal Screed by Stockton Products.
 - b. Vent Width: As indicated on Drawings.
 13. Termination Screed: J Mold.
 - a. Product: J-B Bead by Stockton Products.
 - b. Size: As indicated on Drawings.
 14. Window /Door Drip: Door Drip Screed.
 - a. Product: WTP Window Termination Point by Stockton Products.
 - b. Size: As indicated on Drawings.
 15. Drip Screed: Stucco Drip Soffit.
 - a. Product: NFD #5 Drip by Stockton Products.

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- b. Size: As indicated on Drawings.
- C. Aluminum Trim and Reveals:
 - 1. Aluminum shall be extruded alloy 6063 T5, with clear anodized finish.
 - a. Size: As indicated on Drawings.

2.5 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Bonding Compound: ASTM C 932.
- C. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.
- D. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063 and CBC Section 2506.
 - 1. Nails, screws, and staples as specified in CBC.
 - 2. Fastener for use with concrete/masonry for attaching lath and screeds/control joints, weeps and other shapes.
 - 3. Masonry Applications: Galvanized steel fasteners of furring type and length suitable for at least 1/2 inch penetration of the brick or block substrate.
 - 4. Steel Stud Applications: Galvanized steel furring nails and or screws, of type and length suitable for at least a 2/3 inch penetration of the steel stud system.
- E. Sheathing: Comply with requirements of Division 6 Section "Rough Carpentry".
- F. Isolation Strip at Exterior Walls: Comply with requirements of Division 7 Section "Flexible Sheet Flashing" for flashing windows, door, and other openings.
- G. Thermal Insulation: Comply with requirements of Division 7 Section "Building Insulation".
- H. Acoustical Sealant for Exposed and Concealed Joints: Comply with requirements of Division 7 Section "Joint Sealants".

2.6 PLASTER MATERIALS

- A. Scratch and Brown Coat:
 - 1. Portland Cement: ASTM C 150, Type I or II.
 - 2. Sand Aggregate: ASTM C 897.
 - 3. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- B. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.
 - 1. Finish Texture:
 - a. Exterior: 20-30 semi-smooth troweled finish acceptable to Architect.

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2. Colorant: Match color of field finish coating specified in Division 9 Section "Painting".

2.7 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
- B. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters, comply with manufacturer's written instructions.

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. Prepare solid-plaster bases that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. Thermal Insulation: As specified in Division 7 Section "Building Insulation".
- C. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
- D. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.4 INSTALLING METAL LATH AND WEATHER-RESISTANT BARRIER INSTALLATION

- A. General: Comply with requirements of Title 24.
 1. Use of self-furring lath is subject to satisfactory jobsite demonstration for each project of lath installation, with approval by Inspector of Record.
- B. Expanded-Metal Lath: Install according to ASTM C 1063.

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1. Lath shall be attached to framing members at spacing of not more than 6 inches o.c., 2 inches maximum from longitudinal edges, in accordance with CBC.
 2. Attach metal lath to masonry 16 inch on centers along the sheet, using 5 nails across the sheet. Securely wire tie side laps or lace between the cross rows per ASTM C1063 Section 7.10.5.
- C. Weather-Resistant Barrier: Install 2 layers over sheathing.
1. WrapShield SA as specified in Division 6 Section "Sheathing".

3.5 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. Weep screed: Install at foundation plate line on all exterior stud walls per CBC.
1. Minimum 4 inches above earth.
 2. Minimum 2 inches above paved areas.
- D. Control Joints: Install control joints in specific locations approved by Architect for visual effect as follows:
1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft.
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft.
 2. At distances between control joints of not greater than 18 feet o.c.
 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 4. Where control joints occur in surface of construction directly behind plaster.
 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
 2. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 6 inches at each jamb anchor.
 3. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground, unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 4. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Three-Coat System: Total minimum thickness of 7/8 inch for lathing base and 1/2 inch for solid base.

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1. Scratch Coat:
 - a. Over Lathing Base: Apply scratch coat to a minimum thickness of 3/8 inch on vertical surface, and 1/4 inch on horizontal surface, using sufficient trowel pressure to key plaster into lath or to create bond to substrates as applicable. Prior to initial set, scratch horizontally to provide key for bond of brown coat.
 - b. Over Solid Bases: Apply first coat with sufficient pressure to insure tight contact with complete coverage of solid bases, immediately scratching to provide mechanical key for second coat.
 2. Brown Coat: Apply brown coat to a minimum thickness of 3/8 inch on vertical surface, and 1/4 inch on horizontal surface, using sufficient trowel pressure to insure tight contact with scratch coat.
 - a. Rod surface to screeds creating true and even plane.
 - b. Trowel to a sand float finish and uniform surface to receive finish coat.
 - c. Tool brown coat to provide a V-joint at intersection of plaster with frames or other item of wood, or metal.
 3. Finish Coat: Apply exterior wall finish coat to thickness recommended by manufacturer, but in no case less than 1/8 inch, using sufficient trowel pressure or spray velocity to bond finish coat to basecoat.
- C. Curing Time: Comply with CBC, or longer as needed to insure compliance with manufacturer's recommendations for quality stucco installation.
1. Portland cement plaster:
 - a. Minimum period moist curing:
 - 1) First Coat: 48 hours.
 - 2) Second Coat: 48 hours.
 - b. Minimum interval between coats:
 - 1) First Coat: 48 hours.
 - 2) Second Coat: 7 days.
- D. Bonding Compound: Apply on unit masonry plaster bases.

3.7 ASSEMBLY

- A. Exterior Side from framing out:
 1. Sheathing.
 2. Weather-Resistive Barrier.
 3. Metal Lath.
 4. 3-coat portland cement plaster.
- B. Exterior Side from Masonry/Concrete:
 1. Weather-Resistive Barrier.
 2. Metal Lath.
 3. 2-coat portland cement plaster.

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

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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 092423

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 6 Section "Sheathing" for gypsum sheathing.
 - 3. Division 7 Section "Fire-Resistive Joint Systems" for head-of-wall assemblies that incorporate gypsum board.
 - 4. Division 9 Section "Non-Load-Bearing Steel Framing" for non-structural framing and suspension systems that support gypsum board.
 - 5. Division 9 Section "Tiling" for tile backer board installed as substrates for ceramic tile.
 - 6. Division 9 Section "Painting" for primers and finishes applied to gypsum board surfaces.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 Low-Emitting Materials - Adhesive and Sealants: Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
 - 2. Finishes: Level 4 and 5 of gypsum board finish indicated for use in exposed locations. 4 by 4 foot sample.
 - a. Finishes: For each finish indicated and on same backing indicated for Work.

1.3 QUALITY ASSURANCE

A. Reference Standards:

1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

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 acceptable to DSA.

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.

D. 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 level of gypsum board finish indicated for use in exposed locations.
 - b. Each finish indicated.
 - c. Each areas such as walls, ceilings, and soffits.
2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.

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4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 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.

1.5 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.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of gypsum board that fails in materials or workmanship within specified warranty period.
 1. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Interior Gypsum Board: Subject to compliance with requirements, provide products by one of the following:
 1. USG Corporation.
 2. National Gypsum Company.
 3. G-P Gypsum.
 4. Or equal.
- B. Steel Trim Accessories: Subject to compliance with requirements, provide products by one of the following:
 1. USG Corporation.

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2. Amico.
3. Or equal.

2.2 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.

2.3 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36 or ASTM C 1396, as applicable to type of gypsum board indicated and whichever is more stringent.
- B. Type X:
 1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- C. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
 1. Thickness: 1/4 inch.
 2. Long Edges: Tapered.
- D. Impact Resistant Type: ASTM C1278 and ASTM C1629.
 1. Core: 5/8 inch, Type X.
 2. High-density paperless gypsum and cellulose wall panels with long edges.
 3. Products:
 - a. FIBEROCK Brand VHI panels by USG.
 - b. Hi-Impact XP Wallboard by National Gypsum.
 - c. Or equal.
- E. Water-Resistant Gypsum Backing Board: ASTM C 630 or ASTM C 1396.
 1. Core: 5/8 inch, Type X.
 2. Use: Toilet rooms and janitor's closets walls with painted finish.
 3. Products:
 - a. USG Mold Tough Firecode Core Gypsum Panels by USG.
 - b. Gold Bond Brand Moisture-Resistant Fire Resistant Gypsum Board by National Gypsum.
 - c. Or equal.
 4. When Water-Resistant Gypsum Backing Boards are not available (gradual phasing out by manufacturers), provide Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
 - a. USG Mold Tough Firecode Core Gypsum Panels by USG.
 - b. XP Wallboard by National Gypsum.
 - c. DensArmor Interior Guard by G-P.
 - d. Or equal.

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2.4 TRIM ACCESSORIES

- A. Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 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. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Aluminum Trim and Reveal: As specified in Division 9 Section "Portland Cement Plaster".

2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape: Paper.
- 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. Sealants shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Acoustical Sealant: Sheetrock Acoustical Sealant by USG or equal.
 - 1. Sealants shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.
- D. Thermal and Acoustical Insulation: As specified in Division 7 Section "Building Insulation."
- E. Gypsum Board Adhesives:
 - 1. High performance latex-based construction adhesive designed for gypsum board applications.
 - 2. Adhesives shall comply with South Coast Air Quality Management District (SCAQMD) Rule 1168.
 - 3. Products:
 - a. Green Series SW-325 Shear & Drywall Adhesive by OSI.
 - b. Drywall Adhesive GDWA by Grabberman.
 - c. Or equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Comply with ASTM C 840:
 - 1. Wood Framing: 5/8 inch thick Gypsum Board.
 - a. 1-1/2 inch minimum nail length.
 - b. 1-1/4 inch minimum screw length.
 - c. 1-1/4 inch minimum staple length.
 - 2. Maximum Framing Spacing for single-ply construction: 5/8 inch thick gypsum board.
 - a. Ceilings:
 - 1) Parallel: 16 inches on center maximum framing spacing.
 - 2) Perpendicular: 24 inches on center maximum framing spacing.
 - b. Sidewalls:
 - 1) Parallel or Perpendicular: 24 inches on center maximum framing spacing.
- C. 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.
- D. 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.
- E. 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.
- F. Form control and expansion joints with space between edges of adjoining gypsum panels.
- G. 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.

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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.
- H. Install gypsum board on the interior side of skylight well as indicated on Drawings.
- I. 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.
- J. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 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 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.
 5. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings.

3.4 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: Comply with GA 214 for Level definitions.
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for ceramic tile or acoustical tile.
 3. Level 3: Where indicated on Drawings.
 4. Level 4: At panel surfaces that will be exposed to view with flat paint finish.
 - a. Primer and its application to surfaces are specified in other Division 9 Sections.

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5. Level 5: At panel surfaces that will be exposed to view with non-flat paint finish.
 - a. Primer and its application to surfaces are specified in other Division 9 Sections.

3.5 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Porcelain tile.
 - 2. Stone tile.
 - 3. Stone thresholds installed as part of tile installations.
 - 4. Waterproof membrane for tile installations.
 - 5. Cementitious backer units installed as part of tile installations.
 - 6. Public art work.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

1.3 SYSTEM DESCRIPTION

- A. Accessibility Requirements for Tile Flooring:
 - 1. Ceramic and Quarry Tile Flooring shall be stable, firm, and slip resistant. CBC Section 11B-302.1.

1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6.
 - 2. Step Treads: Minimum 0.6.
 - 3. Ramp Surfaces: Minimum 0.8.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 Low-Emitting Materials - Adhesive and Sealants: Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
 - 1. Propose locations of expansion, contraction, control, and isolation joints if not indicated on Drawings.
- D. Installation Method: Show TCA installation method number for each tiled area in tabulated form.
- E. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- F. Product Certificates: For each type of product, signed by product manufacturer.
- G. Qualification Data: For Installer.
- H. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).

6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
- E. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
1. Build mockup of each type of floor tile installation.
 2. Build mockup of each type of floor and wall tile installation.
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

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1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of ceramic tile and accessories that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Porcelain Tiles: Subject to compliance with requirements, provide products by one of the following manufacturers.
 - 1. Daltile; Div. of Dal-Tile International Inc. (Basis of Design)
 - 2. Crossville Ceramics Company, L.P. (Basis of Design)
 - 3. Images in Tile USA, Inc. (Basis of Design)
 - 4. American Olean; Div. of Dal-Tile International Corp.
 - 5. Interceramic.
 - 6. Unicorn.
 - 7. Or equal.
- B. Setting and Grouting Materials: Subject to compliance with requirements, provide products by one of the following manufacturers.
 - 1. Custom Building Products.
 - 2. LATICRETE International Inc.
 - 3. MAPEI Corporation.
 - 4. Omega.
 - 5. Or equal.
- C. Sheet Waterproofing for Tile Installation: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Noble Company (The); Nobleseal TS. (Basis of Design)

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2. Schluter; KERDI XL.
3. Or equal.

- D. Cementitious Backer Board: Subject to compliance with requirements, provide products by one of the following manufacturers.
1. USG Corporation; DUROCK Cement Board.
 2. National Gypsum Company; PermaBase.
 3. C-Cure; C-Cure Board 990.
 4. Custom Building Products; Wonderboard.
 5. Or equal.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
1. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.
- C. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.3 TILE PRODUCTS

- A. Porcelain and Stone Tiles: As indicated on Drawings.

2.4 EXTERIOR PORCELAIN TILE WALL

- A. (WT-1) 25% digitally applied artwork tile: Images In Tile USA Inc. (Basis of Design)
- B. (WT-2) 75% Field tile: Crossville Color Blox. (Basis of Design)
- C. Porcelain tile weight shall not exceed 15 psf per 12.3.2.1 TMS 401.2.
- D. Bond shear strength shall be 50 psi min. per 12.3.2.4 TMS 402.
- E. Thickness is less than 3/8" per CBC 1411.2.

2.5 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
- B. Marble Thresholds: ASTM C 503 with a minimum abrasion resistance of 10 per ASTM C 1353 or ASTM C 241 and with honed finish.
1. Description: Match Architect's sample.

2.6 SHEET WATERPROOFING FOR TILE INSTALLATIONS

- A. General: Manufacturer's standard product that complies with ANSI A118.10.
- B. Thin (1/32 inch) bonded, load bearing sheet membrane for waterproofing. Alloy made from Chlorinated Polyethylene (CPE) with nonwoven fabric laminated to both sides.
 - 1. System Performance: 1-14 "Extra Heavy Service" cycles per ASTM C627.
 - 2. Hardness: 82 shore A per ASTM D2240.
 - 3. Tensile Strength: 1600 psi per ASTM D412 Die C.
 - 4. Elongation: 44% per ASTM D412 Die C.
 - 5. Tear Strength: 400 psi per ASTM D624 Die C.
 - 6. Shear Strength: Pass per ANSI A118.10-1993.
 - 7. Shear Strength - Water Immersion: Pass per ANSI A118.10-1993.
 - 8. Fungus & microorganism Resistance: Pass per ANSI A118.10-1993.
 - 9. Seam Strength: Pass per ANSI A118.10-1993.
 - 10. Waterproofness: Pass per ANSI A118.10-1993.

2.7 SETTING AND GROUTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.1A and as specified below:
 - 1. Reinforcing Wire Fabric: Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A 185 and ASTM A 82 except for minimum wire size.
 - 2. Latex Additive: Manufacturer's standard water emulsion.
 - 3. Products:
 - a. MAPEI, Mapecem 102, Powder, MAPEI, Planicrete AC (Liquid).
 - b. 3701 (liquid) Additive with 226 (powder) by Laticrete.
 - c. Custom Building Products: Acrylic Mortar Admix
 - d. Or equal.
- B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:
 - 1. Prepackaged dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive.
 - a. For wall applications, provide nonsagging mortar that complies with Paragraph F-4.6.1 in addition to the other requirements in ANSI A118.4.
 - 2. Products:
 - a. MAPEI: Ultraflex 2, Walls: MAPEI Ultralite.
 - b. 254 Platinum by Laticrete.
 - c. Custom Building Products: MegaFlex.
 - d. Or equal.
- C. Chemical-Resistant, Water-Cleanable, Grouting Epoxy: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.
 - 2. Products:
 - a. MAPEI: Kerapoxy IEG.
 - b. SpectraLock Pro by Laticrete.
 - c. Custom Building Products: 100% Solids Epoxy Grout.

d. Or equal.

2.8 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."
 - 1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.

2.9 TILE BACKER UNITS

- A. Cementitious Back Units:
 - 1. Aggregated portland cement board with coated glass-mesh reinforcement scrim.
 - 2. Comply with ANSI A118.9.
 - 3. Pass ASTM E136 for non-combustibility.
 - 4. Thickness: 5/8 inch.
 - 5. Lengths: Maximum lengths available to minimize end-to-end butt joints.
- B. Joint Tape: Mesh type as recommended by backer unit manufacturer.
- C. Joint Compound: As recommended by backer unit manufacturer.

2.10 MOISTURE AND MOLD-RESISTANT GYPSUM BOARD

- A. Comply with requirements of Division 9 Section "Gypsum Board".
- B. Substrates for painted surfaces in toilet rooms. Do not use as substrate for tile application.

2.11 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: ADA compliant, angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications, in aluminum finishes selected by Architect.
 - 1. Outside Corners: ECK-E by Schluter or equal.
 - 2. Exposed Edges: JOLLY by Schluter or equal.
- C. Transitions: ADA compliant, various shapes, height to match tile and setting-bed thickness, metallic designed specifically for flooring applications, in aluminum finishes selected by Architect.

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1. Reno, Reno-T, Reno-U, Reno-TK, and Reno-Ramp by Schluter or equal.

2.12 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

2.13 PUBLIC ART WORK

- A. Product: Images in Tile by Tile USA, Inc. Joplin, MO. or equal.
 1. Tile size: 12"x12".
 2. Tile Body: Porcelain, tiles shall not fade, shall not need cover coat and been tested to have 100 year UV life.
 3. Art work: A digital file will be furnish to Contractor.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
 - a. Sub-floor and Vertical Surfaces: 1/4 inch in 10 feet.
 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

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- B. Provide concrete substrates for tile floors installed with mortar that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
 - 1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions. Use product specifically recommended by tile-setting material manufacturer.
 - 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.
- G. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
- H. Grout tile to comply with requirements of the following tile installation standards:
 - 1. For chemical-resistant epoxy grouts, comply with ANSI A108.6.

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3.4 CEMENTITIOUS BACKER UNIT INSTALLATION

- A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.
- B. Do not install tile over waterproofing until waterproofing has been tested to determine that it is watertight.

3.6 FLOOR TILE INSTALLATION

- A. General: Install tile to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI A108 Series of tile installation standards.
- B. Joint Widths: 1/16 inch unless specified otherwise.
- C. Stone Thresholds: Install stone thresholds at locations indicated; set in same type of setting bed as abutting field tile, unless otherwise indicated.
 - 1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent nontile floor finish.
- D. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

3.7 WALL TILE INSTALLATION

- A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

3.8 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners

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recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

- B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.9 FLOOR TILE INSTALLATION, TCNA ASSEMBLY

- A. Tile Installation: Interior floor installation on waterproof membrane over concrete; cement mortar bed (thickset); TCA F121 with epoxy grout.
 - 1. Mortar: Latex-portland cement mortar.
 - 2. Grout: Chemical-resistant, water-cleanable, tile-grouting epoxy.
 - 3. Tile Pattern: Grid pattern.

3.10 WALL TILE INSTALLATION, TCNA ASSEMBLY

- A. Tile Installation: Interior wall installation over cementitious backer units; thin-set mortar; TCA W244C with epoxy grout and ANSI A108.5.
 - 1. Mortar: Latex-portland cement mortar.
 - 2. Grout: Chemical-resistant, water-cleanable, tile-grouting epoxy.
 - 3. Tile Pattern: 1/3 running bond pattern.
- B. Tile Installation: Exterior wall installation over sound, dimensionally stable masonry or concrete; thin-set mortar; TCNA W202 and ANSI A108.5.
 - 1. Mortar: Latex-portland cement mortar.
 - 2. Grout: Chemical-resistant, water-cleanable, tile-grouting epoxy.

END OF SECTION 093000

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SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Acoustical panels and suspension systems for ceilings.
 - 2. Acoustical wood panels and suspension systems for ceilings.
 - 3. Acoustical metal panels for walls.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 DEFINITIONS

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

1.3 SYSTEM DESCRIPTION

- A. DSA Interpretation of Regulations (IR) Document Metal Suspension Systems for Lay In Panel Ceilings (IR25-2.13) references 2013 CBC, Section 1616A.1.20.
 - 1. Applies to ceiling systems whose total weight, including air conditioning grilles and light fixtures, does not exceed four (4) psf. Heavier systems and those supporting lateral loads from partitions will require special design details.
 - 2. 12 ga. minimum hanger wires may be used for up to and including 4'-0" x 4'-0" grid spacing and shall be attached to main runners.
 - 3. Provide 12 ga. hanger wires at the ends of all main and cross runners within eight inches of the support or within 1/4 of the length of the end tee, whichever is least, for the perimeter of the ceiling area. End connections for runners which are designed and detailed to resist the applied vertical and horizontal forces may be used in lieu of the 12 ga. Hanger wires, subject to Division of the State Architect (DSA) review and approval.
 - 4. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits or discontinuous areas. Hanger wires that are more than 1 in 6 out of plumb are to have countersloping wires.
 - 5. Ceiling grid members may be attached to not more than 2 adjacent walls. Ceiling grid members shall be at least 3/4 inch free of other walls. If walls run diagonally to ceiling

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- grid system runners, one end of main and cross runners should be free, and a minimum of 3/4 inch clear of wall.
6. At the perimeter of the ceiling area where main or cross runners are not connected to the adjacent wall, provide interconnection between the runners at the free end to prevent lateral spreading. A metal strut or a 16 ga. wire with a positive mechanical connection to the runner may be used. Where the perpendicular distance from the wall to the first parallel runner is 12 inch or less, this interlock is not required.
 7. Provide bracing assemblies consisting of a compression strut and four 12 ga. Splayed bracing wires oriented 90 degrees from each other (see Figure 1) at the following spacing:
 - a. Design compression strut per AISC EQ. 2.2.
 - b. For school buildings, place bracing assemblies at a spacing not more than 12 by 12 feet on center.
 - c. For Essential Services Buildings, place bracing assemblies not more than 8 by 12 feet on center.
 - d. Provide bracing assemblies at locations not more than 1/2 the spacings given above, from each perimeter wall and at the edge of vertical ceiling offsets. The slope of these wires shall not exceed 45 degrees from the plane of the ceiling and shall be taut. Splices in bracing wires are not to be permitted without special DSA approval.
 - e. Suspended acoustical ceiling systems with a ceiling area of 144 square feet or less, and fire rated suspended acoustical ceiling systems with a ceiling area of 96 square feet or less, surrounded by walls which connect directly to the structure above, do not require bracing assemblies when attached to two adjacent walls.
 8. Fasten hanger wires with not less than 3 tight turns. Fasten bracing wires with 4 tight turns. Make all tight turns within a distance of 1-1/2 inches. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire.
 - a. Wire turns made by machine where both strands have been deformed or bent in wrapping can waive the 1-1/2 inch requirement, but the number of turns should be maintained, and be as tight as possible.
 9. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4 inch nominal diameter, to hanger wires using connectors acceptable to DSA.
 10. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires, 1 out of 10 must be field tested for 200 lbs. in tension. When drilled-in concrete anchors are used for bracing wires, 1 out of 2 must be field tested for 440 lbs. in tension. Shot-in anchors in concrete are not permitted for bracing wires. If any shot-in or drilled-in anchor fails, see CBC, Section 1913A.7.
 - a. Drilled-in or shot-in anchors require special DSA approval when used in prestressed concrete.
 11. Attach all light fixtures and ceiling mounted air terminals or services, to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures. Screws or approved fasteners are required.
 12. Flush or recessed light fixtures weighing less than 56 lbs., and air terminals or services, weighing less than 20 lbs may be supported directly on the runners of a heavy duty grid system but, in addition, they must have a minimum of two 12 ga. slack safety wires attached to the fixture at diagonal corners and anchored to the structure above. All 4 x 4 feet light fixtures must have slack safety wires at each corner.

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- a. All flush or recessed light fixtures weighing 56 lbs. and air terminals or services, weighing 20 lbs or more must be independently supported by not less than four (4) taut 12 ga. wires each attached to the fixture and to the structure above regardless of the type of ceiling grid system used.
 - b. The 4 taut 12 ga. Wires including their attachment to the structure above must be capable of supporting 4 times the weight of the unit.
 13. All fixtures and air terminals or services supported on intermediate duty grid systems must be independently supported by not less than 4 taut 12 ga. wires each attached to the fixture or terminal, and to the structure above.
 14. Support surface mounted light fixtures by at least two positive devices which surround the ceiling runner and which are each supported from the structure above by a 12 ga. wire. Spring clips or clamps that connect only to the runner are not acceptable.
 - a. Provide additional supports when light fixtures are 8'-0" or longer.
 15. Support pendant mounted light fixtures directly from the structure above with hanger wires or cables passing through each pendant hanger and capable of supporting 4 times the weight of the fixture. A bracing assembly per Figure 1, is required where the pendant hanger penetrates the ceiling. Special details are required to attach the pendant hanger to the bracing assembly to transmit horizontal forces.
 16. Required notes on construction documents:
 - a. Classification of ceiling grid is heavy duty.
 - b. Manufacturer's catalog number - main runner.
 - 1) DX-26 (USG), ICC-ES, ESR-1222.
 - 2) 7301 (Armstrong), ICC-ES, ESR-1308.
 - c. Manufacturer's catalog number - cross runner.
 - 1) DX424 or DX216 (USG), ICC-ES, ESR-1222.
 - 2) XL7341 4 ft cross tee and XL7328 2 ft cross tee (Armstrong), ICC-ES, ESR-1308.
 - d. Manufacturer's catalog number of detail for runner splice.
 - 1) Integral system (USG) ICC-ES, ESR-1222.
 - 2) Same as main runner, 7301. Mains connect together for compression/tension strength (Armstrong), ICC-ES, ESR-1308.
- B. Structural Performance:
1. CBC Seismic Categories D, E, F.
 2. Heavy Duty Grid.
 3. Minimum 3/4 inch clearance from grid end to wall.
 4. Minimum 2 inch perimeter molding or tested 7/8 inch perimeter molding with BERC2 clip by Armstrong.
 5. Grid must be attached on 2 adjacent walls, no attachment on other 2 walls.
 6. Perimeter T ends tied together at perimeters on tees that are not attached to perimeter molding.
 7. Partition attachment bracing is required to be independent from ceiling splay bracing.
 8. Seismic separation joint required for areas greater than 2,500 sq. ft. (or full height partitions).
 9. Rigid bracing required for ceiling elevation changes.
 10. Interior suspended ceilings, soffits, and bulkheads: Maintain deflection of not more than L/360 of distance between supports.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples for Initial Selection: For components with factory-applied color finishes.
- D. 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 full-size 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.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- F. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.
- G. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.

11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- D. 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 Classification: CBC 803 and Table 803.9.
 - 1) Flame-Spread Rating: Class 1 (0-25).
- E. Seismic Loads: Design and size components to withstand seismic loads in accordance with the California Building Code, Section 1616A.1.20 for Category D, E, and F.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site.
- 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, conditioned 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.

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- 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, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

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. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of acoustical panel ceilings that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

1.10 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
 - 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acoustical Panels: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Armstrong World Industries, Inc. (Basis of Design)
 - 2. USG Interiors, Inc.
 - 3. Hunter Douglas Architectural Products.

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4. BPB- Celotex.
5. Tectum Inc.
6. Or equal.

B. Suspension Systems: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.

1. Armstrong World Industries, Inc. (Basis of Design)
2. USG Interiors, Inc.
3. Hunter Douglas Architectural Products.
4. BPB Celotex.
5. Chicago Metallic Corporation.
6. Or equal.

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 reflectances, unless otherwise indicated.

1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

A. Products: As indicated on Drawings.

2.4 WOOD VENEER CEILING PANELS

A. Product: Woodworks Grille by Armstrong or equal.

1. Model: 7263 BO GLC with 5823 Bioacoustic infill and solid maple Slats and backers with flamestop II intumescent coating (Class B).

B. Product: Woodworks Vector Ceiling by Armstrong or equal.

1. Model: 6480 W4 NLC with 5823 Bioacoustic infill. (Class B)

2.5 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

C. Attachment Devices: In accordance with the California Building Code, Section 1616A.1.20 for Category D, E, and F.

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- D. Wire for Hangers and Ties: In accordance with the California Building Code, Section 1616A.1.20.
- E. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch- thick, galvanized steel sheet complying with ASTM A 653, G90 coating designation; with bolted connections and 5/16-inch- diameter bolts.
- G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- I. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.
- J. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.
- K. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
- L. Wall Moldings: In accordance with the California Building Code, Section 1616A.1.20 for Category D, E. and F.

2.6 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Exposed Steel Suspension System: Formed galvanized steel, commercial quality cold rolled; heavy-duty.
- B. Products: As indicated on Drawings.

2.7 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 comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
- B. Product: Axiom (ACT-3) by Armstrong or equal.
 - 1. System: An extruded aluminum trim used to create the transition between the perimeter and the ceiling plane. Commercial quality extruded aluminum alloy 6063 trim channel, factory finished in baked polyester paint (white) color to match intersecting grid system.

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Commercial quality aluminum unfinished t-bar connection clips; galvanized steel splice plates.

2. Types: Formations, and as indicated on Drawings.
3. Finish: Factory painted in colors selected by Architect from manufacturer's full range.

2.8 ACOUSTICAL SEALANT

- A. Comply with requirement of Division 7 "Joint Sealants".

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.
 1. 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

- A. Install suspension system and panels in accordance with the California Building Code, Section 1616A.1.20.

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 095113

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SECTION 096500 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Resilient wall base and accessories.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Concrete Moisture and Alkalinity Testing" for concrete surface testing.
 - 3. Division 7 Section "Concrete Moisture and Alkalinity Barrier" for concrete surface preparation.

1.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements for Resilient Flooring:
 - 1. Resilient Flooring shall be stable, firm, and slip resistant. CBC Section 11B-302.1.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include concrete moisture and alkalinity limits.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 Low-Emitting Materials - Adhesive and Sealants: Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 4. Product Data for Credit IEQ 4.3 Low-Emitting Materials - Flooring Systems: Provide documentation that demonstrates that all product is FloorScore Certified and meets VOC limits. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

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- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: Full-size units of each color and pattern of resilient floor tile required.
 - 1. Resilient Wall Base and Accessories: Manufacturer's standard-size Samples, but not less than 12 inches long, of each resilient product color and pattern required.
- E. Maintenance Data: For resilient products to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- A. Pre-Molded Corners: Pre-molded inside and outside rubber base corners shall be from same production run as straight base. These are commonly from different production run and as result are different color shades. This color difference often negates premium appearance of pre-molded products.
- B. Fire-Test-Response Characteristics: Provide products identical to those tested for fire-exposure behavior per test method indicated by a testing and inspecting agency acceptable to authorities having jurisdiction.

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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. Store tiles on flat surfaces.

1.6 PROJECT CONDITIONS

- A. Maintain temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After postinstallation period, maintain temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install resilient products after other finishing operations, including painting, have been completed.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of resilient floor tile that fails in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 1 year.
- B. Installer's Warranty: 2 years.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.
 - 2. Resilient Wall Base and Accessories: 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 MANUFACTURERS

- A. Type TP Resilient Wall Base: Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.
 - 1. Burke Mercer Flooring Products. (Basis of Design)
 - 2. Allstate Rubber.
 - 3. Armstrong.
 - 4. Johnsonite.
 - 5. Or equal.

2.2 RESILIENT WALL BASE

- A. Product: Type TP Millwork Resilient Wall Base by Johnsonite.
 - 1. Thermoplastic rubber meets performance and dimensional requirements of ASTM F-1861 Standard Specification for Resilient Wall Base, Type TP, and Group 1.
 - 2. Profile: Replicate the look of finely milled wood.
 - 3. Style and Colors: As indicated on Drawings.

2.3 RESILIENT MOLDING ACCESSORY

- A. Types:
 - 1. Reducer strip for resilient floor covering
 - 2. Joiner for tile and carpet.
- B. Material: Rubber.
- C. Profile and Dimensions: As indicated.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic cement based formulation provided or approved by resilient product manufacturer for applications indicated.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed resilient tile and as recommended/ required by the manufacturer for warrantee acceptance or provided by resilient tile manufacturer for the type of carpet being installed.
 - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. VCT and Asphalt Tile Adhesives: 50 g/L.
 - b. Cove Base Adhesives: 50 g/L.
 - c. Rubber Floor Adhesives: 60 g/L.

- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance.
 - 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 products.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of resilient products.
- B. Concrete Substrates:
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Independent moisture and alkalinity testing prior to installation of resilient flooring as specified in Division 7 Section "Concrete Moisture and Alkalinity Testing".
 - 3. Provide barrier as specified in Division 7 Section "Concrete Moisture and Alkalinity Barrier" if test exceed floor covering limits.
- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- E. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- F. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
 - 1. Do not install resilient products until they are same temperature as space where they are to be installed.
- G. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.3 RESILIENT WALL BASE INSTALLATION

- A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Do not stretch wall base during installation.
- E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.
- F. Premolded Corners: Install premolded corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor coverings that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. 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.
 - a. Do not wash surfaces until after time period recommended by manufacturer.
- B. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
 - 1. Apply protective floor polish to horizontal surfaces that are free from soil, visible adhesive, and surface blemishes if recommended in writing by manufacturer.
 - a. Use commercially available product acceptable to manufacturer.
 - 2. Do not move heavy and sharp objects directly over surfaces. Place hardboard or plywood panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 096500

SECTION 096517 - LINOLEUM FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Linoleum sheet flooring.
- B. Related Sections include the following:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 7 Section "Concrete Moisture and Alkalinity Testing" for concrete surface testing.
 - 3. Division 7 Section "Concrete Moisture and Alkalinity Barrier" for concrete surface preparation.
 - 4. Division 9 Section "Resilient Tile Flooring" for resilient base.
 - 5. Division 9 Section "Static-Control Resilient Floor Coverings" for resilient floor coverings designed to control electrostatic discharge.

1.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements for Resilient Flooring:
 - 1. Resilient Flooring shall be stable, firm, and slip resistant. CBC Section 11B-302.1.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include concrete moisture and alkalinity limits.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit IEQ 4.1 Low-Emitting Materials - Adhesive and Sealants: Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Comply with VOC limits from Division 1 Section "Sustainable Design Requirements". Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 4. Product Data for Credit IEQ 4.3 Low-Emitting Materials - Flooring Systems: Provide documentation that demonstrates that all product is FloorScore Certified and meets VOC

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limits. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

- C. 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.
- D. Samples for Initial Selection: For each type of floor covering indicated.
 - 1. Include similar Samples of installation accessories involving color selection.
- E. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch sections of each color and pattern of floor covering required.
 - 1. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- F. Heat-Welded Seam Samples: For each floor covering product and welding bead color and pattern combination required; with seam running lengthwise and in center of 6-by-9-inch Insert size Sample applied to rigid backing and prepared by Installer for this Project.
- G. Product Schedule: For floor covering. Use same designations indicated on Drawings.
- H. Qualification Data: For qualified Installer.
- I. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.

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17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation.

1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

C. 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 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 65 deg F or more than 90 deg F.

1. Sheet Flooring: Store rolls upright.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor coverings during the following time periods:

1. 72 hours before installation.
2. During installation.
3. 72 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than.

C. Close spaces to traffic during floor covering installation.

D. Close spaces to traffic for 72 hours after floor covering installation.

E. Install floor coverings after other finishing operations, including painting, have been completed.

1.7 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace flooring installation that fails in materials or workmanship within specified warranty period.

1. Warranty Period: 5 years.

B. Installer's Warranty: 2 years.

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1.8 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. Sheet Flooring: Furnish not less than 10 linear feet Insert length for every 500 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of sheet flooring installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Linoleum Floor Covering: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Forbo Flooring, Inc. (Basis of Design)
 - 2. Armstrong World Industries, Inc.
 - 3. Johnsonite, a Tarkett Company.
 - 4. Or equal.

2.2 LINOLEUM FLOOR COVERING

- A. Product: Marmoleum Decibel by Forbo or equal.
 - 1. Description: Homogeneous linoleum sheet made primarily of natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendared onto natural jute backing with an applied polyolefin comfort layer. Pattern and color shall extend throughout total thickness of material.
 - 2. Decibel provides the highest reduction of impact sound by 17 dB.
 - 3. Thickness: 3.5 mm sheet floor covering with a 2.5 mm Marmoleum Real laminated onto a 1 mm thick layer of polyolefin foam.
 - 4. Length x width: 32 m x 200 cm.
 - 5. NCS: S 7502-Y.
 - 6. LRV: 14%.
 - 7. Colors: As indicated on Drawings.
- B. Product: Marmoleum Concrete by Forbo or equal.
 - 1. Sheet Flooring: Meets or exceeds ASTM F2034 for Linoleum Sheet Flooring.
 - 2. Roll Size: 79 inches by 105 linear feet (77 sq. yd.).
 - 3. Fire Resistance:
 - a. Smoke Density: 450 or less per ASTM E-662/NFPA 258.
 - b. Critical Radiant Flux: Class 1 per ASTM E-648/NFPA 253.
 - 4. Static Load Limit: 450 pounds per square inch per ASTM F970.
 - 5. Material: Primarily natural materials consisting of linseed oil, wood flour, rosin binders and dry pigments mixed and calendared using a two-layered process.
 - 6. Recycled Content: Minimum 45% Post Industrial Recycled Content.
 - 7. Seaming Method: Multi-Color Heat Weld.
 - 8. Thickness: 1/10 inch.
 - 9. Colors and Patterns: As indicated on Drawings.

2.3 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 products and substrate conditions indicated.
 - 1. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Heat-Welding Bead: Solid-strand product of linoleum floor covering manufacturer.
 - 1. Match linoleum floor covering.
- D. Integral-Flash-Cove-Base Accessories:
 - 1. Cove Strip: 1-inch radius provided or approved by manufacturer.
 - 2. Cove-Base Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that wall surfaces are smooth and flat within tolerances, are dust-free, and are ready to receive resilient base.
- B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.
- C. Concrete Substrates:
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Independent moisture and alkalinity testing prior to installation of resilient flooring as specified in Division 7 Section "Concrete Moisture and Alkalinity Testing".
 - 3. Provide barrier as specified in Division 7 Section "Concrete Moisture and Alkalinity Barrier" if test exceed floor covering limits.
- D. Verify that required floor-mounted utilities are in correct location.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions for installing floor coverings.
- B. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
- C. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.

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- D. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on subfloor. Use chalk or other nonpermanent marking device.
- E. 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.
- F. 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.

3.3 LINOLEUM SHEET FLOORING INSTALLATION

- A. Unroll sheet floorings and allow them to stabilize before cutting and fitting.
- B. Lay out sheet floorings 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.
 - 5. Eliminate deformations that result from hanging method used during drying process (stove bar marks).
- C. Integral-Flash-Cove Base: Cove linoleum floor covering dimension indicated. Support floor covering at horizontal and vertical junction with cove strip. Butt at top against cap strip.

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 exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces 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. After allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover floor coverings until Substantial Completion.

END OF SECTION 096517

SECTION 096816 – SHEET CARPETING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Hybrid resilient sheet carpeting and walk-off mat.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.02 SUBMITTALS

- A. Shop Drawings showing the extent of product, seam direction and accessories shall be submitted to Architect for approval prior to installation. Check pattern match, if any, for matching during installation and possible waste factors in ordering required amounts. Should also indicate columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required. Copy of approved shop drawings to be available on job site during installation.
- B. LEED Submittals:
 - 2. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 3. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 4. Product Data for Credit IEQ 4.2 Low-Emitting Materials – Paints and Coatings. Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 5. Product Data for Credit IEQ 4.3 Low-Emitting Materials - Flooring Systems: Provide documentation that demonstrates that all product is FloorScore Certified and meets VOC limits. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Floor schedule using same room designations indicated on drawings.
- D. Product Data: Provide data on specified products, describing physical and performance characteristics, sizes, patterns, colors available, and method of installation.
- E. Verification Samples: Submit samples illustrating color and pattern for each carpet material specified.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Maintenance Data: Include maintenance procedures, recommendations for maintenance materials and equipment, and suggested schedule for cleaning.
- H. Manufacturer's Product Warranty.

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- I. Verification of reclamation and recycling program.
- J. Certifications: Manufacturer to submit copies of the following independent laboratory reports showing compliance with requirements per these methods outlined in Part 2 of this document. Submitted results shall represent average results for production goods of the specified style.
 - 1. ASTM E-648 Flooring Radiant Panel
 - 2. ASTM E-662: Smoke Density
 - 3. AATCC 134: Electrostatic Propensity
 - 4. CRI TM-102: Fluorine Analysis
 - 5. ASTM D-3936: Delamination
 - 6. Other from methods specified in Part 2

1.03 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.
- B. Manufacturer Qualifications
 - 1. Company specializing in manufacturing specified carpet with minimum 15 years documented experience.
 - 2. Upon request, manufacturer to provide representative to assist in project start-up and to inspect installation while in process and upon completion. Representative will notify designated contact if any installation instructions are not followed.

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3. Single Source Responsibility: Obtain each type of product from one source and by a single manufacturer.
- C. Installer Qualifications
- 1 Flooring contractor must be certified by the manufacturer prior to bid.
 2. Flooring contractor to be a specialty contractor normally engaged in this type of work and shall have prior experience in the installation of these types of materials.
 3. Certify payment of Prevailing Wage Rates to the installers.
 4. Flooring contractor possessing Contract for the product installation shall not sub-contract the labor without written approval of the Project Manager.
 5. Flooring contractor will be responsible for proper product installation, including floor testing and preparation as specified by the manufacturer and JOB CONDITIONS herein.
 6. Flooring contractor to provide Owner a written installation warranty that guarantees the completed installation to be free from defects in materials and workmanship for a period of one year after job completion.

1.04 DELIVERY, STORAGE, & HANDLING

- A. Deliver materials to the site in manufacturer's original packaging listing manufacturer's name, product name, identification number, and related information.
- B. Store in a dry location, between 65 degrees F and 90 degrees F and a relative humidity below 65%. Protect from damage and soiling. Stack carpet rolls horizontally on a flat surface, stacked no higher than two rolls.
- C. Make stored materials available for inspection by the Owner's representative.
- D. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.05 PROJECT CONDITIONS

- A. Sub-floor preparation is to include all required work to prepare the existing floor for installation of the product as specified in this document and Manufacturer's installation instructions.
- B. Powerbond Cushion installations utilizing #54 Seam Weld or C-XL Water Based Seam Sealer do not require moisture vapor emission rate (MVER) testing nor relative humidity (RH) testing provided that no free liquids are present and that no moisture stained concrete is evident. pH testing is required for all Powerbond Cushion installations as detailed below. In the event that free liquids and/or moisture stained concrete are observed, a full assessment of the concrete substrate is required. This assessment includes MVER testing per ASTM F-1869-04 (Standard Test Method for Measuring Moisture Emission Rate of Concrete) and In-Situ RH testing per ASTM F-2170-02 (Standard Test Method for Measuring Relative Humidity in Concrete). For assistance with installations that require MVER and RH testing, please contact Tandus Centiva's Installation Services at 800-241-4902, ext. 2625, 2623, 2129, 2023 or 2670. In cases where such testing is mandated, Tandus Centiva requires that at least 1 MVER and 2 RH tests be performed on the initial 1000 sq ft of each project. In addition, a minimum of one test, alternating between MVER and RH, per 1000 sq ft is required for the balance of the project. The required pH range is 9.0 or less as tested according to ASTM F-710-05. Preparing the

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surface of a concrete slab for pH testing requires the following attention to detail. Make sure the concrete surface is adequately cleaned of any adhesives, primers, curing compounds, surface contaminants, etc. Exercise care not to over clean the surface of the concrete removing the thin layer of carbonation. This can result in higher, non-responsive pH readings. Slightly wet the concrete sub floor surface with a small amount of distilled water and allow the water to stand for one minute. Apply pH test paper to the wet concrete surface and allow the pH test paper to remain in contact with the wet area for one minute. The pH test paper will change color depending on the pH of the wetted surface and a color scale is provided with the pH test papers for comparison. Note: pH test paper commonly supplied in MVER test kits only measures up to a pH of 12 accurately. Please see Powerbond Cushion Installation & Floor Preparation Instructions for specific requirements for moisture vapor emission rate, ambient conditions, and other requirements.

- C. All material used in sub-floor preparation and repair shall be recommended by the carpet manufacturer and shall be chemically and physically compatible with the carpet system being bid.
- D. Maintain minimum 65 degrees F ambient temperature and 65% Relative Humidity for 72 hours prior to, during, and 48 hours after installation.
- E. Do not install flooring until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient temperature and humidity conditions are and will be continuously maintained at values near those indicated for final occupancy.

1.06 EXTRA MATERIALS

- A. Provide additional 5% for "attic stock."

PART 2 – PRODUCTS

2.01 RECYCLED CONTENT

- A. Product must contain a minimum of 7% recycled content by weight. This percentage is calculated by dividing the weight of recycled content in one square yard of finished carpet by the total weight of one square yard of finished product and multiplying by 100. [(Recycle Content Weight) / (Total Product Weight) x 100].
- B. Product must contain 7% post-consumer recycled content by weight from recycled post consumer carpet. This ensures that carpet is diverted from landfills for the production of the product and that virgin resource use in the product is reduced.
- C. Recycled content must be certified by a neutral, independent, third party organization such as Scientific Certification Systems. Product must carry product label certifying overall recycled content (including post-industrial and post-consumer content). Report percentage of post-industrial and post-consumer recycled content as a percentage of total product weight.

2.02 PRODUCT RECYCLABILITY

- A. Manufacturer must fully comply with the US Federal Trade Commissions' "Guides for the Use of Environmental Marketing Claims" (CFR Title 16 part 260) with respect to advertising, labeling, product inserts, catalogs and sales presentations of all its flooring products submitted and sold.

- B. Product must meet Federal Trade Commission's Guides for recyclability and must be one hundred percent (100%) closed-loop recyclable back into flooring. A manufacturer cannot claim that a product or any portion of a product is recyclable if it is incinerated, even if incineration is used to produce heat and power (i.e. waste-to-energy) per FTC guides 16 CFR section 260.7 (d) example 3.
- C. Recyclability of product installed must be the same as that claimed by manufacturer and required by Project requirements.

2.03 RECYCLING PROGRAM

- A. Manufacturer must have a collection and recovery system for product and a fully established, currently operational recycling program at time of bid per FTC Guides Section 260.7 (d).
 - 1. Manufacturer must be able to reclaim and recycle 100% of installed carpet. Like material as installed must be 100% recycled.
 - 2. Manufacturer must have written guarantee that 100% of the recovered vinyl backed carpet will be recycled and that no portion of the product will be land filled or incinerated (including waste-to-energy).

2.04 NSF 140 CERTIFICATION

- A. Product must be certified at the Gold level to ANSI standard NSF 140, the Sustainable Carpet Assessment Standard (SCAS). Product certification must be conducted by an independent, third party organization such as Scientific Certification Systems. Provide documentation.

2.05 PRODUCT WARRANTY

- A. Warranty to be sole source responsibility of the Manufacturer. Second source warranties and warranties that involve parties other than the carpet manufacturer are unacceptable.
- B. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the discretion of the Manufacturer.
- C. Chair pads are not required, but are recommended for optimum textural performance. Absent the use of chair pads, more intensive maintenance will be required for areas in direct contact with chair caster traffic, and some degree of appearance change is to be expected.
- D. Warranty shall not exclude carpet product installed on stairs provided it is properly installed and maintained.
- E. The non-prorated Lifetime Limited warranty shall specifically warrant against:
 - 1. Excessive Surface Wear: More than 15% loss of pile fiber weight
 - 2. Excessive Static Electricity: More than 3.0 kV per AATCC 134
 - 3. Resiliency Loss of the Backing: More than 10% loss of backing resiliency
 - 4. Delamination
 - 5. Edge Ravel
 - 6. Zippering

- F. Tuft Bind warranty in lieu of edge ravel and zippering is not acceptable.
- G. Installer Warranty: 2 years.

2.06 PERFORMANCE CHARACTERISTICS

- A. Test reports for the following performance assurance testing to be submitted upon request. Submitted results shall represent average results for production goods of the referenced style. Requirements listed below must be met by all products.

1. Flooring Radiant Panel
ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts/sq cm or greater)
2. Federal Flammability
CPSC FF 1-70: Passes
3. Smoke Density
ASTM E-662 / NFPA 258: ≤ 450 Flaming Mode
4. Electrostatic Propensity
AATCC 134 (Step & Scuff): 3.0 kV or less
5. Static Coefficient of Friction
ASTM C-1028: Passes ADA Requirements for Accessible Routes (minimum 0.60)
6. Delamination of Secondary Backing of Pile Floor Coverings
ASTM D-3936: No Delamination
7. Lightfastness
AATCC 16E: $\geq 4 @ 100$ hours
8. TARR
Severe Traffic: 3.5 minimum
9. Moisture Barrier
Moisture Penetration by Impact @ 10 psi: No penetration of backing and seam after 10,000 impacts
10. Air Flow Barrier
Air Permeability of Textile Fabrics: No Air Flow (0.0 cu. ft/min) through backing and seam
11. Seam Integrity
Seam to remain intact after 50,000 cycles per Phillips Chair Test
12. Other
As specified in 2.03, 2.04 and 2.05 of this document

- B. Substitutes/Alternates:

Subject to compliance with all requirements, "or equal" must match the selected colors, have similar aesthetic appearance and tuft density, factory-applied "dry" adhesive, asbestos enclosure properties and recyclability. Substitution sample and submittals must be submitted for written approval of quality and color at least ten days prior to bid to be considered. Sample

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of proposed substitute must be inclusive of both the face and proposed cushion (color-only sample not acceptable).

2.07 HYBRID RESILIENT SHEET FLOORING MATERIALS (CARPET)

- A. Product/Manufacturer: Tandus Centiva District Powerbond® Cushion Style sheet flooring or District approved equal.
- B. Style and Color(s): As selected by Architect.
- C. Construction: Stratatec® Patterned Loop
- D. Gauge: 5/64
- E. Stitch Rate: 12.0 / inch
- F. Tuft Density: 153.6 tufts/sq inch
- G. Pile Height Average: .187 inch
- H. Pile Thickness: .098 inch
- I. Density Factor (UM44D): 7,714 oz/cu yd
- J. Fiber System: Antron Lumena BCF Nylon with Static Control & Ensure
- K. Dye Method: Solution Dyed
- L. R-Value: 0.84 Hr-ft²-°F/Btu
- M. Static Coefficient of Friction: ASTM C-1028; Passes ADA requirements.
- N. Static Propensity: AATCC 134: 3.0 kv or less
- O. Flooring Radiant Panel: ASTM E-648 or NFPA 253: Class 1
- P. Acoustic Requirements: Noise Reduction Coefficient (NRC): 0.22 Minimum
- Q. Seam Integrity: No seam separation after 50,000 cycles per Phillips Chair Test
- R. Cushion Compression Force Deflection: Minimum 7 lbs/sq. inch @ 25%; Maximum 25 lbs/sq. inch at 25%
- S. Total Weight: 82.0 oz/sq yd +/- 5%
- T. Environmental Impact: No pesticides added to product (US EPA Registered Antimicrobials)
- U. Fiber
 - 1. Nylon Fiber: Bulked Continuous Filament (BCF) Nylon in a loop pile construction: Antron Lumena®
 - 2. For yarn containing recycled content, report post consumer and post industrial recycled content of the pile face yarn per total yarn weight i.e. [(Recycle Content in Pile Face Yarn) / (Total Weight of Pile Face Yarn) x 100]
 - 3. Fiber to contain carbon-core filament for permanent static control. Topical treatments are not acceptable.
 - 4. Durable stain inhibitor should be applied to the fiber during product manufacturing to resist fiber staining and soiling.: Minimum 200 ppm (CRI TM-102)
- V. Cushion Characteristics
 - 1. Primary Backing: Synthetic Non-Woven.
 - 2. Secondary Backing: Powerbond Closed Cell Cushion
 - a)Product Size: 6-Foot Width Roll Goods
 - b) Cushion Type: Closed Cell Cushion
 - c)Cushion Thickness: .156 inch thick
 - d) Cushion Density (ASTM D-1667): Min. 18.5 lbs/cu ft
 - e)Compression Set (ASTM D-1667): Maximum 10%
 - f)Compression Force Deflection (ASTM D-1667): Minimum 7 lbs/sq. inch @ 25%; Maximum 25 lbs/sq. inch at 25%
 - g) Moisture Barrier: Impermeable to moisture and airflow. Moisture Penetration by Impact @ 10 psi: No penetration of backing after 10,000 impacts. Provide independent test results. The British Spill Test is NOT an acceptable measurement for moisture barrier.
 - h) Seam Method: Chemical weld; molecularly bound seams to be impermeable to moisture and airflow

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- i) Seam Integrity: Moisture Penetration by Impact at SEAMS @ 10 psi; No penetration after 10,000 impacts. Provide independent test results. The British Spill Test is NOT an acceptable measurement for moisture barrier.
- j) Seam Integrity: Phillips Chairs Test: No seam separation after 50,000 cycles; Provide independent test results
- k) Face yarn fully fused to secondary backing system that will not delaminate
- l) Delamination: No delamination per ASTM D3936
- m) Product shall not contain pesticides (US EPA Registered Antimicrobials). Installation adhesives are exempt from this section.

2.08 PERMANENT ENTRY FLOORING (WALK-OFF MATTS)

- A. Product/Manufacturer: Tandus Centiva Geo Tile or District approved equal
 - 1. Size: 18" x 18" tile
 - 2. Fiber type: 100% solutions dyed
 - 3. Yarn type: 100% Premium Polypropylene
 - 4. Construction: Molded Reinforced Needlepunch Textile
 - 5. Pile heights average: 0.250 inch (ASTM D-418, Sec. 12)
 - 6. Texture/Pattern: Rubber Reinforced Geometric Pattern
 - 7. Surface Flammability: Passes CPSC FF 1-70
 - 8. Flooring Radiant Panel: Class 2 (mean ave. CRF: 0.22 w/sq cm to 0.44 w/sq cm (ASTM E-648)
- B. Color: 00154 Charcoal (available locally), currently available from Tandus Centiva.

2.09 ACCESSORIES

- A. Materials recommended by Manufacturer for patching, priming, seam welding, etc.
- B. Provide metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use butt-type metal edge strips for concealed anchorage, or overlap-type metal edge strips for exposed anchorage. Unless otherwise shown, provide strips made of extruded aluminum with a mill finish.
- C. Base and Carpet Edge: As required to comply with ADA.
- D. Walkoff Mat Transition Strips: Tredsafe DT084 or equal.

PART 3 – EXECUTION

3.01 EXAMINATION / PREPARATION

- A. Prepare sub-floor to comply with criteria established in Manufacturer's installation instructions. Use only preparation materials that are acceptable to the Manufacturer.
 - 1. Remove all deleterious substances from substrate(s) that would interfere with or be harmful to the installation (i.e. floor wax).
 - 2. Remove sub-floor ridges and bumps. Fill cracks, joints, holes, and other defects.
- B. Verify that sub-floor is smooth and flat within specified tolerances and ready to receive carpet.
- E. Verify that substrate surface is dust-free and free of substances that would impair bonding of product to the floor.
- F. Verify that concrete surfaces are ready for installation by conducting moisture and pH testing. Results must be within limits recommended by Manufacturer.
- G. There will be no exceptions to the provisions stated in the Manufacturer's installation instructions.

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3.02 INSTALLATION - GENERAL

- A. Install product in accordance with Manufacturer's installation instructions. Product must have low VOC, factory applied, "dry" adhesive. A peel & stick method applied to the back at the time of manufacture is preferred. Product must meet the requirements of CRI's Green Label Plus (GLP) program for carpet. Provide documentation.
- B. Adhesive must meet the requirements of CRI's Green Label Plus program for adhesive. Provide documentation.
- C. Adhesives must be below the VOC content limits specified by the South Coast Air Quality Management District Rule #1168. Provide documentation.
- D. No US EPA registered pesticides (antimicrobials) are to be added to the product. Antimicrobial treatments are registered with the EPA as preservatives of the products only, and no health benefit should be claimed or expected. If antimicrobials are added, then third party documentation with a seal is required stating that the pesticides used will cause NO HARM to the occupants. Installation adhesives are exempt from this section.
- E. Product as installed to be securely attached to the floor as follows:
 - a. Carpet shall be securely attached and shall have a firm cushion, pad, or backing or no cushion or pad. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be 1/2" maximum. CBC Section 11B-302.2.
 - b. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length. Carpet edges shall comply with CBC Section 11B-303. CBC Section 11B-302.2.
- F. Verify product match before cutting to ensure minimal variation between dye lots.
- G. Layout product and locate seams in accordance with shop drawings.
 - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic. Minimize cross seams.
 - 2. Do not locate seams perpendicular through door openings.
 - 3. Align run of pile *in same direction as anticipated traffic and* in same direction on adjacent pieces.
 - 4. Locate change of color or pattern between rooms under door centerline.
 - 5. Provide monolithic color, pattern, and texture match within any one area.
- H. Install product tight and flat on sub-floor, well-fastened at edges, with a uniform appearance.
- I. Double-cut product seams with accurate pattern match. Make cuts straight, true, and unfrayed.
- J. Seal seams with manufacturer's recommended seam sealer as stated in installation instructions. Make sure the seam is fully sealed.
- K. Roll with appropriate roller for complete contact of product with adhesive to sub-floor.
- L. Trim carpet neatly at walls and around interruptions.
- M. Completed product is to be smooth and free of bubbles, puckers, and other defects.
- N. To ensure asbestos enclosure, the carpet material should be sealed around the perimeter of the installation using a one-inch strip of contact adhesive spread directly underneath the outer edge of the product.

3.03 PROTECTION & CLEANING

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- A. Remove excess adhesive and/or seam sealer from floor and wall surfaces without damage.
- B. All rubbish, wrappings, debris, trimmings, etc. to be removed from site and recycled or disposed of properly.
- C. Clean and vacuum surfaces using a beater brush/bar commercial vacuum.
- D. After each area of is installed, protect from soiling and damage by other trades.

END OF SECTION 096816

SECTION 098413 - SOUND ABSORPTIVE PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Sound absorptive finishes as indicated on project Drawings and as specified below. Sound absorptive finish materials shall be designed to achieve the minimum NRC ratings specified below.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 SUBMITTALS

- A. Product Data: For each type of panel edge, core material and mounting indicated, submit Manufacturer's specifications and other data needed to prove compliance with all specified requirements.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content, and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
 - 2. Product Data for Credit MR 5: For products having regional content, documentation indicating location and distance from project of material manufacturer and extraction, with cost and LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Acoustical Test Reports: Submit manufacturer's sound absorption data for specified systems, including; octave band sound absorption values from 125 hertz to 4,000 hertz and Noise Reduction Coefficient (NRC) values for the specified systems. Sound absorption data shall be based on measurements conducted by a laboratory accredited for specific acoustical testing under the National Voluntary Laboratory Accreditation Program (NVLAP) and in accordance with ASTM C 423 and ASTM E795 standards.
- D. Shop Drawings: For sound absorptive finishes, include mounting devices and details; details at panel head, base, joints and corners; and details at ceiling, floor base and wall intersections. Indicate panel edge and core materials. All materials affected by structural or seismic requirements shall be reviewed and signed by a registered structural engineer showing compliance with all structural load and seismic design criteria.
- E. Coordination Drawings: Show intersections with structure, electrical outlets and other permanent ceiling features.

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- F. Exceptions: Identify all proposed changes, differences, and/or discrepancies, including verbiage, terms, definitions between Contract Documents and submittals.
- G. Samples for Verification. Prepare Samples from same material to be used for the Work.
 - 1. Fabric: Full width 36-inch long Sample from dye lot to be used for the Work, as follows:
 - a. With specified treatments applied.
 - b. Show complete pattern repeat.
 - c. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch long Sample showing edge profile, corner and finish.
 - 3. Core Material: 12-inch square Sample showing corner.
 - 4. Mounting Device: Full size Sample.
 - 5. Sample Panels: No larger than 36-inches by 36-inches. Show joints and mounting methods.
- H. Maintenance Data: For stretched fabric wall systems to include in maintenance manuals. Include fabric manufacturer's written cleaning and stain removal recommendations.
- I. Warranty: Warranty specified in this Section.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
 - 15. NFPA 20 - Stationary Pumps, 2016 Edition.
 - 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 - 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 - 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 - 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 - 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 - 21. Americans with Disabilities Act (ADA), Title II.

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- B. Fabricator Qualifications: The Manufacturer shall have successful experience in sound absorptive finish fabrication and installation, including no less than five years experience in the fabrication and installation of materials identical to those required in this project.
- C. Source Limitations: Obtain sound absorptive finishes through one source from a single manufacturer.
- D. Acoustical Performance: Sound absorption tests shall be conducted in accordance with ASTM C 423 – Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method and ASTM E 795 – Standard Practices for Mounting Specimens during Sound Absorption Tests. The test shall be conducted by a laboratory accredited for specific acoustical testing under the National Voluntary Laboratory Accreditation Program (NVLAP). Acoustical test reports shall include a description of the tested material sample, size of the sample, test setup (including type of mounting used), measurement instrumentation, test procedure and octave band sound absorption coefficients.
- E. Fire-Test Response Characteristics: Provide sound absorptive finishes with the following surface burning characteristics as determined by testing identical products per ASTM 84 by UL or other testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke Development Index: 450 or less.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Comply with sound absorptive wall panel manufacturer's written instructions for minimum and maximum temperature and humidity requirements for shipment, storage and handling.
- B. Protect products during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the requirements of the manufacturer's instructions for storage and handling.
 - 1. Package products at factory prior to shipping using manufacturer's standard method.
- C. Deliver materials and panels in unopened bundles and store in a temperature controlled dry place with adequate air circulation.
- D. Protect panel edges from crushing and impact.

1.5 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. Fabric: For each fabric, color and pattern installed, furnish length equal to 10 percent of amount installed but no fewer than 10 yards.
 - 2. Mounting Devices: Full size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.
- B. Protect products during transit, storage and handling to prevent damage, soiling and deterioration. Comply with the requirements of the manufacturer's instructions for storage and handling.

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1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sound absorptive finishes until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify locations of sound absorptive finishes by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound absorptive finishes that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, fabric sagging, distorting or releasing from panel edge; or warping of core.
 - 2. Warranty Period: 2 years.
- B. Installer's Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Sound Absorptive Panels:
 - 1. Owens Corning (Basis of Design).
 - 2. Or equal.

2.2 SOUND ABSORPTIVE PANELS

- A. Product: Respond IR108 Series Acoustical Panels by Conwed, an Owens Corning Company or equal.
 - 1. Construction: Composite core of dimensionally stable rigid fiberglass, laminated with impact resistant 16-20 pcf molded glass fiber.
 - 2. Core Fiberglass Density: 6 - 7 pcf.
 - 3. Cores laminated with 1/8 inch layer of 16 - 20 pcf molded glass fiber.
 - 4. Recycled Content: For fiberglass, 52 percent pre-consumer and 5 percent post-consumer recycled content.
 - 5. Core Thickness: 7/8 inches.
 - 6. Width: 24-60 inches and custom.
 - 7. Length: 24-120 inches and custom.
 - 8. Corners: Square.
 - 9. Edge Profile: Square.
 - 10. Fabric Finish:
 - a. Knoll Beacon Fabric in Reef color or equal.

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- b. Applied directly over face and edges of panels to provide full finished edge, fully tailored corners.
- 11. Mounting Type: Aluminum Z-Clip.
- 12. Flammability (ASTM E 84): Panel components shall have a Class "A" rating per ASTM E 84.
- 13. Resistivity To Heat Or Cold: R-factor of 4.16 per inch of thickness.
- 14. Acoustical Performance: Values below are for panels mounted in accordance with ASTM C 423 (Type F5 Mounting) and vary by panel thickness and finish.
- 15. Noise Reduction Coefficient (NRC) for 7/8 inch Thickness: 0.80.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine materials, substrates, areas and conditions, with the installer present, for compliance with requirements, installation tolerances and other conditions affecting performance of the sound absorptive finishes.
- B. Do not proceed with Work until unsatisfactory conditions have been corrected.
- C. Clean sound absorptive finishes and hardware to remove deleterious and soil substances.

3.2 PREPARATION

- A. Measure each area and establish layout of panels and joints as indicated in the Drawings.
- B. Before installation, allow sound absorptive finishes to adjust and become stable in the area in which they will be installed in accordance with the manufacturer's installation instructions.

3.3 INSTALLATION

- A. Do not install any work until space is enclosed and weatherproofed, wet work in space is completed and nominally dry, work above ceilings is complete and temperature and humidity is continuously maintained at values near those of final occupancy.
- B. Comply with the manufacturers printed instructions, recommendations and approved shop drawings.
- C. Install framework, support hardware, sound absorptive finishes in accordance with the manufacturer's instructions and recommendations. Install panels vertical and plumb and if applicable, true in plane.

3.4 INSTALLATION TOLERANCES

- A. Edge Straightness: Plus or minus 1/16-inch over 8-feet.
- B. Variation from Level and Plumb: Plus or minus 1/16-inch over 8-feet.

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- C. Variation of Panel-Joint Width: Not more than hairline.

3.5 CLEANING

- A. Clean all surfaces following installation.
- B. Replace material having scratches, abrasions or other defects with unblemished sound absorptive finish assemblies at no cost to the owner.

3.6 PROTECTION

- A. Protect sound absorptive panels from damage by other trades after installation.

END OF SECTION 098413

SECTION 099000 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - 1. Surface Preparation.
 - 2. Field application of paints, stains, varnishes, and other coatings.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 1 Section "Alternates" for additional requirements.
 - 3. Division 9 Section "Graffiti-Resistant Coatings".

1.2 SUBMITTALS

- A. Product data - Submit product data sheets for each product.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.2 Low-Emitting Materials – Paints and Coatings. Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples:
 - 1. Submit two painted samples, illustrating selected colors and textures for each color and systems selected with specified coats cascaded.
 - 2. Submit on suitable backing, 8x10 inch size.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).
 - 4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.

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8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

1.4 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

1.5 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Provide lighting level of 80 ft candles measured mid-height at substrate surface.
- C. Environment Requirements:
 1. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be stored and applied.
 2. Do not paint when there is a threat of rain within 24 hours or when surface or air temperatures are at or below 40 degrees.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace paint that fails in materials or workmanship within specified warranty period.
 1. Warranty Period: 1 year.
- B. Installer Warranty: 2 years.

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1.7 EXTRA STOCK

- A. Minimum 1 gallon each product in original or new 1 gallon cans.
 - 1. Color spot each lid.
 - 2. Identify with formula, location, product and date.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Paints: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Dunn-Edwards (Basis of Design)
 - 2. Glidden (ICI) Paints.
 - 3. Sherwin Williams.
 - 4. Frazee Paint.
 - 5. Vista Paint.
 - 6. Or equal.

2.2 PAINTS AND COATINGS

- A. Ready mixed, except field-catalyzed coatings.
- B. Prepare pigments:
 - 1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogenous coating.
 - 2. For good flow and brushing properties.
 - 3. Capable of drying or curing free of streaks or sags.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application. Do not proceed unless substrate is suitable.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Plaster and Gypsum Wallboard: 12 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent
 - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

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4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 PREPARATION OF SURFACE

A. General:

1. Clean all exterior walls and surfaces of loose and scaly paint, dirt, dust, chalk, and other foreign matter by water-blasting using care not to damage substrate followed by hand scraping, sanding or wire brushing after surfaces are dry. Mildew must be treated with household bleach solution and rinsed thoroughly.
2. Patch, caulk, set protruding nails and repair all surfaces and cracks where necessary with suitable patching materials and smooth off to match adjacent surfaces.
3. Sand Glossy surfaces to dull surface and remove residue.
4. Remove mildew from affected surfaces with a solution of Tri-Sodium Phosphate and bleach. Rinse with clean water and allow to dry completely.
5. Existing surfaces to be recoated shall be thoroughly cleaned and de-glossed by sanding or other means prior to priming and painting. Patched and bare areas shall be spot primed with the same primer as specified for new work.
6. Rusty metal: Scrape, sand or wire wheel, feathering edges to sound coating. Dust surfaces. Topcoat.
7. Remove soil and body oils completely from surfaces, including handrails, door edges and posts. Treat with Liquid Sandpaper or Dull-N-Bond.
8. Remove hardware, accessories, plates, fixtures and similar items not to be finished. Reinstall at completion.
9. Paint edges of sink cut-outs.

B. Concrete Surfaces:

1. Concrete surfaces shall be dry, clean and free from efflorescence, encrustations and other foreign matter. Any glazed surface shall be slightly roughened or etched. Curing compounds, bond breakers, release agents and other coatings shall be removed with a light sandblast or high pressure power wash.

C. CMU Surfaces:

1. Remove dirt, loose mortar, scale, powder and other foreign matter from concrete block surfaces which are to be painted.
2. Unpainted CMU surfaces shall be cleaned with TSP. Rinse thoroughly. Surface shall be tested for adhesion. Prime as listed in materials section; allow to cure, then perform adhesion test with duct tape.

D. Galvanized Surfaces: Remove all oils and contamination from galvanized surfaces scheduled to be painted by washing with a compliant solvent wash.

E. Ferrous Metal: Remove grease, rust, scale, dirt and dust from ferrous metal surfaces. Primer coat shall be applied not less than 30 minutes, nor more than 3 hours after preparation of surface.

F. Primed Metal: Sand and scrape shop primed metal to remove loose primer and rust. Touch-up bare, abraded and damaged areas with metal primer. Feather edges to make touch-up patches inconspicuous.

G. Wood Surfaces:

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1. Remove dust, grit and foreign matter from wood surfaces. Sand surfaces and dust clean. Spot prime knots, pitch streaks and sappy sections with a stain blocking primer where surfaces are to be painted. Fill nail holes, cracks and other defects after priming and spot prime repairs after patching material has fully cured.
 2. Wood surfaces with peeling areas are to have edges of broken paint film sanded to a feather edge.
 3. Back prime wood trim. Paint tops, bottoms, edges and cut-outs of doors.
- H. Gypsum Board: Gypsum board shall be dusted clean and free from encrustations and other foreign matter.
- I. Preparation of other surfaces shall be performed following specific recommendations of the coating manufacturer.

3.3 PREVIOUSLY COATED SURFACES

- A. Maintenance painting will frequently not permit or require complete removal of all old coatings prior to repainting. However, all surface contamination such as oil, grease, loose paint, mill scale dirt, foreign matter, rust, mold, mildew, mortar, efflorescence, and sealers must be removed to assure sound bonding to the tightly adhering old paint. Glossy surfaces of old paint films must be clean and dull before repainting. Thorough washing with an abrasive cleanser will clean and dull in one operation, or, wash thoroughly and dull by sanding. Spot prime any bare areas with an appropriate primer. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system. Check for compatibility by applying a test patch of the recommended coating system, covering at least 2 to 3 square feet. Allow to dry one week before testing adhesion per ASTM D3359. If the coating system is incompatible, complete removal is required per ASTM D4259.

3.4 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved
- E. Sand wood surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust particles just prior to applying next coat.
- G. Stipple all edges and corners to conceal brush marks.
- H. Paint entire trim element with like color. Painting of faces only is unacceptable. Trim surfaces must be wrapped with the trim color and not "faced off" or "Hollywooded".

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- I. Doors: Paint entire door unless otherwise noted, including door top and bottom edge surfaces.
- J. Tinting: Tint each primer a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint primer to match the color of the finish coat, but provide sufficient differences in shade of primer to distinguish each separate coat.

3.5 PROTECTION

- A. Protect work of other trades and items not intended to receive paint. Install "wet paint" signs to protect newly painted surfaces.

3.6 CLEANING

- A. Protection - Carefully protect areas where work is in progress from damage.
 - 1. Provide and spread clean drop cloths when and where required to provide the necessary protection.
 - 2. Immediately clean-up all accidental spatter, spillage, misplaced paint and restore the affected surface to its original condition.
- B. Clean-up:
 - 1. Clean up debris daily per OSHA requirements.
 - 2. At completion of work, remove all materials, supplies, debris and rubbish and leave each area in a clean, acceptable condition.
 - 3. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.7 SURFACES TO BE FINISHED

- A. Paint all new work and areas affected by new work, unless noted otherwise.
- B. Do not paint or finish the following items:
 - 1. Items fully factory-finished unless specifically noted.
 - 2. Fire rating labels, equipment serial number and capacity labels.
- C. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
 - 1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
 - 2. Paint shop primed items occurring in finished areas.
 - 3. Paint interior surfaces of air ducts and convactor and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint.
 - 4. Paint dampers exposed behind louvers, grilles and convactor and baseboard cabinets to match face panels.

3.8 PAINT SYSTEMS – EXTERIOR

- A. Concrete and Plaster:
 - 1. Flat – Modified Copolymer / 100% Acrylic:

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- a. First Coat: FLEX-PRIME Select, Flexible Crack-Resistant Primer (FPSL00) or EFF-STOP SELECT Interior /Exterior Primer Sealer (ESSL00).
 - b. Second Coat: SPARTASHIELD Exterior Flat Paint (SSHL10).
 - c. Third Coat: SPARTASHIELD Exterior Flat Paint (SSHL10).
- B. “Base Bid” Option: Dunn Edwards EFF-Stop Primer and Two Coats of Dunn Edwards Evershield Evsh 50 Semi-gloss Solid Paint Finish in color selected. This will provide additional protection and it will be easy to wipe off dirt and scuff marks from the smooth plaster finish.
- C. “Alternate #3” Option (Anti-Graffiti Coat Upgrade): Same paint system as above with Two Coats of Permashield 200 Two Pack Urethane over the paint system as a clear protective additional layer. Must allow minimum 5 days dry time in good weather for full cure of paint coats prior to application of this clear topcoat. To maintain a consistent finish, we recommend this be applied to the full height exterior plaster wall, where the wall is within 6 feet of a walkable surface.
- D. Concrete Block – CMU:
1. Flat –Acrylic Copolymer / 100% Acrylic:
 - a. First Coat: SMOOTH BLOCFIL SELECT CONCRETE BLOCK FILLER (SBSL00).
 - b. Second Coat: SPARTASHIELD Exterior Flat Paint (SSHL10).
 - c. Third Coat: SPARTASHIELD Exterior Flat Paint (SSHL10).
- E. Wood – Paint Finish:
1. Flat:
 - a. First Coat: EZ-PRIME Premium, Exterior Wood Primer (EZPR00).
 - b. Second Coat: SPARTASHIELD Exterior Flat Paint (SSHL10).
 - c. Third Coat: SPARTASHIELD Exterior Flat Paint (SSHL10).
 2. Velvet:
 - a. First Coat: EZ-PRIME Premium, Exterior Wood Primer (EZPR00).
 - b. Second Coat: SPARTASHIELD Exterior Velvet Paint (SSHL20).
 - c. Third Coat: SPARTASHIELD Exterior Velvet Paint (SSHL20).
 3. Eggshell:
 - a. First Coat: EZ-PRIME Premium, Exterior Wood Primer (EZPR00).
 - b. Second Coat: SPARTASHIELD, Exterior Eggshell Paint (SSHL30).
 - c. Third Coat: SPARTASHIELD, Exterior Eggshell Paint (SSHL30).
 4. Low Sheen:
 - a. First Coat: EZ-PRIME Premium, Exterior Wood Primer (EZPR00).
 - b. Second Coat: SPARTASHIELD, Exterior Low Sheen Paint (SSHL40).
 - c. Third Coat: SPARTASHIELD, Exterior Low Sheen Paint (SSHL40).
 5. Semi-Gloss:
 - a. First Coat: EZ-PRIME Premium, Exterior Wood Primer (EZPR00).
 - b. Second Coat: SPARTASHIELD, Exterior Semi-Gloss Paint (SSHL50).
 - c. Third Coat: SPARTASHIELD, Exterior Semi-Gloss Paint (SSHL50).
 6. Gloss:
 - a. First Coat: EZ-PRIME Premium, Exterior Wood Primer (EZPR00).
 - b. Second Coat: SPARTASHIELD, Exterior Gloss Paint (SSHL60).
 - c. Third Coat: SPARTASHIELD, Exterior Gloss Paint (SSHL60).
- F. Wood Rough Sawn – Stain Finish – Opaque:
1. Two Coats SPARTASHIELD Exterior Flat Paint (SSHL10).

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- G. Wood – Stain Finish – Semi-Transparent:
 - 1. Two Coats: OKON WEATHER PRO, 100% Acrylic Semi-Transparent Stain (WPT3).

- H. Ferrous Metal:
 - 1. Semi-Gloss – Alkyd Emulsion / 100% Acrylic:
 - a. First Coat: BLOC-RUST Red Oxide or White (BRPR00-1-RO or BRPR00-1-WH)
 - b. Second Coat: SYN-LUSTRO, Rust Preventive 100% Acrylic Semi-Gloss Paint (W-9). SPARTASHIELD Exterior Semi-Gloss Paint (SSHL50).
 - c. Third Coat: SYN-LUSTRO, Rust Preventive 100% Acrylic Semi-Gloss Paint (W-9). SPARTASHIELD Exterior Semi-Gloss Paint (SSHL50).

- I. Non-Ferrous (Galvanized) Metal:
 - 1. Semi-Gloss – Alkyd / 100% Acrylic:
 - a. Pretreatment: SUPREME CHEMICAL, METAL CLEAN AND ETCH (ME 01).
 - b. First Coat: GALV-ALUM Premium, Non Ferrous Metal Primer (GAPR00). ULTRA GRIP Premium (UGPR00) Interior Exterior Primer.
 - c. Second Coat: SYN-LUSTRO, Rust Preventive 100% Acrylic Semi-Gloss Paint (W-9).SPARTASHIELD Exterior Semi-Gloss Paint (SSHL50)
 - d. Third Coat: SYN-LUSTRO, Rust Preventive 100% Acrylic Semi-Gloss Paint (W-9). SPARTASHIELD Exterior Semi-Gloss Paint (SSHL50)

3.9 PAINT SYSTEMS -INTERIOR - ZERO VOC

- A. Gypsum Board:
 - 1. Flat, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Flat Paint (W 601).
 - 2. Low Sheen, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Low Sheen Paint (W 602).
 - 3. Semi-Gloss, Acrylic, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Acrylic Semi-Gloss Paint (W 603).

- B. Concrete and Plaster:
 - 1. Flat, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Flat Paint (W 601).
 - 2. Low Sheen, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Low Sheen Paint (W 602).
 - 3. Semi-Gloss, Acrylic, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Acrylic Semi-Gloss Paint (W 603).

- C. Masonry (CMU) with Block Filler:

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1. Flat, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: CONCRETE BLOCK FILLER - Smooth (W 315), BLOCFIL SELECT Interior /Exterior Smooth Block Filler (SBSL00).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Flat Paint (W 601).
 2. Low Sheen, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: CONCRETE BLOCK FILLER - Smooth (W 315), BLOCFIL SELECT Interior /Exterior Smooth Block Filler (SBSL00).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Low Sheen Paint (W 602).
 3. Semi-Gloss, Acrylic, Low-Odor/Zero-VOC:
 - a. First Coat: CONCRETE BLOCK FILLER - Smooth (W 315), BLOCFIL SELECT Interior /Exterior Smooth Block Filler (SBSL00).
Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Acrylic Semi-Gloss Paint (W 603).
- D. Wood:
1. Flat, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Flat Paint (W 601).
 2. Low Sheen, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Low Sheen Paint (W 602).
 3. Semi-Gloss, Acrylic, Low-Odor/Zero-VOC:
 - a. First Coat: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Primer (W 600).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Acrylic Semi-Gloss Paint (W 603).
- E. Metals: Ferrous
1. Flat, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: BLOC-RUST Red Oxide or White (BRPR00-1-RO or BRPR00-1-WH) or GALV-ALUM Premium (GAPR00).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Flat Paint (W 601).
 2. Low Sheen, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: BLOC-RUST Red Oxide or White (BRPR00-1-RO or BRPR00-1-WH) or GALV-ALUM Premium (GAPR00).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Low Sheen Paint (W 602).
 3. Semi-Gloss, Acrylic, Low-Odor/Zero-VOC:
 - a. First Coat: BLOC-RUST Red Oxide or White (BRPR00-1-RO or BRPR00-1-WH) or GALV-ALUM Premium (GAPR00).
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Acrylic Semi-Gloss Paint (W 603).
- F. Metals: Non-Ferrous.
1. Flat, Modified Copolymer, Low-Odor/Zero-VOC:
 - a. First Coat: GALV-ALUM Premium (GRPR00) or ULTRA GRIP Premium Primer (UGPR00)
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Flat Paint (W 601)
 2. Low Sheen, Modified Copolymer, Low-Odor/Zero-VOC:

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- a. First Coat: GALV-ALUM Premium (GAPR00) or ULTRA GRIP Premium Primer (UGPR00)
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Latex Low Sheen Paint (W 602).
3. Semi-Gloss, Acrylic, Low-Odor/Zero-VOC:
- a. First Coat: GALV-ALUM Premium (GAPR00) or ULTRA GRIP Premium Primer (UGPR00)
 - b. Two Coats: ECOSHIELD Low-Odor/Zero-VOC Interior Acrylic Semi-Gloss Paint (W 603).
- G. Product: Everest (Interior velvet paint) by Dunn-Edwards or equal.
1. First coat: Primer.
 2. Two coats: Everest.
 3. Use:
 - a. Walls: Semi-gloss finish.
 - b. Ceilings: Flat finish.
 - c. Wainscot Under Chair Rails: Satin Finish.

3.10 COLORS

- A. To be selected by Architect from manufacturer's full range of colors.

END OF SECTION 099000

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
 - 1. Urethane system.
 - a. Steel Surfaces.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.
 - 2. Division 5 Section "Architecturally Exposed Structural Steel" for steel framing.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.2 Low-Emitting Materials – Paints and Coatings. Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".
- C. Samples for Initial Selection: For each type of finish-coat product indicated.
- D. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- E. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
 - 3. 2016 California Electrical Code (CEC), Part 3, Title 24 CBSC (2014 National Electrical Code, with California Amendments).

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4. 2016 California Mechanical Code (CMC), Part 4, Title 24 CBSC (2015 Uniform Mechanical Code, with California Amendments).
5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
6. 2016 California Energy Code, Part 6, Title 24 CBSC.
7. 2016 California Historical Code, Part 8, Title 24 CBSC.
8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.
15. NFPA 20 - Stationary Pumps, 2016 Edition.
16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
21. Americans with Disabilities Act (ADA), Title II.

B. Qualifications:

1. Contractor: Contractor is responsible for quality control of the Work.
2. Manufacturer: A firm experienced in successfully producing work similar to that indicated for this Project, with a record of successful in-service performance, and with sufficient production capacity to produce required units without causing delay in the Work.
3. Installer: An installer trained in the use of the materials and equipment to be employed in the Work.

C. Single Source Responsibility:

1. Obtain materials from a single manufacturer for the complete system.
2. Provide primers and undercoat material produced by the same manufacturer as the finish coats.
3. Use only thinners recommended by the manufacturer, and only within recommended limits.

D. Mockups: Apply benchmark samples of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each type of coating and substrate.
2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
3. Final approval of color selections will be based on benchmark samples.

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- a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

- E. Pre-Installation Meetings: Contractor to conduct meetings at site with installer prior to start of Work. Familiarize installer with conditions at site and related Work.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General: Deliver materials in manufacturer's original packaging with label indicating pertinent information identifying the item. Store materials in accordance with manufacturer's instructions in a protected dry location off ground. Do not open packaging nor remove labels until time of installation. Include the following.
 1. Name or title of material.
 2. Federal Specification number, if applicable.
 3. Manufacturer's name, stock number and date of manufacture.
 4. Shelf life.
 5. Thinning instructions.
 6. Color name and number.
 7. Handling instructions and precautions.
- B. Storage and Protection: Store materials not in actual use in tightly covered containers at a minimum ambient temperature of 45 deg. F in a well ventilated area. Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue.
 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary precautionary measures to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of coatings.

1.5 PROJECT CONDITIONS OR SITE CONDITIONS

- A. Environmental Requirements: Proceed with the Work in accordance with manufacturer's requirements and instructions and any agreements or restrictions of the Pre-Construction Conference. , including the following:
 1. Apply coatings only when the temperature of surfaces to be coated and surrounding air temperatures are above 45 deg. F, unless otherwise permitted by manufacturer's printed instructions.
 2. Do not apply coatings in snow, rain, fog or mist, or when the relative humidity exceeds 85 percent, or at temperatures less than 5 deg. F above the dew point, or to damp or wet surfaces unless otherwise permitted by manufacturer's printed instructions. Allow wet surfaces to dry thoroughly and attain the temperature and conditions specified before proceeding with or continuing the coating operation.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace high-performance coatings that fails in materials or workmanship within specified warranty period.
 1. Warranty Period: 1 year.

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- B. Installer Warranty: 2 years.

1.7 EXTRA STOCK

- A. Provide following:
 - 1. Minimum 1 gallon each product in original or new 1 gallon cans.
 - a. Color spot each lid.
 - b. Identify with formula, location, product and date.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. High-Performance Coatings: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 - 1. Carboline. (Basis of Design)
 - 2. Devoe - International Paint Inc (Akzo Nobel).
 - 3. Tnemec Company Inc.
 - 4. PPG Industries, Pittsburgh Paints.
 - 5. Or equal.

2.2 FINISH MATERIALS

- A. Exterior surfaces:
 - 1. Ferrous Metal:
 - a. Apply first coat to all surfaces Carbozinc 859 3.0 to 5.0 mils OFT.
 - b. Apply second coat to all surfaces Carboguard 890 epoxy 6.0 to 8.0 mils OFT.
 - c. Apply third coat to all surfaces Carbothane 143 HG 2.0to 3.0 mils OFT (Gloss)
Carbothane 133 MC 3.0 to 5.0 mils OFT (Semi Gloss).
- B. Interior surface:
 - 1. Apply first coat to all surfaces Carboguard 890 epoxy 6.0 to 8.0 mils OFT
 - 2. Apply second coat to all surfaces Carbothane 143 HG 2.0to 3.0 mils OFT (Gloss)
Carbothane 133 MC 3.0 to 5.0 mils OFT (Semi Gloss).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Examine and correct conditions of area to receive the Work prior to installation.
 - 1. Start of coating work will be construed as the Applicator's acceptance of surfaces within particular area.

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3.2 SURFACE PREPARATION

A. Exterior:

1. Surface preparation definitions for expose metal: SSPC-SP10 / NACE 2 Near-White BlastCleaning
 - a. When viewed without magnification shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, oxides, corrosion products and other foreign matter of at least 95% of each unit area. Staining shall be limited to no more than 5 percent of each unit area, and may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coatings. Unit area shall be approximately 3 in. x 3 in. (9 sq. in.).

B. Interior:

1. SSPC-SP2 Hand Tool Cleaning
 - a. Removes all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter by hand chipping, scraping, sanding, and wire brushing.
2. SSPC-SP3 Power Tool Cleaning:
 - a. Removes all loose mill scale, loose rust, loose paint, and other loose detrimental foreign matter by power wire brushing, power sanding, power grinding, power tool chipping, and power tool descaling.

3.3 INSTALLATION

A. General: Install system in accordance with manufacturer's printed installation instructions, submittals, applicable industry standards, and governing regulatory requirements for the Work.

1. Minimum Coating Thickness: Apply each material at not thinner than the manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by the manufacturer.
2. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or recoat work not in compliance with specified requirements.

B. Metal Surfaces:

1. Prime Coats: Before application of top coats, apply a prime coat, as recommended by the manufacturer, to material required to be coated or finished, and which has not been prime coated by others.
 - a. Recoat primed and sealed substrates where there is evidence of suction spots or unsealed areas in the first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
2. Intermediate Coats: Color shall approximate finish coat color, except shall be a different tint from finish coat color. Sheen shall be of a degree that will not be detrimental to intercoat adhesion.
3. Finish Coats: Color and sheen shall be as selected by Architect. Sheen range as acceptable to Architect.

3.4 PROTECTION

- A. Protect work of other trades, whether to be coated or not, against damage from coating. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to the Architect. Leave in an undamaged condition.

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- B. Provide "Wet Paint" signs to protect newly-coated finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of coating operations.
 - 1. At completion of construction activities of other trades, touch-up and restore damaged or defaced coated surfaces.

END OF SECTION 099600

SECTION 099623 – GRAFFITI-RESISTANT COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes:
 - 1. Non-sacrificial, clear anti-graffiti coating system.
- B. Related Sections:
 - 1. Division 1 Section "Sustainable Design Requirements" for additional LEED requirements.

1.2 SUBMITTALS

- A. Product Data: Written product list and description of products to be used with manufacturer's printed literature for each product.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.2 Low-Emitting Materials – Paints and Coatings. Provide VOC content data for materials used. Data typically available in manufacturer spec or MSDS. Include LEED Product Submittal Cover Sheet from Division 1 Section "Sustainable Design Requirements".

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. 2016 California Building Standards Administrative Code, Part 1, Title 24 CBSC.
 - 2. 2016 California Building Code (CBC), Part 2, Title 24 CBSC. (2015 International Building Code of the International Code Council, with California Amendments).
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 - 5. 2016 California Plumbing Code (CPC), Part 5, Title 24, CBSC (2015 Uniform Plumbing Code, with California Amendments).
 - 6. 2016 California Energy Code, Part 6, Title 24 CBSC.
 - 7. 2016 California Historical Code, Part 8, Title 24 CBSC.
 - 8. 2016 California Fire Code, Part 9, Title 24 CBSC. (2015 International Fire Code, with California Amendments).
 - 9. 2016 California Green Building Standards Code (CALGreen Code), Part 11, Title 24 CBSC.
 - 10. 2016 California Referenced Standards Code, Part 12, Title 24, CBSC.
 - 11. NFPA 13 - Automatic Sprinkler Systems (California Amended), 2016 Edition.
 - 12. NFPA 14 - Standpipe Systems (California Amended), 2013 Edition.
 - 13. NFPA 17 - Dry Chemical Extinguishing Systems, 2013 Edition.
 - 14. NFPA 17A - Wet Chemical Extinguishing Systems, 2013 Edition.

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15. NFPA 20 - Stationary Pumps, 2016 Edition.
 16. NFPA 24 - Private Fire Service Mains (California Amended), 2016 Edition.
 17. NFPA 72 - National Fire Alarm and Signaling Code (California Amended).
 18. NFPA 80 - Fire Door and Other Opening Protectives, 2016 Edition.
 19. NFPA 253 - Critical Radiant Flux of Floor Covering Systems, 2015 Edition.
 20. NFPA 2001 - Clean Agent Fire Extinguishing Systems (California Amended), 2015 Edition.
 21. Americans with Disabilities Act (ADA), Title II.
- B. Manufacturer Qualifications: Capable of providing field service representation during installation and who will approve the installer and application method.
- C. Installer Qualifications: Installer experienced in performing this type of work and who has specialized in work similar to the type required for this project.
- D. Mock-Up or Test Panels: Before full-scale application, test products to be used on a mock-up or test panels on the CMU being supplied to the project.
1. Review manufacturer's product data sheets to determine suitability of each product for each surface.
 2. Apply products using manufacturer-approved application methods, determining actual requirements for surface preparation, coverage rate, number of coats, and application procedures.
 3. After 48 hours, review effectiveness of protection, compatibility with substrates, and ability to achieve desired results.
 4. Obtain approval by Designated Representative and Architect of workmanship, color, and texture before proceeding with work.
 5. Test Panels: Inconspicuous sections of actual construction.
 - a. Location and number as selected by Designated Representative.
 - b. Size: 4 feet by 4 feet.
 - c. Repair unacceptable work to the satisfaction of the Designated Representative.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in time to avoid construction delays.
- B. Deliver and store products in manufacturer's original packaging with identification labels intact.
- C. Store products protected from weather and at temperature and humidity conditions recommended by manufacturer.

1.5 PROJECT CONDITIONS

- A. Do not apply products under conditions outside manufacturer's requirements, which include:
 1. Surfaces that are frozen; allow complete thawing prior to installation.
 2. Surface and air temperatures below 40 degrees F.
 3. Surface and air temperatures above 95 degrees F.
 4. When surface or air temperature is not expected to remain above 40 degrees F for at least 8 hours after application.
 5. Wind conditions that may blow water repellents onto surfaces not intended to be treated.

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6. Less than 24 hours after a rain.
7. When rain is expected less than 6 hours after installation.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of anti-graffiti coating system that fails in materials or workmanship within specified warranty period.
 1. Warranty Period: 2 years.
- B. Installer Warranty: 2 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Anti-Graffiti System: Subject to compliance with requirements, provide either the named product or an equal product by one of the other manufacturers specified.
 1. Microguard. (Basis of Design).
 2. Or equal.

2.2 ANTI-GRAFFITI SYSTEM

- A. Product: AD1000 All-In-One Hard Surface Finish by Microguard or equal.
 1. Provides a permanent, non-sacrificial, protective barrier for many bare and painted surfaces where graffiti tagging is a problem.
 2. The non-stick, repelling properties of this clear treatment prevent graffiti from attaching to the surface making removal quick and simple.
 3. All forms of aerosol and roller-applied paint, permanent marker, ink, etc. can be easily removed using solvent or one of many graffiti cleaners without damaging the protective clear coat.
 4. A reactive siloxane coating that forms an unbreakable bond at the molecular level with a variety of surfaces.
 5. Can also be used in protecting painted metal, fiberglass, signs, benches, bathrooms, interior and exterior walls, elevators, stainless steel, non-ferrous metal, painted or bare masonry and concrete.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that substrates are acceptable for product installation; do not begin until substrates meet manufacturer's requirements.
 1. Masonry, including mortar and concrete plaster, must cure a minimum of 28 days prior to applying anti-graffiti coating system.

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- B. Do not begin until mock-up/test panels have been approved by Architect.

3.2 SURFACE PREPARATION

- A. Protect adjacent surfaces not to be treated prior to beginning application.
- B. Repair, patch and fill cracks, voids, defects, and damaged areas to satisfaction of manufacturer. Allow repair materials to cure completely.
- C. Ensure that the surface is free of graffiti and contaminants such as dust, dirt, form oil, grease, wax, curing compounds, grime and loose paint. Clean the surface by any of the following methods, as approved by anti-graffiti coating system manufacturer:
 1. Water blasting: Use water at a minimum pressure of 2,000 psi.
 2. Steam cleaning: Use high, medium or low pressure depending on the condition of the surface.
 3. Sandblasting: As required for a clean surface, remove sand with water rinse.
 4. Cleaning solution: Scrub with a low residue, easily rinsed solution to remove all grease and wax build-up.
 5. Sand paper or wire wool: Lightly etch surface, then remove all residue.
 6. Acid etch: Rinse with appropriate acid, then neutralize and rinse surface thoroughly. Allow the surface to dry thoroughly for a minimum of 24 to 48 hours after rinsing.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations, product data, and container label instructions.
- B. Mix materials in strict accordance with manufacturer's instructions; do not dilute unless permitted by manufacturer.
- C. Prevent overspray, wind drift, and splash onto surfaces not to be treated.
- D. Provide the services of the manufacturer's authorized field representative to verify that installed products comply with manufacturer's requirements and with the standard established by approved mock-up/test panels.

3.4 CLEANING AND PROTECTION

- A. At completion of work, remove protective coverings.
- B. If surfaces that should have been protected from damage by this work have been damaged, clean, repair or replace to the satisfaction of Architect.
- C. Repair or replace damaged treated surfaces.
- D. Protect completed work from damage during construction.

END OF SECTION 099623