



PROJECT MANUAL

Volume 1

For

PICO BRANCH LIBRARY AT VIRGINIA AVENUE PARK

Santa Monica, CA

BID SET

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KEA Project Number **1001**

Prepared by

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DIVISION 01

GENERAL REQUIREMENTS

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. Contractor-furnished, Owner-installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and drawing conventions.
14. Miscellaneous provisions.

- B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Pico Branch Library.

1. Project Location: 2201 Pico Blvd., Santa Monica, CA.

- B. Owner: City of Santa Monica

1. Owner's Representative: Tom Afschar, Architect
Architect: Koning Eizenberg
1454 25th Street
Santa Monica, CA 90404
310.828.6131

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. New construction of a single story branch library within Virginia Avenue Park. The proposed building sits along the south elevation of the existing Thelma Terry building. The 8,690 GSF structure is broken up into two masses connected by a single roof. The building will be Type VB construction and will require a minimum LEED silver certification.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.5 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
 - 1. Security Equipment: Key Pad Control Entry System
 - a. The installation of conduit and raceway is not part of the Security Equipment contract scope and shall be provided by the general contractor.

1.6 PURCHASE CONTRACTS

- A. General: Owner has negotiated purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum, unless otherwise indicated.
 - 1. Contractor's responsibilities are same as if Contractor had negotiated purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.
- B. Purchase Contracts Information:
 - 1. Book Sorting System:
Purchase Contract Firm and Representative:

Tech Logic Corporation
Mike Heitzman
1818 Buerkle Road
White Bear Lake, MN 55110
Toll Free: 800-494-9330

- a. Purchase Contract Scope: Material and installation labor of 5 Bin Interior Book drop, RFID, Staff Induction, Multi Bin System control Software, (5) IA125 Bin with Control Box, Installation and Training.
- b. Purchase Status: Price negotiated by Owner, to be incorporated in the Contract Sum by Contractor; see Section 012100 "Allowances" for cash allowance for purchase contract

- 2. Library Shelving:
Purchase Contract Firm and Representative:
Interra Inc.
384 Forrest Ave #14
Laguna Beach, CA 92651
949-497-0277

- a. Purchase Contract Scope: Material and installation labor of Library Shelving, Custom End Panels, Custom Canopy Tops and OPAC Stations.
- b. Purchase Status: Price negotiated by Owner, to be incorporated in the Contract Sum by Contractor; see Section 012100 "Allowances" for cash allowance for purchase contract

- 3. Network Infrastructure build out and Network Active Equipment:
Purchase Contract Firm and Representative:
TBD

- a. Purchase Contract Scope: Material and installation labor of data network components.
Network Infrastructure build out:
 - IDF build out (Ladder Racks/Floor Standing Racks)
 - Grounding of Ladder Racks and Floor Standing Racks from supplied Ground Busbar
Network Active Equipment:
 - Procurement of Active Equipment (Cisco Switch; UPS; Wi-Fi)
 - Configuration of Network Equipment and Wi-Fi
 - Installation of Network Equipment and Wi-Fi
- b. Purchase Status: Price negotiated by Owner, to be incorporated in the Contract Sum by Contractor; see Section 012100 "Allowances" for cash allowance for purchase contract
- c. The installation of conduit and raceway is not part of this purchase contract scope and to be provided by the general contractor.

1.7 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, assembling, protecting, and installing Owner-furnished products.
- B. Owner-Furnished Products:
 - 1. Furniture
 - a. The wiring and final connection of electrified furniture is not part of the owner furnished scope and to be provided by the general contractor.

1.8 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on drawing A1.06 – Staging Plan by the staging legend limits and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. If utility or other work is required to be performed outside of project site area, contractor to provide a minimum of 14 day notice to owner explaining time need, area affected, duration of work and date of completion.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
- D. Maintain access to the Fire Lane by emergency vehicles as directed by Fire Marshal.
- E. The area occupied by the Farmers Market must be clear and available for Farmers Market use on Saturdays.
- F. Contractor may utilize the Virginia Avenue Park Overflow lot on the East portion of VAP along Cloverfield Blvd (approximately 60 parking spaces) for contractor parking and temporary construction office).
 - a. The parking spaces in the overflow lot must be made available to the public on Saturdays during Farmers market hours.

- b. Contractor to maintain turf area during construction and repair damages areas.
- c. Contractor to restore turf area to its original condition after completion of construction.

1.9 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

1.10 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 8 a.m. to 6 p.m., Monday through Friday, unless otherwise indicated.
 - 1. Weekend Hours: No work on weekends unless approved by City.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Construction Manager not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Construction Manager's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Construction Manager not less than two days in advance of proposed disruptive operations.
 - 2. Comply with City construction noise ordinance.

1.11 SPECIFICATION AND DRAWING CONVENTIONS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Addenda, General Conditions, Construction Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
 - 1. Certain materials and equipment are specified in the Contract Documents by allowances. In some cases, these allowances include installation. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
 - 2. Agency stipulated cash allowance is included in the bid schedule.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Construction Manager of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Construction Manager's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by the City from the designated supplier.

1.4 SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

1.5 AGENCY STIPULATED ALLOWANCES

- A. Use the agency stipulated allowance only as directed by the City.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by City under the agency stipulated allowance are included in the allowance. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. At Project closeout, credit unused amounts remaining in the allowance to City by Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Purchase Contract Allowance: Include an allowance of \$199,182.38 for the Purchase Contract with Tech Logic Corporation as specified in Section 011000 "Summary".
- B. Allowance No. 2: Purchase Contract Allowance: Include an allowance of \$91,900.00 for the Purchase Contract with Interra Inc. as specified in Section 011000 "Summary".
- C. Allowance No. 3: Purchase Contract Allowance: Include an allowance of \$61,500 for the Purchase Contract for Network Infrastructure build out and Network Active Equipment as specified in Section 011000 "Summary".
- D. Allowance No. 4: Quantity Allowance: Include 250 cu. yd. of unsatisfactory soil excavation and disposal off-site and replacement with satisfactory soil material from off-site, as specified in Section 312000 "Earth Moving."

E. Allowance No. 5: Miscellaneous and Structural Steel.

Include 2000 lbs. of miscellaneous structural steel for lintels and other supports not otherwise indicated in the Contract Documents, according to Section 051200 "Structural Steel Framing" , Section 055000 "Metal Fabrication and Section 012700 Unit Prices".

F. Allowance No. 6: Structural Steel.

Include an allowance of \$18,000 for additional steel detailing of structural steel connections and supports not otherwise indicated in the Contract Documents, according to Section 051200 "Structural Steel Framing" and Section 055000 "Metal Fabrications."

G. Allowance No. 7: Existing Operating Facility Limitations.

Include an allowance of \$25,000 for working around existing operating facility limitations.

H. Allowance No. 8: Additional Misc. Devices.

Include an allowance of \$25,000 for additional electrical outlet, junction box, hose bibs, data drops not otherwise indicated in the Contract Documents.

I. Allowance No. 9: Unforeseen Existing Conditions.

Include an allowance of \$15,000 for unforeseen existing conditions not indicated in the Contract Documents.

J. Allowance No. 10: Architectural Concrete.

Include an allowance of \$10,000 for architectural concrete not otherwise indicated in the Contract Documents.

K. Allowance No. 11: Security System.

Include an allowance of \$22,500 for the installation of a security system not otherwise indicated in the Contract Documents.

L. Allowance No. 12: Contingency Allowance.

Include a contingency allowance of \$75,000.00 for use according to Owner's written instructions.

M. Allowance No. 13: Plan Check Contingency Allowance.

Include a contingency allowance of \$75,000.00 for use according to Owner's written instructions to cover revisions in the Construction Documents in response to plan check corrections.

END OF SECTION SM012100

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
- B. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

- A. Coordination:
 - 1. Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 2. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. A Schedule of Alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS

NOT APPLICABLE

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Section 09 69 00 - In lieu of an access floor system at the Workroom, provide for slab on grade with the finish as shown on sheet A9.40.
- B. Alternate No. 2: In lieu of the Tiger Drylac 75 powder coated finish on the exterior metal panels, provide for Cardinal powder coating. Color to be chosen from the standard "whites and grays" selection.

- C. Alternate No. 3: Rainwater harvesting with a combination below-grade tank and above-grade cistern.
- D. Alternate No. 4: Carpet tile in lieu of cork tile where indicated.

END OF SECTION

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 012100 "Allowances" for products selected under an allowance.
 - 2. Section 012300 "Alternates" for products selected under an alternate.
 - 3. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Substitution Requests: Submit five copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 15 days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 30 days of receipt of request, or 15 days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Except as otherwise noted and permitted by law, whenever in the Contract Documents any material or process is indicated or specified by two or fewer patents, proprietary names, brand names and/or manufacturers, such specification shall be deemed pursuant to Public Contract Code 3400 to be followed by the words "or approved equal".
- B. Contractor shall have ten (10) Days after submission of the Bid to submit data substantiating substitution of "or equal" items. City, with the advice of the Design Consultant, will determine whether the proposed brand or item is equal in quality and utility to that specified in the Contract Documents, and its decision shall be final. City, Construction Manager or Design Consultant may require the submission of samples, formulae, and/or statements of physical properties for consideration in determining equality of the material or process in question. No proposal for an equal will be considered complete unless accompanied by complete information and descriptive data necessary to determine the equality of the offered equal.
- C. If Contractor requests use of substitute material or process, it shall be incumbent upon Contractor to furnish sufficient evidence to support the claim of equality to the satisfaction of City, Construction Manager or Design Consultant.
- D. If City accepts for use in the Project a substitute material or process which in the opinion of City, Construction Manager or Design Consultant is not the equal of that specified, a Change Order shall be issued issuing a credit to City for the difference in value.

Substitutions by Contractor that are incorporated into the Work without the prior review and Approval by City, Construction Manager or Design Consultant in accordance with the requirements of the Contract Documents shall be deemed to be Defective Work.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

CHANGE ORDER REQUEST (PROPOSAL)

Project: _____ Change Order Request Number: _____

From (Contractor): _____
To: _____ Date: _____

A/E Project Number: _____
Re: _____ Contract For: _____

This Change Order Request (C.O.R.) contains an itemized quotation for changes in the Contract Sum or Contract Time in response to proposed modifications to the Contract Documents based on Proposal Request No. _____.

Description of Proposed Change:

Attached supporting information from: ☐ Subcontractor ☐ Supplier ☐ _____ ☐ _____

Reason For Change:

Does Proposed Change involve a change in Contract Sum? ☐ No ☐ Yes [Increase] [Decrease] \$ _____
Does Proposed Change involve a change in Contract Time? ☐ No ☐ Yes [Increase] [Decrease] _____ days.

Attached pages: ☐ Proposal Worksheet Summary: _____
☐ Proposal Worksheet Detail(s): _____

Signed by: _____ Date: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

SECTION 01 25 10 - CONTRACTOR'S REQUEST FOR INTERPRETATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. This Section covers general requirements for Contractor's Requests for Interpretation (RFI).
 - 2. Procedure for Shop Drawings, Product Data and Samples submittals are specified elsewhere in Division One.
 - 3. Procedures for substitutions are specified elsewhere in Division One.

1.2 GENERAL

- A. Contractor shall be responsible for its costs to implement and administer RFI during the life of the Contract.
- B. Contractor may be responsible to the City for the cost of answering RFI where the answer can reasonably be found by a review of the Contract Documents.

1.3 CONTRACTOR'S REQUESTS FOR INTERPRETATION

- A. Submit a Request for Interpretation to the Design Consultant when:
 - 1. An unforeseen condition or constructibility question occurs.
 - 2. Questions regarding information in the Contract Documents arise.
 - 3. Information not found in the Contract Documents is required.
- B. When possible, request such interpretation either verbally or in writing at the next scheduled Project meeting.
 - 1. When the RFI is answered at the Project meeting, number the RFI and enter the response into the meeting minutes.
 - 2. When the urgency of the need, or the complexity of the item makes interpretation at the next scheduled Project meeting impractical, prepare and submit a formal written RFI to the Design Consultant without delay.
- C. RFI received directly from a subcontractor will be returned unprocessed to the Contractor.

1.4 SUBMITTAL

- A. Submit RFIs within a reasonable time frame so as not to interfere with, or impede the progress of the Work.
 - 1. Keep the number of RFIs to a minimum.
 - 2. When the number and frequency of RFIs submitted becomes unwieldy, the Design Consultant may require the Contractor to abandon the process and submit requests as either submittals, substitutions, or requests for change.
 - 3. When an answer to an RFI has an effect on cost or time, notify the Design Consultant in accordance with the Contract Documents when the RFI is received. Notification shall occur prior to commencing such work, so that the change order process, when authorized, can be initiated.

4. When submitting an RFI, alert the Design Consultant, in writing, to the time available before the response will cause an impact to the Project schedule.
- B. When submitted in writing, submit the RFI in quadruplicate in digital format as follows:
1. Submit a legible written request on preprinted form provided, or another form approved in advance by the Design Consultant. Include the following information:
 - a. Project name, as listed on the Contract Documents, Design Consultant's project number or other identifying number, if any.
 - b. Date.
 - c. Name, address, telephone and FAX numbers of the Contractor.
 - d. Number and title of affected Specification Section or Sections.
 - e. Drawing numbers and detail references, as appropriate.
 - f. Clear, concise explanation of information or interpretation requested.
 - g. Blank, lined spaces for Design Consultant's written response.
- C. Each page of each attachment to the RFI shall bear the RFI number in the lower right corner.
- D. Number submitted RFIs consecutively.
- E. Sign and stamp all RFI forms. RFI from subcontractors or material suppliers shall be submitted through, and be reviewed by the Contractor prior to submittal to the Design Consultant.
- F. Unanswered RFI will be returned with a stamp or notation "NOT REVIEWED."
- G. Prepare and maintain an RFI log on the form provided, or an equivalent form acceptable to the Design Consultant. Update on a weekly basis. Log RFI number, brief description of content or subject discussed, date submitted, and date answered. Keep log current and furnish copy when so requested by the Design Consultant.
- H. Allow a minimum of 5 working days for review and response time; the response time will be increased if more information is required, when the RFI is submitted out-of-sequence, or if in the opinion of the Design Consultant, more time is needed to answer the RFI.

1.5 QUALITY ASSURANCE

- A. Carefully study the Contract Documents to assure that the requested information is not available therein.
1. RFI which requests interpretation available in the Contract Documents may not be answered by the Design Consultant.
 2. Before submitting RFI to the Design Consultant, verify that the information requested is not indicated in the Contract Documents, or cannot be determined from a careful review of same.
- B. In all cases where a RFI is issued to request interpretation of coordination issues, for example, pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items, the Contractor shall fully lay-out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFI that fails to include a suggested solution will not be answered.
- C. Do not use RFI for the following purpose:
1. To request approval of submittals.
 2. To request approval of substitutions.
 3. To request changes to the Contract Documents and to confirm action taken by the Contractor for requested changes/substitutions to the Contract Documents.

- D. If the Contractor believes that an interpretation by the Design Consultant may result in a change in Contract price, the Contractor shall not proceed with the work indicated by the RFI until a Change Order or other acceptable tracking device is prepared and approved.
 - 1. If the Contractor believes that an interpretation by the Design Consultant results in additional cost, the Contractor shall identify in the RFI the basis of the Contractor's bid as it relates to the RFI.
 - 2. Answered RFI shall not be construed as approval to perform extra work.

END OF SECTION



REQUEST FOR INTERPRETATION

Project: _____ R.F.I. Number: _____

To: _____ From: _____

Re: _____ Date: _____
_____ A/E Project Number: _____
_____ Contract For: _____

Specification Section: Paragraph: Drawing Reference: Detail:

Request:

Signed by: _____ Date: _____

Response:

☐ Attachments

Response From: To: Date Rec'd: Date Ret'd:

Signed by: _____ Date: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ _____ ☐ File

REQUEST FOR INTERPRETATION LOG

Project: _____

A/E Project Number: _____

Owner: _____

Contractor: _____

[illegible]

SECTION 012700 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Addenda, General Conditions, Construction Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
 - 1. Division 1 Section "Allowances" for procedures for using unit prices to adjust quantity allowances.
 - 2. Division 1 Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. List of Unit Prices: A list of unit prices is included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

- A. Unit Price 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.
1. Description: Unsatisfactory soil excavation and disposal off site and replacement with satisfactory fill material or engineered fill from off site, as required, according to Section 312000 "Earth Moving."
 2. Unit of Measurement: Cubic yard of soil excavated, disposed of or replaced, based on survey of volume removed.
 3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 012100 "Allowances."
- B. Unit Price No. 2: Cutting and patching of concrete floor slabs.
1. Description: Cutting of new or existing concrete slabs up to 6 inches thick, removal and excavation as required, and subsequent backfill, compaction, and patching of concrete according to Section 017300 "Execution." not otherwise indicated in the Contract Documents.
 2. Unit of Measurement: Square feet of concrete removed.
- C. Unit Price No. 3: Miscellaneous and structural steel.
1. Description: Miscellaneous lintels and other supports not otherwise indicated in the Contract Documents, according to Section 051200 "Structural Steel Framing" and Section 055000 "Metal Fabrications."
 2. Unit of Measurement: Cost in place of pounds of fabricated steel as indicated on itemized invoice of steel supplier and verified by Architect.
- D. Unit Price No. 4: Cutting and patching of A.C. paving
1. Description: Cutting of new or existing A.C. paving up to 4 inches thick, removal and excavation as required, and subsequent backfill, compaction, and patching of concrete according to Section 017300 "Execution." not otherwise indicated in the Contract Documents.
 2. Unit of Measurement: Square feet of A.C. removed.
- E. Unit Price No. 5: Cutting and patching of resin pavement.
1. Description: Cutting of new or existing concrete slabs up to 4 inches thick, removal and excavation as required, and subsequent backfill, compaction, and patching of concrete according to Section 017300 "Execution." not otherwise indicated in the Contract Documents.
 2. Unit of Measurement: Square feet of resin pavement removed.

F. Unit Price No. 6: Additional photovoltaic panels.

1. Description: Additional photovoltaic panels in according to Section 263100 "Photovoltaic Energy Equipment" not otherwise indicated in the Contract Documents.
2. Unit of Measurement: Kilowatt installed

END OF SECTION SM01270

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Project meetings.
 - 3. Requests for Interpretation (RFI).
- B. See Section 01 71 23 Field Engineering for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

- A. OAC meeting: City/Design Consultant/Contractor meeting.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-construction meetings:
 - 1. Arrange pre-construction, pre-installation, pre-fabrication, and coordination meetings with the suppliers, subcontractors and others whose work is, or will be affected by the work of the Section. Notify City and Design Consultant of scheduled meeting dates and times, which they may decline to attend.
 - 2. Resolve conflicts and conditions that would prevent proper installation of the work of the Section affected.
 - 3. Keep minutes of the meeting and distribute to those participants and the Design Consultant within 48 hours of the meeting.
- B. Construction FTP site: At the initial pre-construction meeting, distribute access passwords and explain the Project FTP site and the Contractor's responsibility for its maintenance and operation. It is expected that most of the digital forms and submittals required by the Specifications be accessible from the construction FTP site.

1.4 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components between suppliers and subcontractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.

4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
 5. Coordinate operations so as to interfere the least with daily school activities and school calendar, Farmers Market operation, and Virginia Avenue Park programs.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for City and separate contractors if coordination of their Work is required.
- C. Administrative procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following.
1. Preparation of Contractor's Construction Schedule.
 2. Preparation of the Schedule of Values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Startup and adjustment of systems.
 8. Project closeout activities.

1.5 SUBMITTALS ADMINISTRATIVE REQUIREMENTS

- A. Coordination Drawings: Prepare Coordination Drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components and where coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of Design Consultantural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Design Consultant for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Number of copies and transmittal methods:
1. Paper copies: Submit 2 opaque (black line) copies of each submittal. Design Consultant will return one copy.
 - a. Paper size: At least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
 - b. Digital copy: Submit in indexed PDF by email, download, CD or DVD.
 2. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct bi-weekly meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify City and Design Consultant of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees at least 3 working days prior to meeting.
 3. Minutes:
 - a. Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including City and Design Consultant within 48 hours of meeting conclusion.
 - b. Record and distribute meeting minutes, RFI and submittal status, using forms attached or similar forms acceptable to the Design Consultant, and provide corrected minutes related to prior meetings as necessary.
- B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction. Provide comprehensive schedule for all pre-installation meetings. Revise schedule based on Project progress.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow. Advise Design Consultant of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including applicable requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of field samples and mockups.
 - i. Possible conflicts.
 - j. Possible compatibility issues.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Delegated Design submittals.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.

- v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- C. Progress (OAC) Meetings: Conduct bi-weekly progress meetings. Coordinate dates of meetings with preparation of payment requests.
- 1. Attendees: In addition to representatives of City and Design Consultant, Contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.

- 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
- 3. Provide the City and Design Consultant a “3-Week-Look-Ahead” schedule at each progress meeting, unless otherwise directed by the Design Consultant.
 - 4. Minutes: Record the meeting minutes within 24 hours of meeting.
 - 5. Reporting:
 - a. Distribute minutes of the meeting to each party present and to parties who should have been present within 48 hours of meeting.
 - b. Revise Contractor's Construction Schedule after each progress meeting where revisions to the Schedule have been made or recognized. Issue revised Schedule concurrently with the report of each meeting. Highlight revisions in the Schedule to show changes from prior Schedule.

1.7 REQUESTS FOR INTERPRETATION (RFIS)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI as specified in Section 01 25 10.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

SECTION 01 32 23 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for Construction photographs.
- B. Related requirements includes the following in Division One:
 - 1. Procedures for unit prices for extra photographs.
 - 2. Submittal procedures for submitting photographic documentation.
 - 3. Submitting digital media as Project Record Documents at Project closeout.
 - 4. Submitting DVD (or equal digital media as approved in advance by the City), of demonstration of equipment and training of the City's personnel.

1.2 UNIT PRICES

- A. Basis of Bid: Base Bid on 12 photographs per week for the duration of Project based on the original Project Completion date.

1.3 SUBMITTALS

- A. Qualification data: For photographer.
- B. Key plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same label information as corresponding set of photographs.
- C. Digital images: Submit to the City and Design Consultant, digital files of photos on CD-ROM within 7 days of taking photographs. Identify electronic media with date photographs were taken. Submit uncropped images with same aspect ratio as the sensor.
 - 1. Identification: Identify each CD-ROM (on label) with name of project, name and address of photographer, name of Design Consultant, name of Contractor, date range when images were taken, and brief/general description of images (e.g., excavation for foundations, start of rough framing, etc.....). Identify each digital image with the following information.
 - a. Date and time photograph was taken if not date stamped by camera.
 - b. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - c. Unique sequential identifier.

1.4 QUALITY ASSURANCE

- A. Photographer's qualifications: Individual regularly engaged as a professional photographer of construction projects for not less than 3 years.

1.5 AUXILIARY SERVICES

- A. Cooperate with photographer and provide auxiliary services requested, including access to Project site and use of temporary facilities, including temporary lighting required to produce clear, well-lit photographs without obscuring shadows.

1.6 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to The City for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital images: Provide images in JPEG format, produced by a digital camera with minimum sensor size of 8.0 megapixels, and at an image resolution of not less than 1600 by 1200 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified commercial photographer to take construction photographs.
- B. General:
 - 1. Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 2. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital images: Submit images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - 1. Date and time: Include date and time in filename for each image.
 - 2. Field office images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Design Consultant.
- D. Preconstruction photographs: Before commencement of Work, take color, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Design Consultant.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take a minimum of 8 photographs, or as many as required to show existing conditions adjacent to property before starting the Work.
 - 3. Take a minimum of 8 photographs, or as many as required to show existing conditions of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
 - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- E. Periodic construction photographs: Take 12 color digital photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

- F. Final completion construction photographs:
1. Take a minimum of 8 color photographs after Substantial Completion for submission as Project Record Documents. Design Consultant will direct photographer for desired vantage points.
 2. Do not include date stamp.
- G. Additional photographs: Owner Design Consultant may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
1. Three days' notice will be given, when feasible.
 2. In emergency situations, take additional photographs within 24 hours of request.
 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. The City's request for special publicity photographs.

END OF SECTION

SECTION 01 34 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section supplements Article 3.12 of the General Conditions and includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.
- B. Related requirements include the following:
 - 1. Project management and coordination.
 - 2. Construction progress documentation.
 - 3. Photographic documentation.
 - 4. Quality requirements.
 - 5. Closeout procedures.
 - 6. Project record documents.
 - 7. Operation and maintenance data.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-construction meeting: Prior to the first submittal being sent to the Design Consultant or its Consultants, arrange a pre-construction meeting, which may be combined with other pre-construction administrative tasks, to review the submittal procedures specified below.

1.3 SUBMITTAL PROCEDURES

- A. General: Electronic copies of selected CAD Contract Drawings (as determined by the Design Consultant) will be provided by the Design Consultant for Contractor's and subcontractors' use in preparing submittals, provided the attached Release Form is properly completed, and a PDF copy is submitted electronically to the Design Consultant at the time of request. The Contractor shall keep a current log of the Release Forms, in digital format, available to the City and Design Consultant.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - 3. Design Consultant reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Submittals schedule: Comply with requirements in Section 01 32 00 for list of submittals and time requirements for scheduled performance of related construction activities.
- D. Processing time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Design Consultant's receipt of submittal.
 - 1. Initial review:
 - a. Allow 15 days for initial review of each submittal.
 - b. Allow additional time, if processing must be delayed to permit coordination with subsequent submittals.

- c. Design Consultant will advise Contractor when a submittal being processed will be delayed for coordination or due to the large number of material being submitted.
 - d. Delegated design (design/build) submittals will require a longer review time than other submittals.
 - 2. Concurrent review: Where concurrent review of submittals by Design Consultant's consultants, City, or other parties is required, allow 21 days, or as mutually agreed, for initial review of each submittal.
 - 3. Direct transmittal to consultant: Where the Contract Documents indicate that submittals may be transmitted directly to Design Consultant's consultants, provide duplicate copy of transmittal to Design Consultant. Submittal will be returned to the Design Consultant, before being returned to the Contractor.
 - 4. If intermediate submittal(s) is(are) necessary, process it (them) in the same manner as the initial submittal.
 - 5. Allow 15 days for processing each resubmittal.
 - 6. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- E. Re-submittals: Re-submittals are limited to two after initial submittal.
- F. Identification: Place a permanent label or title block on each submittal for identification.
- 1. Indicate name of firm or entity that prepared each submittal on label or title block.
 - 2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Design Consultant.
 - 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of the following:
 - 1) Contractor.
 - 2) Design Consultant.
 - 3) Subcontractor.
 - 4) Supplier.
 - 5) Manufacturer.
 - d. Unique identifier, including revision number.
 - e. Number and title of appropriate Specification Section.
 - f. Drawing number and detail references, as appropriate.
 - g. Other necessary identification.
- G. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- H. Additional copies: Unless additional copies are required for final submittal, and unless Design Consultant observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.
- 1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Design Consultant.
 - 2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

- I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using Transmittal Form included in the Project Manual, or a similar form acceptable to the Design Consultant. Submittals received from sources other than the Contractor will be returned by Design Consultant without review.
1. On an attached separate sheet prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Design Consultant on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.
 2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.
 3. Transmittal form: If attached form is not used, use a form with the following minimum information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Submittal and transmittal distribution record.
 - i. Remarks.
 - j. Signature of transmitter.
- J. Distribution:
1. Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities.
 2. Show distribution on transmittal forms and submit one copy to the Design Consultant..
- K. Use for construction: Use only final submittals with mark indicating action taken by Design Consultant in connection with construction.

PART 2 - PRODUCTS

2.1 SUBMITTALS

- A. General: Prepare and submit Submittals required by individual Specification Sections.
1. Number of copies: Submit copies of each submittal as follows, unless otherwise indicated:
 - a. Initial submittal: Preliminary single PSF copy of each submittal where selection of options, color, pattern, texture, or similar characteristics is required. Design Consultant will return submittal with options selected.

- b. Final submittal: 3 copies, unless copies are required for operation and maintenance manuals. Submit 2 hard (paper) copies, one which will be returned by the Design Consultant, and one digital PDF copy on CD Rom or DVD, where copies are required for operation and maintenance manuals. Design Consultant will retain a paper copy and the CD or DVD. The Contractor shall mark-up and retain one paper copy as a Project Record Document.

B. Product Data:

- 1. Collect information into a single submittal for each element of construction and type of product or equipment.
- 2. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
- 3. Mark each copy of each submittal to show which products and options are applicable.
- 4. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Wiring diagrams showing factory-installed wiring.
 - g. Printed performance curves.
 - h. Operational range diagrams.
 - i. Mill reports.
 - j. Standard product operating and maintenance manuals.
 - k. Compliance with recognized trade association standards.
 - l. Compliance with recognized testing agency standards.
 - m. Application of testing agency labels and seals.
 - n. Notation of coordination requirements.

C. Shop drawings: Prepare Project-specific information drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

- 1. Preparation: Include the following information, as applicable.
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions for conditions where manufacturer's instructions or industry standard installations are not applicable.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations for delegated design (design/build) assemblies.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
- 2. Wiring diagrams: Differentiate between manufacturer-installed and field-installed wiring.
- 3. Sheet size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inch but no larger than 30 by 40 inches.

4. Number of copies: Submit copies of each submittal as follows:
 - a. Initial submittal: Submit one digital PDF copy and one black-line print. Design Consultant will return a marked-up PDF copy or the black-line print.
 - b. Final submittal: As specified above for initial submittal. Make back line prints required for Project Record Drawings and Maintenance Manual, when appropriate.
- D. Coordination drawings: Comply with requirements in Section 01 31 00.
- E. Samples: Prepare physical units of materials or products, including the following:
 1. Mockups: Comply with requirements of Section 01 45 00.
 2. Samples: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples shall include, but are not limited to, the following:
 - a. Partial sections of manufactured or fabricated components.
 - b. Small cuts or containers of materials.
 - c. Complete units of repetitively used materials.
 - d. Swatches showing color, texture, and pattern.
 - e. Color range sets.
 - f. Components used for independent testing and inspection.
 3. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Design Consultant's control sample where specified. Attach label on unexposed side that includes the following.
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 4. Additional information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following.
 - a. Size limitations.
 - b. Compliance with recognized standards.
 - c. Availability.
 - d. Delivery time.
 5. Samples: Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least 3 sets of paired units, or a sample panel at least 3 feet square that shows the approximate limits of the variations.
 - b. Maintain sample panel at the job site for review by Design Consultant and City where shipping would be inappropriate due to size and/or weight. The sample panel shall match the character of the proposed installation.
 - c. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

6. Number of Samples:

- a. Unless otherwise instructed by the Design Consultant for bulky and/or heavy Samples, submit 3 sets of Samples. Design Consultant will retain one Sample and return the remainder. Mark-up and retain one returned Sample set as a Project Record Sample.
- b. For custom, bulky and heavy Samples, submit one Sample only, unless otherwise instructed by the Design Consultant.
- c. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics need to be demonstrated.

7. Disposition:

- a. Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity.
- b. Sample sets may be used to determine final acceptance of construction associated with each set.
- c. Samples that may be incorporated into the Work are so specified in individual Sections. Such Samples must be in an undamaged condition at time of use.
- d. Samples not incorporated into the Work, or otherwise originally designated as City's property, shall be treated and disposed of as the property of Contractor.

F. Product schedule or list: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form.

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.

G. Delegated-design submittal: Comply with requirements in Section 01 40 00.

H. Contractor's construction schedule: Comply with requirements of Section 01 32 00 for Contractor's action.

I. Submittals schedule: Comply with requirements in Section 01 32 00.

J. Subcontractor list: Including those who are to furnish products or equipment fabricated to a special design. Use form acceptable to the Design Consultant. Include the following information in tabular form.

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 ADMINISTRATIVE SUBMITTALS

A. General: Prepare and submit the following submittals when so specified.

1. Number of copies: Submit a digital copy of each submittal, unless otherwise specified. Design Consultant will not comment on, and will return administrative submittals, unless they deviate from the Contract Documents.
2. Certificates and certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

3. Test and inspection reports: Comply with requirements of Section 01 45 23. In addition to copies of the reports to be sent to the Contractor, the individual or firm performing the tests and inspections shall forward the results of same directly to the Design Consultant's office (to the attention of the Project Manager) within 48 hours after the results are available.
- B. Contractor's construction schedule: Comply with requirements in Section 01 32 00.
- C. Qualification data:
 1. Prepare written information that demonstrates capabilities and experience of firm or person.
 2. Include lists of completed projects with project names and addresses, names and addresses of Design Consultants and Citys, and other information specified.
- D. Product certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.
- E. Welding certificates:
 1. Prepare written certification that welding procedures and personnel comply with requirements.
 2. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms.
 3. Include names of firms and personnel certified.
- F. Installer certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- G. Manufacturer certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- H. Material certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- I. Material test reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- J. Preconstruction test reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements.
- K. Compatibility test reports:
 1. Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product.
 2. Include written recommendations for primers and substrate preparation needed for adhesion.
- L. Field test reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements.
- M. Research/evaluation reports: Prepare written evidence, from a model code organization acceptable to AHJ, that product complies with building code in effect for Project. Include the following information.
 1. Name of evaluation organization.
 2. Most current date of evaluation.

3. Time period when report is in effect.
 4. Product and manufacturers' names.
 5. Description of product.
 6. Test procedures and results.
 7. Limitations of use.
- N. Maintenance data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Section 01 77 00.
- O. Design data:
1. Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations.
 2. Include list of assumptions and other performance and design criteria and a summary of loads.
 3. Include load diagrams if applicable.
 4. Provide name and version of software, if any, used for calculations.
 5. Include page numbers.
- P. Manufacturer's instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable.
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.
 4. Required installation tolerances.
 5. Required adjustments.
 6. Recommendations for cleaning and protection.
- Q. Manufacturer's field reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable.
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- R. Insurance certificates and bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Construction photographs and DVDs: Comply with requirements specified in Section 01 32 23.
- T. Material safety data sheets (MSDS)S:
1. File information directly with "Record Documents" for submittal to the City,
 2. If submitted to Design Consultant, the Design Consultant will not review this information but will discard it with no action taken.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Prior to making the first submittal, submit an imprint of the proposed Contractor's approval stamp.
- B. Review each shop drawings and product data prior to submission as follows:
 - 1. Review each submittal and check for compliance with the Contract Documents. Note related RFIs, corrections and field dimensions. Mark with approval stamp before submitting to Design Consultant.
 - 2. Stamp each submittal with a uniform approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 3. When shop drawings with the notation "VERIFY DIMENSIONS", or similar language are submitted, it will be assumed that the responsibility to verify the dimensions is that of the Contractor, a subcontractor, or the firm preparing the shop drawings; not the responsibility of the Design Consultant.
- C. Coordinate each submittal with requirements of the work and of the Contract documents.
- D. Notify the Design Consultant in writing, at the time of submission, of deviations in the submittals from requirements of the Contract Documents. Design Consultant will assess deviations to determine if submittal is acceptable.

3.2 DESIGN CONSULTANT'S ACTION

- A. General: Design Consultant will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Transmittal Form: Refer to 01 34 00.1 Submittal Transmittal Form which must be completed and attached to each submittal.
- C. Review:
 - 1. Submittals not required by the Contract Documents will not be reviewed and will be discarded.
 - 2. For submittals required by the Contract Documents, Design Consultant will review each submittal, and indicate corrections or modifications required, when appropriate, and return it, except as otherwise specified.
 - 3. Design Consultant will stamp each submittal, with a facsimile of the stamp below, and will indicate action taken.

REMAINDER OF PAGE LEFT BLANK

Koning Eizenberg Architecture

1454 25th Street, Santa Monica, Ca 90404

This shop drawing has been reviewed from the stand-point of conformance of the equipment or work with the overall arrangement. All details and dimensions remain the responsibility of the contractor or vendor. This review does not relieve the contractor or vendor of the obligation to meet all requirements of the specifications, drawing and all other terms of the contract.

☐ NO EXCEPTIONS TAKEN

☐ NOTE MARKINGS

☐ RESUBMIT

☐ REJECTED

☐ REVIEWED ONLY

☐ SUBMIT SPECIFIED ITEM

SIGNED

DATE

END OF SECTION



SUBMITTAL TRANSMITTAL

Project: _____ Date: _____
A/E Project Number: _____

TRANSMITTAL To (Contractor): _____ Date: _____ Submittal No. _____
A From (Subcontractor): _____ By: _____ ☐ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

- ☐ Submitted for review and approval ☐ Substitution involved - Substitution request attached
☐ Resubmitted for review and approval ☐ If substitution involved, submission includes point-by-point comparative data or preliminary details
☐ Complies with contract requirements ☐ Items included in submission will be ordered immediately upon receipt of approval
☐ Will be available to meet construction schedule
☐ A/E review time included in construction schedule

Other remarks on above submission: _____ ☐ One copy retained by sender

TRANSMITTAL To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____
B From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

- ☐ Approved ☐ Revise / Resubmit
☐ Approved as noted ☐ Rejected / Resubmit

Other remarks on above submission: _____ ☐ One copy retained by sender

TRANSMITTAL To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____
C From (A/E): _____ ☐ Other By: _____ Date Trnsmt'd by A/E: _____

- ☐ Approved ☐ Provide file copy with corrections identified
☐ Approved as noted ☐ Reproducible copies only returned
☐ Revise and Resubmit ☐ Point-by-point comparative data required to complete approval process
☐ Rejected / Resubmit
☐ No action taken or required
☐ Not required for review ☐ Submission Incomplete / Resubmit

Other remarks on above submission: _____ ☐ One copy retained by sender

TRANSMITTAL To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____
D From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: ☐ Owner ☐ Consultants ☐ _____ ☐ _____ ☐ _____ ☐ One copy retained by sender



A/E Project Number: _____

Owner: _____

Contractor: _____

[illegible]

SECTION SM01400 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, Addenda, General Conditions, Construction Contract and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Architect, City, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Division 1 Section "Allowances" for testing and inspecting allowances.
 - 2. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
 - 3. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 4. Divisions 2 through 16 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with

requirements. Services do not include contract enforcement activities performed by Construction Manager.

- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.
- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 QUALITY ASSURANCE

- A. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by the Construction Manager.
 - 2. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 3. Obtain Architect and Construction Manager's approval of mockups before starting work, fabrication, or construction.
 - 4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 5. Demolish and remove mockups when directed, unless otherwise indicated.

1.5 QUALITY CONTROL

- A. City Responsibilities: Where quality-control services are indicated as City's responsibility, City will engage a qualified testing agency to perform these services.
 - 1. City will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of the types of testing and inspecting they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

- a. Contractor shall not employ the same entity engaged by City, unless agreed to in writing by City.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field-curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for commencement of the Work.

1. Distribution: Distribute schedule to City, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION SM01400

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and

effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AABC	Associated Air Balance Council www.aabc.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.americanbearings.org	(202) 367-1155
ACI	American Concrete Institute (Formerly: ACI International) www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216

AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, and Refrigeration Institute (The) www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(607) 256-3313
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000

ARI	Air-Conditioning & Refrigeration Institute (See AHRI)	
ARI	American Refrigeration Institute (See AHRI)	
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air- Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Safety Engineers (The) www.asse.org	(847) 699-2929
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWEA	American Wind Energy Association www.awea.org	(202) 383-2500
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWMAC	Architectural Woodwork Manufacturers Association of Canada www.awmac.com	(403) 453-7387
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association)	(205) 733-4077

	www.awpa.com	
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.gobrick.com	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BOCA	BOCA (Building Officials and Code Administrators International Inc.) (See ICC)	
BWF	Badminton World Federation (Formerly: International Badminton Federation) www.bwfbadminton.org	60 3 9283 7155
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.electricity.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CFSEI	Cold-Formed Steel Engineers Institute www.cfsei.org	(866) 465-4732 (202) 263-4488
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700

CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(404) 622-0073
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	(703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.org	(706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(800) 328-6306 (847) 517-1200
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
CWC	Composite Wood Council (See CPA)	
DASMA	Door and Access Systems Manufacturers Association www.dasma.com	(216) 241-7333
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010

ECA	Electronic Components Association www.ec-central.org	(703) 907-8024
ECAMA	Electronic Components Assemblies & Materials Association (See ECA)	
EIA	Electronic Industries Alliance (See TIA)	
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (703) 538-1616
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ESTA	Entertainment Services and Technology Association (See PLASA)	
EVO	Efficiency Valuation Organization www.evo-world.org	(415) 367-3643 44 20 88 167 857
FIBA	Fédération Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Fédération Internationale de Volleyball (The International Volleyball Federation) www.fivb.org	41 21 345 35 45
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridarroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council U.S. www.fscus.org	(612) 353-4511

GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GS	Green Seal www.greenseal.org	(202) 872-6400
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association (See AHRI)	
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(415) 536-0288
IAS	International Approval Services (See CSA)	
ICBO	International Conference of Building Officials (See ICC)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (202) 370-1800
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICPA	International Cast Polymer Alliance www.icpa-hq.org	(703) 525-0511
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc.	(212) 419-7900

	(The) www.ieee.org	
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America) www.ies.org	(212) 248-5000
IESNA	Illuminating Engineering Society of North America (See IES)	
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 981-0100
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
IGSHPA	International Ground Source Heat Pump Association www.igshpa.okstate.edu	(405) 744-5175
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
Intertek	Intertek Group (Formerly: ETL SEMCO; Intertek Testing Service NA) www.intertek.com	(800) 967-5352
ISA	International Society of Automation (The) (Formerly: Instrumentation, Systems, and Automation Society) www.isa.org	(919) 549-8411
ISAS	Instrumentation, Systems, and Automation Society (The) (See ISA)	
ISFA	International Surface Fabricators Association (Formerly: International Solid Surface Fabricators Association) www.isfanow.org	(877) 464-7732 (801) 341-7360
ISO	International Organization for Standardization www.iso.org	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association (See ISFA)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association	(703) 264-1690

www.kcma.org

LMA	Laminating Materials Association (See CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association) www.wmmpa.com	(800) 550-7889 (530) 661-9591
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.org	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAIMA	North American Insulation Manufacturers Association	(703) 684-0084

	www.naima.org	
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFPA	NFPA International (See NFPA)	
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NHLA	National Hardwood Lumber Association www.nhla.com	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association (See NWFA)	
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585

NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSPE	National Society of Professional Engineers www.nspe.org	(703) 684-2800
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PLASA	PLASA (Formerly: ESTA - Entertainment Services and Technology Association) www.plasa.org	(212) 244-1505
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International (Society of Automotive Engineers) www.sae.org	(877) 606-7323 (724) 776-4841
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
SCTE	Society of Cable Telecommunications Engineers	(800) 542-5040

	www.scte.org	(610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 293-1995
SMA	Screen Manufacturers Association www.smainfo.org	(773) 636-0672
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SRCC	Solar Rating and Certification Corporation www.solar-rating.org	(321) 638-1537
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265

SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. (Formerly: Tile Council of America) www.tileusa.com	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association, Inc. www.tema.org	(914) 332-0040
TIA	Telecommunications Industry Association (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance) www.tiaonline.org	(703) 907-7700
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance (See TIA)	
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tilerroofing.org	(312) 670-4177
UBC	Uniform Building Code (See ICC)	
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council	(800) 795-1747

	www.usgbc.org	
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122
WDMA	Window & Door Manufacturers Association www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association (See MMPA)	
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 938-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut für Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, LLC www.icc-es.org	(800) 423-6587 (562) 699-0543

- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of

the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce National Institute of Standards and Technology www.nist.gov	(301) 975-4040
DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-2664
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FG	Federal Government Publications www.gpo.gov	(202) 512-1800
GSA	General Services Administration www.gsa.gov	(800) 488-3111 (202) 619-8925
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory Environmental Energy Technologies Division http://eetd.lbl.gov	(510) 486-4000
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742
SD	Department of State www.state.gov	(202) 647-4000
TRB	Transportation Research Board National Cooperative Highway Research Program www.trb.org	(202) 334-2934
USDA	Department of Agriculture	(202) 720-3656

Agriculture Research Service
U.S. Salinity Laboratory
www.ars.usda.gov

USDA Department of Agriculture (202) 720-2791
Rural Utilities Service
www.usda.gov

USDJ Department of Justice (202) 307-0703
Office of Justice Programs
National Institute of Justice
www.ojp.usdoj.gov

USP U.S. Pharmacopeia (800) 227-8772
www.usp.org (301) 881-0666

USPS United States Postal Service (202) 268-2000
www.usps.com

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CFR Code of Federal Regulations (866) 512-1800
Available from Government Printing Office (202) 512-1800
www.gpo.gov/fdsys

DOD Department of Defense (215) 697-2664
Military Specifications and Standards
Available from Department of Defense Single Stock Point
<http://dodssp.daps.dla.mil>

DSCC Defense Supply Center Columbus
(See FS)

FED-STD Federal Standard
(See FS)

FS Federal Specification (215) 697-2664
Available from Department of Defense Single Stock Point
<http://dodssp.daps.dla.mil>

Available from Defense Standardization Program
www.dsp.dla.mil

Available from General Services Administration (800) 488-3111
www.gsa.gov (202) 619-8925

Available from National Institute of Building Sciences/Whole (202) 289-7800
Building Design Guide
www.wbdg.org/ccb

MILSPEC Military Specification and Standards
C
(See DOD)

USAB United States Access Board (800) 872-2253
www.access-board.gov (202) 272-0080

USATBC U.S. Architectural & Transportation Barriers Compliance
B Board
(See USAB)

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF State of California (800) 952-5210
Department of Consumer Affairs (916) 574-2041
Bureau of Electronic Appliance and Repair, Home Furnishings
and Thermal Insulation
www.bearhfti.ca.gov

CCR California Code of Regulations (916) 323-6225
Office of Administrative Law
California Title 24 Energy Code
www.calregs.com

CDHS California Department of Health Care Services
(Formerly: California Department of Health Services)
(See CCR)

CDPH California Department of Public Health
Indoor Air Quality Program
www.cal-iaq.org

CPUC California Public Utilities Commission (800) 848-5580
www.cpuc.ca.gov (415) 703-2782

SCAQM South Coast Air Quality Management District (909) 396-2000
D www.aqmd.gov

TFS Texas Forest Service (979) 458-6606
Forest Resource Development and Sustainable Forestry
<http://txforestservation.tamu.edu>

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Water Service: Pay water-service use charges for water used by all entities for construction operations.
 - a. Water service for construction activities to be metered.
- C. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.
 - a. Electric service for construction activities to be metered.

1.4 INFORMATIONAL SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts.
 - a. Provide full height vision barrier fabric at chain link fence.
- B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
 - a. Provide full height vision barrier fabric at chain link fence.
- C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Construction Manager, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer

than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.

3. Drinking water.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.

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

1. Store combustible materials apart from building.

2.3 EQUIPMENT

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- E. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
1. Install electric power service overhead unless otherwise indicated.
 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Install lighting for Project identification sign.
- G. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.
1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine in each field office.
 - b. Provide one telephone line for Owner's use.
 2. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.

1. Identification Signs: Provide Project identification signs as indicated on Drawings.
2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.

a. Provide temporary, directional signs for construction personnel and visitors.

3. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities

having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

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

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Section 311000 "Site Clearing."
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- F. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- G. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

- H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- I. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As indicated on Drawings.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- J. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- K. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- M. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 - 1. Construct covered walkways using scaffold or shoring framing.
 - 2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - 3. Paint and maintain appearance of walkway for duration of the Work.
- N. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 01 56 39 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the protection and trimming of existing trees that interfere with, or are affected by, execution of the Work, whether temporary or permanent construction.
- B. Related Sections include the following:
 - 1. Division 01 Section "Summary" for limits placed on Contractor's use of the site.
 - 2. Division 01 Section "Temporary Facilities and Controls" for temporary tree protection.
 - 3. Division 31 Section "Site Clearing" for removal limits of trees, shrubs, and other plantings affected by new construction.
 - 4. Division 31 Section "Earth Moving" for building and utility trench excavation, backfilling, compacting and grading requirements, and soil materials.
 - 5. Division 32 Section "Plants" for tree and shrub planting, tree support systems, and soil materials.
 - 6. Division 32 Section "Planting Irrigation" for tree and shrub planting irrigation systems.
 - 7. Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS": LEED Requirements.

1.3 REFERENCES

- A. US Green Building Council (USGBC), www.usgbc.org

1.4 DEFINITIONS

- A. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Tree Pruning Schedule: Written schedule from arborist detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

- C. Qualification Data: For tree service firm and arborist.
- D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- F. LEED certification product data as specified in Division 1, Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content
 - 2. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally

1.6 QUALITY ASSURANCE

- A. Tree Service Firm Qualifications: A tree service firm that has successfully completed tree protection and trimming work similar to that required for this Project and that will assign a, qualified arborist to Project site during execution of tree protection and trimming.
- B. Arborist Qualifications: An arborist certified by ISA or licensed in the jurisdiction where Project is located.
- C. Tree Pruning Standard: Comply with ANSI A300 (Part 1), "Tree, Shrub, and Other Woody Plant Maintenance--Standard Practices (Pruning)."
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
 - 1. Before tree protection and trimming operations begin, meet with representatives of authorities having jurisdiction, Owner, Design Consultants, and other concerned entities to review tree protection and trimming procedures and responsibilities.]

1.7 GUARANTEE

- A. If a tree to remain is destroyed or injured so that in the judgement of the Owner's Representative it should be replaced, it shall be removed at the expense of the Contractor. Contractor shall pay compensation to the Owner of the property where the tree was located at the rate as specified herein this Section (see Compensation).

1.8 COMPENSATION

- A. Contractor shall replace existing tree that died or sustained injury from the result of the Contractor's negligence to provide adequate required tree protection, pruning, irrigation or maintenance during the course of construction operations. Compensation shall be awarded to the Owner as follows:
 - 1. Contractor shall thoroughly remove damaged tree, including trunk, branches, and roots, at no cost to the Owner, and at the direction of the Owner's Representative. Contractor shall furnish and install an equal size tree, up to a six-inch (6") caliper size with a tree that is of the same form, species, shape, and in

the same quantity as those tree(s) that were damaged, at the direction of the Owner's Representative.

2. Contractor shall provide an additional cash settlement to the Owner for each damaged tree, as evaluated by the Owner's Representative. Additional compensation shall be based on the following formula:

- a. Tree caliper measurement of the damaged tree(s), where caliper is measured at the greatest trunk diameter 24" above the finished grade:

1)	Tree Trunk Caliper	Amount
a)	Less than 6"	none
b)	6" to 12"	\$9,000.00
c)	>12"to18"	\$15,000.00
d)	over 18", add for each caliper inch	\$1.000.00

- B. Contractor shall replace vegetation (other than trees) that died or sustained injury from the result of the Contractor's negligence to provide adequate required vegetation protection, pruning, or maintenance during the course of construction operations, as evaluated by the Owner's Representative. Compensation shall be awarded to the Owner as follows:

1. Contractor shall thoroughly remove damaged vegetation at no cost to the Owner, and at the direction of the Owner's Representative.

2. Contractor shall furnish and install per requirements in Section 329300 "Plants", with five gallon container stock minimum (as applicable) of the same form, species, and in the same quantity as vegetation that was damaged, at the direction of the Owner's Representative.

- C. The Owner's Representative shall make the final judgement on whether trees and/or vegetation have been damaged by the Contractor during the execution of the Work, and their decision is final.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.
- B. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of weeds, roots, and toxic and other nonsoil materials.
 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches deep or more; do not obtain from bogs or marshes.
- C. Filter Fabric: Manufacturer's standard, nonwoven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.

- D. Chain-Link Fence: Metallic-coated steel chain-link fence fabric of 0.120-inch- diameter wire; a minimum of 72 inches high; with 1.9-inch- diameter line posts; 2-3/8-inch-diameter terminal and corner posts; 1-5/8-inch- diameter top rail; and 0.177-inch-diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system. Fence to be posted with a minimum 8.5" x 11" laminated sign stating: "TREE PROTECTION ZONE – THIS FENCE SHALL NOT BE REMOVED".
- E. Organic Mulch: Shredded hardwood, free of deleterious materials.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Locate and clearly flag trees and vegetation to remain or to be relocated. Protect existing site improvements to remain from damage during construction.
- B. Temporary Fencing: Prior to commencement of construction activities, install temporary fencing around tree protection zones to protect remaining trees and other vegetation to remain from construction damage. Maintain temporary fence and remove when construction is complete.
 - 1. Install chain-link fence according to ASTM F 567 and manufacturer's written instructions.
- C. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- D. Mulch areas inside tree protection zones and within drip line of trees to remain and other areas indicated.
 - 1. Apply 6-inch (152-mm) average thickness of organic mulch. Do not place mulch within 6 inches of tree trunks.
Maintain a 6" layer of chip mulch, free of deleterious materials, over the entire area of the TPZ for the duration of the construction phase. Mulch to be removed by the contractor after project completion.
- E. Do not store construction materials, debris, or excavated material inside tree protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems.
- F. Maintain tree protection zones free of weeds and trash.
- G. Do not allow fires within tree protection zones.
- H. Irrigation: Contractor shall supply fresh potable water in adequate amounts and rates of application as required to maintain the health of all protected trees and vegetation throughout the duration of the construction operations. Contractor shall maintain a watering schedule and document dates and duration of irrigation applications.
 - 1. Construct a temporary watering basin, as required, on the surface- of the-existing undisturbed grade, with imported soil, to aid in the retention of water around existing protected trees and planting.

- I. Protect root systems of existing trees and vegetation from damage due to chemically injurious materials in solution caused by run-off or spillage during mixing or placement of construction materials, and drainage of stored materials. The Contractor shall insure that no foreign material and/or liquid, such as paint, concrete, cement, oil, turpentine, acid or the like, be deposited or allowed to be deposited on soil within the drip line (the outside edge of the foliage overhang) of tree or shrub within 6" of the trunk of a vine. Should such poisoning of the soil occur, the Contractor shall remove said soil as directed by the Owner's Representative and replace with acceptable soil at no expense to the Owner.

3.2 EXCAVATION

- A. Install shoring or other protective support systems to minimize sloping or benching of excavations.
- B. Do not excavate within drip line of trees, unless approved, in writing, by the Owner's Representative.
- C. Do not excavate within tree protection zones, unless otherwise indicated.
- D. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks and comb soil to expose roots.
 1. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction.
 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
- E. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.
 1. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

3.3 REGRADING

- A. Do not backfill against tree trunk.
- B. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade beyond tree protection zones. Maintain existing grades within tree protection zones.
- C. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist, unless otherwise indicated.
 1. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.

- D. Minor Fill: Where existing grade is 6 inches or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- E. Moderate Fill: Where existing grade is more than 6 inches but less than 12 inches below elevation of finish grade, place drainage fill, filter fabric, and topsoil on existing grade as follows:
 - 1. Carefully place drainage fill against tree trunk approximately 2 inches above elevation of finish grade and extend not less than 18 inches from tree trunk on each side. For remainder of area within drip-line perimeter, place drainage fill up to 6 inches below elevation of grade.
 - 2. Place filter fabric with edges overlapping 6 inches) minimum.
 - 3. Place fill layer of topsoil to finish grade. Do not compact drainage fill or topsoil. Hand grade to required finish elevations.

3.4 TREE PRUNING

- A. Prune trees to remain that are affected by temporary and permanent construction.
- B. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
 - 1. Type of Pruning: As directed by the Design Consultant.
- C. Cut branches with sharp pruning instruments; do not break or chop.
- D. Chip removed tree branches and dispose of off-site.

3.5 TREE REPAIR AND REPLACEMENT

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
- B. Remove and replace trees indicated to remain that die or are damaged during construction operations that arborist determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size and species as those being replaced; plant and maintain as specified in Division 32 Section "Plants."
 - 2. Provide new trees of 6-inch caliper size and of a species selected by Design Consultant when damaged trees more than 6 inches in caliper size, measured 12 inches above grade, are required to be replaced. Plant and maintain new trees as specified in Division 32 Section "Plants."
- C. Aerate surface soil, compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material and displaced trees from Owner's property.

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following administrative and procedural requirements:
 - 1. Definitions
 - 2. Submittals
 - 3. Quality assurance
 - 4. Product delivery, storage, and handling.
 - 5. Product warranties.
 - 6. Product options.
 - 7. Product substitutions; and comparable products.
 - 8. Seismic anchorage
 - 9. Protection of installed products
- B. Related requirements:
 - 1. The following in other Sections of Division 01.
 - a. References.
 - b. Closeout procedures.
 - 2. Divisions 02 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.2 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock.
 - 1. Named products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless stated otherwise. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable product: Product demonstrated and approved through submittal process, or where indicated as a product substitution, with the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. "Basis of design" product specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

- D. Manufacturer's warranty: Pre-printed warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to City.
- E. Special warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide additional rights to the City.

1.3 SUBMITTALS

- A. Product list: Submit a list, in tabular form, listing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
 - 1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
 - 2. Form: Tabulate information for each product under the following column headings.
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 - 3. Initial submittal:
 - a. Within 30 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - b. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
 - 4. Completed list: Within 60 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
 - 5. Design Consultant's action:
 - a. Design Consultant will respond in writing to Contractor within 15 days of receipt of completed product list.
 - b. Design Consultant's response will include a list of unacceptable product selections and a brief explanation of reasons for this action.
 - c. Design Consultant's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.
- B. Substitution requests: Submit 3 copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution request form: Use form acceptable to the Design Consultant.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable.
 - a. Statement indicating why specified material or product cannot be provided.
 - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by City and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of Design Consultants and Citys.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Design Consultant's action: If necessary, Design Consultant will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Design Consultant will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
 - a. Form of acceptance: Change Order.
 - b. Use product specified if Design Consultant cannot make a decision on use of a proposed substitution within time allocated.

- C. Basis-of-design product specification submittal: Comply with requirements elsewhere in Division 01. Show compliance with requirements.

1.4 QUALITY ASSURANCE

- A. Compatibility of options: If Contractor is given option of selecting between 2 or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

B. Exceptions:

1. Listing manufacturer's name and model number after product description does not constitute guarantee or representation on part of City and Design Consultant that maker listed will provide item specified at time of bidding or when needed for construction.
2. It is incumbent on bidders to verify availability of all items required and base their bids on quotations from providers who can and will supply items meeting detailed product specifications in time to meet Contractor's construction schedule.
3. Model numbers listed may not include all options or modifications required by the Specifications or to complete the Work.

C. Unless otherwise specified, material and equipment for Work shall be essentially standard product of manufacturer regularly engaged in production of such materials and equipment or materials and equipment of comparable character.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including the-foot Comply with the products manufacturer written instructions.

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
5. Store products to allow for inspection and measurement of quantity or counting of units.
6. Store materials so that they will not endanger Project structure.
7. Store products subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
8. Periodically inspect to assure products are undamaged and are maintained under required conditions.
9. Comply with product manufacturer written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
10. Protect stored products from damage.

B. Storage: Provide a secure location and enclosure at Project site for storage of materials and equipment by City's construction forces. Coordinate location with City.

1.6 PRODUCT WARRANTIES

A. General: Warranties specified in other Sections are in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

- B. Special warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's standard form: Modified to include Project-specific information and properly executed.
 2. Specified form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
 3. Refer to Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal time: Comply with requirements specified elsewhere in Division 01.

PART 2 - PRODUCTS

2.1 PRODUCT OPTIONS

- A. General product requirements: Provide products that comply with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. City reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Design Consultant will make selection.
 5. Where products are accompanied by the term "match sample," sample to be matched is Design Consultant's control sample.
 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 7. Where products are specified by name and accompanied by the term "or equal" or "or approved equal" comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product selection procedures: Procedures for product selection include the following:
1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer followed by "no" substitution, provide the product named.
 2. Manufacturer/source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.
 3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
 4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

5. Basis-of-design products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions above to obtain approval for use of an unnamed product.
6. Visual matching specification:
 - a. Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Design Consultant's sample. Design Consultant's control decision will be final on whether a proposed product matches satisfactorily.
 - b. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
7. Visual selection specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
 - a. Standard range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Design Consultant will select color, pattern, or texture from manufacturer's product line that does not include premium items.
 - b. Full range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Design Consultant will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Design Consultant will consider requests for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Design Consultant will return requests without action, except to record noncompliance with these requirements.
 1. Requested substitution offers City a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities City must assume. City's additional responsibilities may include compensation to Design Consultant for redesign and evaluation services, increased cost of other construction by City, and similar considerations.
 2. Requested substitution does not require extensive revisions to the Contract Documents.
 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 4. Substitution request is fully documented and properly submitted.
 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
 7. Requested substitution is compatible with other portions of the Work.
 8. Requested substitution has been coordinated with other portions of the Work.
 9. Requested substitution provides specified warranty.
 10. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

2.3 COMPARABLE PRODUCTS

- A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
1. Evidence that the proposed product does not require extensive revisions to the Contract Documents that it is consistent with the Contract Documents, and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of Design Consultants and Citys, if requested.
 5. Samples, if requested.

PART 3 - EXECUTION

3.1 SEISMIC ANCHORAGE

- A. Except where specifically noted otherwise in the Specifications, for delegated design assemblies anchor equipment, architectural features, and appurtenant facilities to resist the minimum following seismic forces:
1. Horizontal and vertical forces: In accordance with the CBC.
 2. Weight of equipment or facilities shall include contents therein, and be the operating weight.
 3. Shop drawings incorporating seismic anchorage shall be stamped by a California-licensed professional engineer that designed the anchorage. With submittal, include calculations showing compliance with the CBC.
- B. This requirement applies, but is not limited to, such items as light fixtures, electrical panels, switchgear, tanks, pumps, chillers, boilers, piping, pipe supports and hangers, athletic equipment, motors, cabinets, shelving, control panels, starters, fans, and air ducts, etc.
- C. The horizontal force shall be considered as acting in any direction in a horizontal plane.
- D. Vertical force shall be considered as acting upwards or downwards in a vertical plane.
- E. Design of entire anchoring system and furnishing of any part of anchoring system that must be integral with equipment or facilities shall be responsibility of the Contractor. The Contractor, working closely with manufacturer, supplier, or both, and with a California-licensed professional engineer, shall be responsible for designing, furnishing, and installing anchors or restraints that relate to the facility. Examples, but not limited to these noted, are anchor bolts, Unistrut retaining curbs, housekeeping pads, walls, or resisting seismic forces, additional structural elements may be required.
- F. Except where specifically noted otherwise in the Specifications, submit certification for equipment in Division 02 through 33, inclusive, that equipment anchorage complies with requirements of this article. Also submit sketch or description of anchorage system where certification is required. City will require submission of calculations prepared by California-registered professional engineer to substantiate anchorage design if design does not appear to be adequate.
- G. Perform one field test for shear and/or pullout of each kind of anchorage assembly. If assembly fails, revise, reinstall, or otherwise correct such assemblies installed in the Work, and retest, at no additional cost to City.

3.2 PROTECTION

- A. After installation, provide coverings to protect products from damage from traffic, construction operations, drywall dust, dirt, etc., and remove when installation is complete and covering is no longer needed.

END OF SECTION



SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase)

Project: _____ Substitution Request Number: _____

From: _____
To: _____ Date: _____

A/E Project Number: _____
Re: _____ Contract For: _____

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____
Installer: _____ Address: _____ Phone: _____
History: ☐ New product ☐ 1-4 years old ☐ 5-10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product: _____

☐ Point-by-point comparative data attached — REQUIRED BY A/E

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____
Address: _____ Owner: _____
_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; explain _____

Savings to Owner for accepting substitution: _____ (\$ _____).

Proposed substitution changes Contract Time: ☐ No ☐ Yes [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

SUBSTITUTION REQUEST

(After the Bidding/Negotiating Phase — Continued)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: ☐

A/E's REVIEW AND RECOMMENDATION

- ☐ Approve Substitution - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- ☐ Approve Substitution as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- ☐ Reject Substitution - Use specified materials.
- ☐ Substitution Request received too late - Use specified materials.

Signed by: _____ Date: _____

OWNER'S REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures. Prepare Change Order.
- ☐ Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures. Prepare Change Order.
- ☐ Substitution rejected - Use specified materials.

Signed by: _____ Date: _____

Additional Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ A/E
☐ Other:

SECTION 01 73 20 – INDOOR AIR QUALITY MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Indoor Air Quality Procedure include:
 - 1. IAQ Management Plan During Construction:
 - a. IEQ 3.1: Construction procedures to promote healthy indoor air quality during and after construction, which meets the SMACNA IAQ Guidelines for Occupied Buildings under Construction 2nd Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3).
 - b. IEQ 3.2: Construction procedures to promote healthy indoor air quality during and after construction, which meets the SMACNA IAQ Guidelines for Occupied Buildings under Construction 2nd Edition ,2007, ANSI/SMACNA 008-2008
- B. Related Work Specified in Other Sections:
 - 1. Section 018113, "Sustainable Design Requirements" for additional requirements.

1.3 REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE); 1791 Tullie Circle NE, Atlanta, GA 30329. Tel: (404) 636-8400. Fax: (404) 321-5478. www.ashrae.org.
 - 1. ASHRAE 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
- B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA); 4201 Lafayette Center Drive, Chantilly, VA 20151-1219. Tel: (703) 803-2980. Fax: (703) 803-3732. www.smacna.org / American National Standards Institute (ANSI); 1899 L Street NW, 11th Floor, Washington, DC 20036. Tel: (202) 293-8020. Fax: (202) 293-9287.
 - 1. SMACNA (OCC) – IAQ Guideline for Occupied Buildings under Construction, 2nd Edition 2007, ANSI/SMACNA 008-2008 (Chapter 3)
- C. U.S. Environmental Protection Agency (EPA); www.epa.gov.
 - 1. Compendium of Methods for the Determination of Air Pollutants in Indoor Air.
- D. U.S. Green Building Council (USGBC) / Green Building Certification Institute (GBCI); 2101 L Street NW, Washington, DC 20037. Tel: (800) 795-1747. www.usgbc.org.
 - 1. LEED™ Rating System, Version 3.0 – Green Building Rating System for New Construction
 - 2. LEED™ BD&C Reference Guide.

1.4 SUBMITTALS

- A. See Section 018113, "Sustainable Design Requirement."
- B. Construction Indoor Air Quality Management Plan.

1. IEQ 3.1: An IAQ plan based upon SMACNA IAQ Guidelines. The plan describes in detail measures specific to this project to be taken during construction to promote adequate indoor air quality upon completion.
 - a. HVAC Protection: Seal and protect ductwork and HVAC equipment from dust and water damage.
 - b. Source Control: Identify sources of VOCs and appropriate measures to mitigate their impacts.
 - c. Pathway Interruption: Manipulate air paths to reduce contaminants of finished spaces
 - d. Housekeeping: Describe cleaning and dust control procedures.
 - e. Scheduling.
 - f. Quality Assurance and IAQ Monitoring: Describe steps to ensure compliance by General Contractor and subcontractors.
 - g. 18 Photographs – six photographs of the 5 SMACNA approaches taken on three different occasions during construction. Identify SMACNA approach featured in each with dates and captions.
- C. IEQ 3.2: An IAQ plan that describes in detail measures specific to this project to be taken before occupancy to promote adequate indoor air quality upon completion.
 1. Narrative describing the Project's specific flush-out procedures and proposed schedule for flush-out.
OR
 2. IAQ Testing plan and schedule to verify that all required contaminants are accounted for and reported in the correct unit of measure.
- D. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.

1.5 QUALITY ASSURANCE

- A. Comply with the requirements of IEQc3.1, "Construction IAQ Management Plan During Construction."
- B. Comply with the requirements of IEQc3.2, "Construction IAQ Management Plan Before Occupancy."
- C. Contractor's Plan shall meet or exceed the recommended design approaches of SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," 2nd Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3)
- D. IAQ Management Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 1. Review methods and procedures related to IAQ management during construction.
 2. Review IAQ management requirements for each trade.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. IEQ 4: See Section 013510 LEED Certification Requirements for specific VOC limits.
- B. Air Filters: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2-1999.

PART 3 - EXECUTION

3.1 IEQ 3.1 IAQ MANAGEMENT DURING CONSTRUCTION

- A. Refer to SMACNA IAQ Guideline for Occupied Buildings under Construction for avoiding unnecessary contamination due to construction procedures.
- B. Prevent the absorption of moisture and humidity by adsorptive materials by:
 - 1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - 2. Delivery and storage of such materials in moisture-impermeable packaging.
 - 3. Provide sufficient ventilation for drying within reasonable time frame.
- C. Building HVAC system and supply air ductwork may be used for ventilation during construction.
 - 1. Operate HVAC system with 100 percent outside air and with 1.5 air changes per hour, minimum.
 - 2. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.
 - 3. Do not use return air ductwork for ventilation unless absolutely necessary.
 - 4. Where return air ducts must be used for ventilation, install MERV 8 filters at return inlets, sealed to ducts; replace filters when they lose efficiency.
- D. Do not store construction materials or waste in mechanical or electrical rooms.
- E. Prior to using return air ductwork without intake filters clean up and remove dust and debris generated by construction activities:
 - 1. Inspect duct intakes, return air grilles, and terminal units for dust.
 - 2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 - 3. Clean tops of doors and frames.
 - 4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 - 5. Clean return air plenums of air handling units.
 - 6. Remove air intake filters only after cleaning is complete.
- F. Do not perform dust or dirt- producing work after starting use of return air ducts without intake filters on return air ducts.
- G. HVAC Protect:
 - 1. Seal off all louvers and air intake/discharge points to prevent construction dust and debris from entering.
 - 2. Seal off all ductwork openings and air outlets with plastic sheeting to protect the duct system from dust and debris. Do not re-open until the end of activities that produce dust or pollution, such as drywall sanding, concrete cutting, masonry work, wood sawing, and so forth.
 - 3. If, off all ductwork openings and air outlets with plastic sheeting to protect the duct system from dust and debris. Do not re-open until the end of activities that produce dust or pollution, such as drywall sanding, concrete cutting, masonry work, wood sawing, and so forth.
 - 4. Under permanent supply ductwork, unless and until the level of construction in the relevant area involves final finishes and trim and the construction has reached a point of complete building dry-in with no sanding and is free from dust, debris, and contaminants.
 - 5. Store permanent supply ductwork, unless and until the level of construction in the relevant area involves final finishes and trim and the construction has reached a point

- of complete building dry-in with no sanding and is free from dust, debris, and contaminants.
6. Seal all HVAC inlets and outlets. Use of the HVAC system shall be avoided during construction until drywall construction is complete. Temporary ventilation may be installed to remove contaminants. All air inlets and outlets shall be sealed securely with tape during construction. These include outside air inlets, grilles, diffusers, supply ducts, return ducts, ceiling plenums, VAV (variable-air volume) plenum intakes, exhaust ducts and window ventilator or air conditioning units. Openings shall be sealed with plastic film and tape that can be removed cleanly.
 7. Seal HVAC components during installation. For ducting runs that require several days to install, sections shall be sealed off as they are completed. Seals shall be removed prior to continuing the ducting run. Other components of the HVAC system shall be subjected to the same requirements to protect them from contamination.
 8. Use temporary filtration media. If the HVAC system is to be used while construction work is being done, temporary filtration media shall be installed on all intakes. Such filtration media shall have a minimum filtration efficiency (Minimum Efficiency Reporting Value-MERV per ASHRAE 52.2) of 8 or higher. For air intakes into parts of a building that are very sensitive to dust contamination, such as computer rooms, filtration media with a MERV rating of 13 or higher is required. New filtration with a MERV rating of 13 or higher shall be installed after construction.
 9. Inspect filters regularly. When the HVAC system is being used during construction and temporary filters are installed, filters shall be inspected weekly and replaced as needed.
 10. Avoid contaminated air entry into enclosed parts of the building. When outdoor construction activities generate dust, combustion emissions, or other contaminants, operable windows and outside air supplies to enclosed portions of the building shall be closed.

H. Source Control:

1. Limit construction traffic and motor idling in the vicinity of air intake louvers when the HVAC systems are activated. Restrict motor vehicles to the loading dock area, well-removed from air intakes and operable windows, preventing emissions from being drawn into the building.
2. Use electric or natural gas alternatives for gasoline and diesel equipment where possible and practical.
3. Cycle equipment off when not being used or needed.
4. Avoid the use of materials and products with high VOC and/or particulate levels. Use products and installation methods with low VOCs such as paints, sealers, sealants, filler materials, insulation, adhesives, caulking and cleaners. Comply with the requirements in other specification Sections.
5. Keep containers of wet products closed as much as possible. Cover and seal waste materials which can release odor or dust.
6. Protect all materials, especially absorbent materials such as insulated ductwork, against moisture during delivery to and storage at the job site. Store materials inside the structure in a dry and clean environment pending installation. Building materials shall be kept dry to avoid the introduction of moisture into the building interior.
7. Avoid the use of moisture-damaged materials. Any porous materials that have been wetted shall be dried thoroughly before installation. Any porous materials that have been damaged remained wet longer than 48 hours, or show signs of visible mold shall be discarded.
8. Ensure that the construction process will not result in moisture intrusion.
9. Avoid tracking pollutants into work areas. Once the framing and mechanical system installation starts, access to the building interior shall be controlled to minimize the tracking in of contaminants. Material deliveries and construction waste removal shall

be routed via the most direct route to the building exterior of the building rather than through the space.

10. Provide rough track-off grates or matting at the entry way to remove moisture and containments from entering the building.
11. Prevent the ingress of rodents and pests.
12. Prohibit smoking inside the building and designate outdoor smoking areas to prevent environmental tobacco smoke trespass.

I. Pathway Interruption:

1. Use dust curtains or temporary enclosures to prevent dust from migrating to other areas when applicable. During construction, isolate areas of work to prevent contamination of clean or occupied areas.
2. Keep pollutant sources as far away as possible from ductwork and areas occupied by workers when feasible.
3. Isolate work areas and/or create pressure differentials to prevent the migration of contaminants.
4. Use portable fan systems to exhaust contaminated air directly to the outside of the building, and discharge the air in a means to prevent it from re-entering.

J. Housekeeping:

1. Minimize accumulation of dust and other contaminants. Construction practices shall be used that minimize the production of dust and other contaminants from construction activities. Use integral dust-collection systems on drywall sanders, cut-off saws, and routers. Confine dust-generation activities to areas where clean-up can be carried out easily and contaminants will not be tracked to other areas.
2. Suppress Dirt Wetting agents or sweeping compounds shall be used to deep dust from becoming airborne.
3. Clean up dust. Wet clothes, damp mops, wet scrubbers, and vacuum cleaners with high-efficiency particulate (HEPA) filters shall be used to clean up dust generated by construction activities.
4. Cleaning frequency shall be increased when dust accumulation is noted. Institute cleaning activities of building areas on a daily basis, and of HVAC equipment as required.
5. Keep all coils, air filters, dampers, fans, and ductwork clean during installation, and clean them as required prior to performing the testing, adjusting and balancing of the systems.
6. Clean up spills. All spills and excess applications of solvent-containing products should be cleaned up using approved methods as soon as practicable. Water spills shall be mopped up promptly.
7. Keep work area dry. Avoid accumulations of water inside the building, and promptly remove any that may occur. Especially protect porous materials such as insulation and ceiling tiles from exposure to moisture.
8. The entire area shall be kept as dry as practicable by promptly regarding any leaks that allow rainwater entry and mopping up any water accumulation. Use dehumidification if necessary for prompt drying of wetted spaces. Unvented combustion (e.g., propane or diesel "salamander" space heaters) shall not be used.
9. Seal containers containing volatile liquids. Containers of fuel, paints, finishes, and solvents shall be kept tightly sealed and preferably stored outside of the building when not in use.

K. Scheduling:

1. Comply with the scheduling requirements of Article, "Sequence of Finish Installation" of this Section.
2. To avoid potential contamination of porous or absorbent materials such as ceiling tiles, install furnishings after interior finishes (drywall, paint, and floor finishing) have cured.

3. Phased Completion: Implement IAQ control measures in each tenant area until construction in that area is complete. Do not allow contaminants from an area under construction to enter the HVAC ductwork systems or to migrate to completed areas.
4. Filters: Install new MERV 13 filters at the central fan system, immediately prior to the first phase of building occupancy. Install new MERV 13 filters at fan systems serving limited areas immediately prior to occupancy for each respective area.

L. Ventilation:

1. Provide adequate ventilation during curing period. To aid in curing of interior finishes and other products used during construction and to remove pollutants after drywall installation is complete, provide adequate ventilation with 100% outside air, and proper filtration. In humid periods or when very high-moisture materials are present, supplementary dehumidification may be required during this curing period.

M. Monitoring of IAQ Plan:

1. Hold weekly Contractor Site Coordination Meetings with the superintendents of all trade contractors. Review the appropriate components of the IAQ Construction Management Plan as a regular action topic at these meetings, and update the Plan as required. Document the implementation of the Plan in the meeting minutes. As a recording format, use SMACNA IAQ Guidelines Appendix C (Planning Checklist) and Appendix D (Inspection Checklist) as a guide.
2. Take a specific series of record photographs at the appropriate stages to document adherence with the IAQ requirements. Submit at least 18 photographs (six photos taken on three different occasions during construction) along with identification of the SMACNA approach featured by each photo in order to show consistent adherence to the LEED Credit requirements.

3.2 IEQ. 3.2 IAQ MANAGEMENT PLAN BEFORE OCCUPANCY

A. Perform either Building Flush-Out (A) or Air Quality Testing (B)

B. After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent. Indicate operating procedure for each HVAC system and piece of equipment and the operating duration required for flush-out.

1. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater.
2. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy.
3. These conditions shall be maintained until a total of 14000 cu. ft. per sq. ft. of outside air has been delivered to the space.

C. Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the US EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air" and as additionally detailed in the USGBC LEED Reference Guide for Green Building Design and Construction, 2009 Edition.

1. Demonstrate that the contaminants concentrated levels listed below are not exceeded:

a.	Formaldehyde	50 parts per billion
b.	Particulates (PM 10)	50 micrograms per cubic meter
c.	Total VOCs	500 micrograms per cubic meter
d.	4- Phenylcyclohexene	6.5 micrograms per cubic meter

- e. Carbon Monoxide 9 parts per million and no greater than 2 parts per million above outdoor levels.
- 2. All measurements shall be conducted prior to occupancy, but during normal occupied hours and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
- 3. The building shall have all interior finishes installed, including but not limited to millwork doors, paint, carpet and acoustic tiles. Non-fixed furnishings such as workstations and partitions are required to be in place for the testing.
- 4. The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq.ft or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.
- 5. Air samples shall be collected between 4 feet and 7 feet from the floor to represent the breathing zone of occupants and over a minimum 4 hour period.

3.3 SEQUENCE OF FINISH INSTALLATION

- A. Sequence of Finish Installation: Project schedule shall address construction scheduling/sequencing requirements and procedures necessary to optimize Indoor Air Quality (IAQ) levels for the completed Project.
 - 1. Scheduling: Contractor's Project Schedule for finish applications should allow for: Dissipation of high emissions from finishes that off-gas perceptible quantities of deleterious material during curing Separation of off-gasing effects from the installation of adsorptive materials that would act as a "sink" for storage and subsequent release of these unwanted substances into building spaces and mechanical systems after project occupancy.
 - 2. When Contractor's "Project Schedule" requires less than optimal sequencing of finish installation, related to IAQ, provide supplemental filtered "fresh air" ventilation of work areas during construction and restrict / control the use of permanent building mechanical systems prior to Owner acceptance of building to prevent contamination of systems by construction wastes and other deleterious substances.
- B. Finish Types:
 - 1. Type 1 Finishes: Materials and finishes which have a potential for short-term levels of off-gassing from chemicals inherent in their manufacturing process, or which are applied in a form requiring vehicles or carriers for spreading which release a high level of particulate matter in the process of installation and/or curing. Type 1 Finishes include, but are not limited to the following:
 - a. Adhesives, sealants, and glazing compounds, specifically those with petrochemical vehicles or carriers.
 - b. Wood preservatives, finishes, and paint.
 - c. Control and/or expansion joint fillers.
 - d. All hard finishes requiring adhesive installation.
 - e. Gypsum board and associated finish processes.
 - f. Sealants and associated filler materials.
 - 2. Type 2 Finishes: "Fuzzy" materials and finishes which are woven, fibrous, or porous in nature and tend to adsorb chemicals off-gassed by Type 1 finishes or may be adversely affected by particulates. These materials become "sinks" for deleterious substances which may be released much later, or collectors of contaminants that may promote subsequent bacterial growth. Type 2 Finishes include, but are not limited to the following:

- a. Carpet and padding.
 - b. Fabric wallcovering.
 - c. Insulation exposed to the airstream.
 - d. Acoustic ceiling materials.
 - e. Fabric covered acoustic wall panels.
 - f. Upholstered furnishings.
 3. Materials that can be categorized as both Type 1 and Type 2 materials shall be considered to be Type 1 materials.
- C. Optimal Order of Installation: Apply all Type 1 interior finishes throughout the entire controlled air zone of each enclosed building or building segment and allow such finishes to completely cure according to intervals and times stated in respective finish manufacturer's printed instructions before commencing installation of any Type 2 materials in the same area.
1. Do not store any Type 2 materials in areas where installation or curing of Type 1 materials is in progress.
- D. Materials Test Data – Required for Substitutions Only:
1. All manufacturers/producers of materials listed below that are proposed for substitution on this Project are required to provide test data for their materials which show permanent, in-place Indoor Air Quality performance in accordance with requirements of this Specification.
 2. Material Safety Data Sheets: Review all MSDS's of materials to be submitted for testing as well as MSDS's for other products where specifically requested in this Project Manual and identify those classified as "Prohibited Materials".
 3. Prohibited Materials: Any building materials or products that emit pollutants included on the International Agency for Research on Cancer (IARC) "List of Chemical Carcinogens", the "Carcinogen List" of the National Toxicology Program, and the "Reproductive Toxin List" of the "Catalog of Teratogenic Agents" must have approval in writing from the Owner's Representative before that building material or product may be used on this Project. Carcinogens: Use of materials emitting carcinogens will not be permitted unless a suitable substitute is not available. Do not proceed with procurement of any carcinogen emitting product or material without prior review and written approval of the Owner's Representative.

END OF SECTION

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 1. Salvaging, recycling and disposing of nonhazardous demolition and construction waste as required in LEED MRc2 Construction Waste Management.
 - 2. Salvaging, recycling and disposing of nonhazardous demolition and construction waste as required by City of Santa Monica Construction and Demolition Debris Ordinance #1996.

1.3 DEFINITIONS

- A. Construction and Demolition Waste (LEED): Includes waste and recyclables generated from construction and demolition. It does not include land-clearing debris, such as soil, vegetation and rocks.
- B. Construction and Demolition Waste: Building and site improvement waste and recyclables materials resulting from demolition or construction.
- 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.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 95-percent by weight (75-percent minimum allowable) of total waste generated by the work.
- B. Salvage/ Recycle Requirements: Salvage and recycle as much nonhazardous demolition and construction waste as possible including, as applicable, the following materials:
 - 1. Demolition Waste:
 - a. Asphaltic concrete paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.
 - d. Brick.
 - e. Concrete masonry units.
 - f. Plywood and oriented strand board.
 - g. Wood paneling.
 - h. Wood trim.

- i. Structural and miscellaneous steel.
- j. Rough hardware.
- k. Roofing.
- l. Insulation.
- m. Doors and frames.
- n. Door hardware.
- o. Windows.
- p. Glazing.
- q. Metal studs.
- r. Gypsum board.
- s. Acoustical tile and panels.
- t. Carpet.
- u. Carpet pad.
- v. Demountable partitions.
- w. Equipment.
- x. Cabinets.
- y. Plumbing fixtures.
- z. Piping.
- aa. Supports and hangers.
- bb. Valves.
- cc. Sprinklers.
- dd. Mechanical equipment.
- ee. Refrigerants.
- ff. Electrical Conduit.
- gg. Copper Wiring.
- hh. Lighting fixtures.
- ii. Lamps.
- jj. Ballasts.
- kk. Electrical devices.
- ll. Switchgear and panelboards.
- mm. Transformers.

2. Construction Waste:

- a. Site-clearing waste.
- b. Masonry and CMU.
- c. Lumber.
- d. Wood sheet materials.
- e. Wood trim.
- f. Metals.
- g. Roofing.
- h. Insulation.
- i. Carpet.
- j. Gypsum board.
- k. Piping.
- l. Electrical conduit.
- m. Packaging: Regardless of salvage/recycle goal specified above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and trim.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.5 SUBMITTALS

- A. Waste Management Plan: Submit three copies of plan within 30-days of date established for the Notice to Proceed.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual tons.
 - 5. Quantity of waste recycled, both estimated and actual tons.
 - 6. Location and name of Material Recovery Facility or Landfill.
 - 7. Letter from government agency verifying recovery rates.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. LEED Submittal: LEED form for Credit MR 2, signed by General Contractor tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- I. Qualification Data: For Waste Management Coordinator.

1.6 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having Jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site. 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 plan that complies with City of Santa Monica Construction & Demolition Debris Ordinance #1996. Plan consisting of waste identification, waste reduction work plan, and diversion goals, implementation protocols, and parties responsible. Indicate quantities in tons throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site-clearing and construction waste generated by the work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include only City of Santa Monica approved Recycling Facilities and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate name of City of Santa Monica Public Works' approved private hauler and how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement waste management plan as approved by the City of Santa Monica. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within 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 waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- 3.2 SALVAGING DEMOLITION WASTE
- A. Salvaged Items for Reuse in the Work:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional.
- 3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL
- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Approved Private Haulers:
http://www.smgov.net/uploadedFiles/Departments/Public_Works/Solid_Waste/Approved_Haulers.pdf
- C. Approved C&D Recycling Facilities:
http://www.smgov.net/uploadedFiles/Departments/Public_Works/Solid_Waste/Approved_C_D_Facilities.pdf
- D. Procedures: To the maximum extent possible, separate recyclable waste from other waste materials, trash, and debris.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste off property and transport to recycling receiver or processor.

END OF SECTION

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT

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PART 3 - EXECUTION

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- 3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL
- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Approved Private Haulers:
http://www.smgov.net/uploadedFiles/Departments/Public_Works/Solid_Waste/Approved_Haulers.pdf
- C. Approved C&D Recycling Facilities:
http://www.smgov.net/uploadedFiles/Departments/Public_Works/Solid_Waste/Approved_C_D_Facilities.pdf
- D. Procedures: To the maximum extent possible, separate recyclable waste from other waste materials, trash, and debris.
1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste off property and transport to recycling receiver or processor.

END OF SECTION

SECTION 01 78 00 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general requirements for preparation, maintenance and delivery of record documents.

1.2 SUBMITTALS

- A. Deliver record documents and 3 copies (sets) in PDF format on CD ROM to Design Consultant at completion of Project.
- B. Accompany submittal with transmittal letter, in duplicate, containing date, Project title and number, Contractor's name and address, title and number of each record document, certification that each document as submitted is complete and accurate, and signature of Contractor or its authorized representative.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.1 DOCUMENT MAINTENANCE

- A. Maintain one copy of the following in Contractor's field office at the site:
 - 1. Contract Drawings, including the Building Department stamped set.
 - 2. Contract Specifications and Addenda.
 - 3. Reviewed Shop Drawings.
 - 4. Bulletins and Change Orders, Field Change Authorization and Notice of Clarification, and other modifications to Contract.
 - 5. Field test records.
 - 6. Deferred permit "delegate design" stamped set.
- B. File record documents apart from constructions documents and maintain in clean, dry, legible condition. Make record documents available for review by the City and Design Consultant during regular business hours.
- C. Do not use record documents for construction purpose.
- D. Record documents will be subject to a monthly review by the Design Consultant prior to approval of each progress payment.

3.2 RECORDING

- A. Clearly label each document "**PROJECT RECORD.**"
- B. Keep record documents current.
- C. Record and properly dimension deviations on the record drawings within 24 hours after work in affected area is completed. Dimensions shall be accurate to within one inch.
 - 1. Use a fine felt or nylon tip pen with waterproof colored ink for marking.

2. Legibly mark to record actual construction of the following:
 - a. Depths of various elements of foundation in relation to first floor level.
 - b. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements. Cut-off points and point of connections of utilities.
 - c. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
 - d. Field changes of dimension and detail.
 - e. Changes made by Change Order, Field Change Authorization and Notice of Clarification.
 - f. Details not on original Contract Drawings.
 - g. Do not permanently conceal any work until required information has been recorded.

D. Legibly mark-up each Section of the Specifications to record the following:

1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment installed.
2. Changes made by change order, field change authorization and notice of clarification.
3. Other matters not originally specified.

E. Maintain shop drawings as record documents. Legibly annotate to record changes made after approval.

3.3 RECORD TRANSPARENCIES

- A. At completion of Project, obtain from Design Consultant and pay for a set of Mylar transparencies of all affected Contract Drawings.
- B. Incorporate on transparencies, all changes noted on record set in black ink. This requirement applies to all the disciplines. An experienced, competent draftsman shall perform work.
- C. Identify documents as "**RECORD DRAWINGS.**"

END OF SECTION

SECTION 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver certification (minimum allowable) under the LEED for New Construction and Major Renovations Rating System v.3 (2009) from the US Green Building Council and Green Building Certification Institute.
- B. 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.
- C. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's and Engineer's design and other aspects of Project that are not part of the Work of the Contract.
- D. LEED credits dependent on material selection require the contractor to establish and maintain a Materials Tracking Log.
- E. A copy of the LEED Project checklist is attached at the end of this Section for information only.
- F. The General Contractor and subcontractors have essential roles in the credits related to products and procedures used for construction. Credits outlined in this section relate to the products and procedures used for construction which are the responsibility of the Contractor to implement and document. The full cooperation of the Contractor and subcontractors is essential to achieving final certification and achieving the goal of LEED Silver (minimum)
- G. The Contractor shall be familiar with the relevant LEED requirements and provide the necessary information and instruction to all subcontractors and installers.
 - 1. A copy of the LEED BD+C Reference Guide shall be kept onsite.
- H. This section summarizes the LEED credits requiring direct participation of the Contractor and subcontractors to achieve LEED certification.
 - 1. Some credits are dependent on proper performance by the Contractor and subcontractors.
 - 2. Other credits involve quantifying percentages by weight and cost; these require careful recordkeeping and reporting by the Contractor and cooperation from subcontractors.
- I. Related work specified in other sections. Sections that include requirements intended to achieve LEED credits include, but are not limited to, the following:
 - 1. Section 017320 Indoor Air Quality Management
 - 2. Section 017419 Construction Waste Management
 - 3. Sections 019113, 220800, 230800, and 260800 Commissioning

4. Divisions 3 through 10, 31 and 32 – Materials Requirements Product Information for LEED Submittals

1.3 DEFINITIONS

- A. Chain-of-custody Certificates: Certificates awarded to companies that produce, sell, promote or trade forest products after audits verify proper accounting of material flows and proper use of the FSC name and logo. The COC is listed on invoices for non labeled products to document that an entity as followed FSC guidelines for product accounting.
- B. Rapidly Renewable: Building materials and products made from plants that are typically harvested within a 10-year or shorter cycle.
- C. Regional Materials: Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured within 500 miles 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 percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer) or after consumer use (post-consumer). The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
 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.
 3. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
- E. MERV: Minimum Efficiency Reporting Value for filtration media, as determined by ASHRAE Standard 52.2-1999.

1.4 REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE); 1791 Tullie Circle NE, Atlanta, GA 30329. Tel: (404) 636-8400. Fax: (404) 321-5478.
www.ashrae.org
 1. ASHRAE 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
- B. American National Standards Institute (ANSI); 1899 L Street NW, 11th Floor, Washington, DC 20036. Tel: (202) 293-8020. Fax: (202) 293-9287 / Business and Institutional Furniture Makers' Association (BIFMA); 678 Front Avenue NW, Suite 150, Grand Rapids, MI 49504-5368. Tel: (616) 285-3963. Fax: (616) 285-3765
 1. X7.1-2007 Standard for Formaldehyde and TVOC Emissions of Low-Emitting Office Furniture Systems and Seating; www.bfma.org/standards/standards.html.
- C. California Department of Health Services (CDHS)

1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda; www.cal-iaq.org/VOC/Section01350_7_15_2004_FINAL_PLUS_ADDENDUM-2004-01.pdf.
- D. Carpet and Rug Institute (CRI) Green Label Plus Testing Program; www.carpet-rug.com.
- E. Environmental Technology Verification (ETV) Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes, effective September 1999; www.epa.gov/etv/pdfs/vp/07_vp_furniture.pdf.
- F. FloorScore™ Program, Resilient Floor Covering Institute; 115 Broad Street, Suite 201, LaGrange, GA 30240; www.rfci.com/int_Florescore.htm.
- G. Forest Stewardship Council (FSC); www.fscus.org.
- H. GREENGUARD™ Certification Program, Greenguard Environmental Institute; 2211 Newmarket Parkway, Suite 110, Marietta, GA 30067. Tel: (770) 984-9903. Fax: (770) 980-0072. www.greenguard.org.
- I. Green Seal; 1001 Connecticut Avenue NW, Suite 827, Washington, DC 20036-5525. Tel: (202) 872-6400. Fax: (202) 872-4324. www.greenseal.org.
 1. GC-03; www.greenseal.org/certification/standards/anti-corrosivepaints.pdf.
 2. GS-11; www.greenseal.org/certification/standards/paints_and_coatings.pdf.
 3. GS-36, effective October 19, 2000; www.greenseal.org/certification/standards/commercial_adhesives_GS_36.cfm.
- J. International Organization for Standardization (ISO); www.iso.org.
 1. ISO 14021-1999, Environmental labels and Declarations – Self Declared Environmental Claims (Type II Environmental Labeling)
- K. Sheet Metal and Air Conditioning Contractors National Association (SMACNA); 4201 Lafayette Center Drive, Chantilly, VA 20151-1219. Tel: (703) 803-2980. Fax: (703) 803-3732. www.smacna.org.
 1. IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition, Chapter 3, November 2007
- L. South Coast Air Quality Management District (SCAQMD); 21865 E. Copley Drive, Diamond Bar, CA 91765. Tel: (909) 828-5100. www.aqmd.gov.
 1. Rule 1113 Architectural Coatings; www.aqmd.gov/rules/reg/reg11/r1113.pdf.
 2. Rule 1168 VOC Limits; www.aqmd.gov/rules/reg/reg11/r1168.pdf.
 3. Amendment to South Coast Rule 1168, VOC Limits, effective January 7, 2005; www.aqmd.gov/rules/reg/reg11/r1168.pdf.
- M. State of California Standard 1350, Section 9, Standard Practice for Testing of Volatile Organic Emissions, from Various Sources Using Small-Scale Environmental Chambers, Testing Criteria; www.dhsca.gov/ps/deodc/ehlb/iaq/VOCS/Section01350_7_15_2004_FINAL_PLUS_ADDENDUM-2004-01.pdfw.
- N. U.S. Environmental Protection Agency (EPA); www.epa.gov.
 1. EPA Office Water, 2003 EPA Construction General Permit; <http://cfpup.epa.gov/npdes/stormwater/cgp.cfm>.
 2. Compendium of Methods for the Determination of Air Pollutants in Indoor Air
- O. U.S. Green Building Council (USGBC) / Green Building Certification Institute (GBCI); 2101 L Street NW, Washington, DC 20037. Tel: (800) 795-1747. www.usgbc.org.

1. LEED™ Rating System, Version 3.0 – Green Building Rating System for New Construction
2. LEED™ BD&C Reference Guide.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect, LEED Consultant 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.

1.6 INFORMATIONAL SUBMITTALS

- A. Project Materials Cost Data: provide statement indicating total cost for materials in Divisions 2-10, 31 and 32 used for Project. Costs exclude labor, overhead, and profit. Provide breakout of costs for the following categories of items:
 1. Wood-based construction materials.
 2. Furniture (Division 12)
- B. LEED Action Plans: Provide preliminary submittals within 30 days of date established for Notice to Proceed indicating how the following requirements will be met:
 1. Credit MR 2: Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."
 2. Credit MR 4: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
 3. Credit MR 5: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
 4. Credit MR 7: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
 5. Credit IEQ 3.1 and 3.2: Draft Plan for IAQ during construction that complies with Section 018119 Indoor Air Quality Requirements.
 6. LEED Report Schedule – Provide schedule for submitting progress LEED reports for SSp1, MR 2, MR 4, MR 5, IEQ 3.1, IEQ 3.2, IEQ 4.1, IEQ 4.2, IEQ 4.3 and IEQ 4.4. Reports shall be submitted to the Architect and LEED Consultant at no more than 60-day intervals.
- C. LEED Progress Reports: Submit reports summarizing progress in construction and purchasing activities related to the following credits:
 1. Credit SSp1: Work plan complying with Divisions 01 Section "Temporary Facilities and Controls," Division 31 Section "Site Clearing," and Division 32 Section "Earth Moving." Include date-stamped photos over course of site work activities to document the erosion and sedimentation control plan.
 2. Credit MR 2: Waste reduction progress reports complying with Division 01 Section 017419 "Construction Waste Management."
 3. Credit MR 4: Summary of product data and material costs collected for all recycled content materials that have been purchased or installed.
 4. Credit MR 5: Summary of manufacturer's information and material costs collected for all regional materials that have been purchased or installed.
 5. Credit MR 7: Summary of all product data and material costs for all wood-based products (excluding recycled wood) in the project. Include Forest Stewardship Council chain-of-custody certificate number on all materials which apply and on vendor receipts.

6. Credit IEQ 3.1: Include six photographs taken on at least three different occasions during construction showing implemented SMACNA measures complying with Division 01 Section "Indoor Air Quality Requirements."
7. Credit IEQ 3.2: Include flush out schedule in construction schedule or date for IAQ Testing.
8. Credit IEQ 4: Summary of product data collected for all adhesives, sealants, paints, coatings, carpeting, hard surface and resilient flooring systems, composite wood, agrifiber and laminate adhesives that is installed inside of the building's moisture barrier.

1.7 ACTION 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. LEED Documentation Submittals:
 1. Credit SSp1 – Construction Activity Pollution Prevention:
 - a. Storm Water Pollution Prevention Plan (SWPPP).
 - b. Construction Documentation: date-stamped photos which show the implemented measures and any corrective action that was taken.
 2. Credit EAp1& EAc3 – Fundamental and Enhanced Commissioning of the Building Energy Systems: Summary of all product data collected for all building energy systems materials and equipment that have been purchased and installed. Comply with Sections 019113 General Commissioning Requirements.
 - 3.
 4. Credit MR 2 – Construction Waste Management:
 - a. Comply with Section 017419 Construction Waste Management.
 - b. Complete LEED construction waste calculations.
 - c. Itemized waste hauling certificates/receipts for all waste removed from the Project site and documentation of recycling recovery rate for off-site sorting facilities (if waste is commingled).
 - 5.
 6. Credit MR 4 – Recycled Content:
 - a. Cut sheet, product literature or letter from manufacturer that clearly indicates the percentage by weight of post-consumer and pre-consumer (post-industrial) recycled content.
 - b. Material cost.
 - c. Complete LEED recycled content calculations.
 7. Credit MR 5 – Regional Content :
 - b. Cut sheet, product literature or letter from manufacturer indicating the location of harvest, processing and manufacturer proximity from the project site.
 - c. Cost for each regional material and the fraction by weight that is considered regional.
 - d. Complete LEED regional content calculations.
 8. Credit MR 7 – Certified Wood:

- a. List of all wood products used on project, including product type, manufacturer, material cost (excluding installation and labor) and chain of custody number for products claiming FSC certification.
 - b. Product Data and certificates of chain-of-custody for new (non-recycled content) wood products containing certified wood.
 - c. Vendor receipts with chain-of-custody number.
 - d. Calculations demonstrating quantity, by cost, of FSC certified wood used on project as a percentage of the total wood used.
 - e. Complete LEED certified wood calculations.
9. 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 each 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.
10. Credit IEQ 3.2:
- a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
 - b. Product data for filtration media used during flush-out and during occupancy.
 - c. Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.
11. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used.
12. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used.
13. Credit IEQ 4.3: Product data for carpet and flooring systems indicating compliance per LEED.
14. 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. This requirement is for both shop and field applied.

1.8 QUALITY ASSURANCE

- A. 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 20 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.
 3. Recycled content of materials shall be defined according to the ISO 14021 Environmental Labels and Declarations – Self declared environmental claims (Type II environmental labeling).

2.3 REGIONAL MATERIALS

- A. Credit MR 5: Provide not less than 10 percent of building materials (by cost) that are regional materials (extracted, harvested or recycled AND processed AND manufactured within 500 linear miles from the project site).
1. Include Divisions 3-10 plus 31, 32 excluding labor and equipment costs.
 2. If only a fraction of the material complies, then only that percentage (by weight) may contribute to the regional value.

2.4 CERTIFIED WOOD

- A. Credit MR 7: Provide not less than 90 percent (50 percent minimum allowable) by cost of wood-based materials that are 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." Only applies to NEW wood (not-recycled content or salvaged wood).
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.
 - n. Furniture.

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 limits for VOC content established in South Coast Air Quality Management District (SCAQMD) Rule 1168 (July 1, 2005 and rule amendment date January 7, 2005) and Green Seal Standard for Commercial Adhesives GS-36 (October 19, 2000):

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. Indoor 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. Nonmembrane 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 limits for VOC content established in Green Seal Standard GS-11 (May 20, 1993), anti-corrosive and anti-rust paints shall comply with the following limits for VOC content established in Green Seal Standard GC-03 (January 7 1997), and clear wood finishes, floor coatings, stains, primers, and shellacs shall comply with the following limits for VOC content established in South Coast Air Quality Management District (SCAQMD) Rule 1113 (January 1, 2004).
1. Flat Paints and Coatings: VOC not more than 50 g/L.
 2. Nonflat Paints and Coatings: VOC not more than 50 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 100 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 275 g/L.
 9. Clear Wood Finishes, Lacquers: VOC not more than 275 g/L.
 10. Floor Coatings: VOC not more than 50 g/L.
 11. Shellacs, Clear: VOC not more than 730 g/L.
 12. Shellacs, Pigmented: VOC not more than 550 g/L.
 13. Interior Stains: VOC not more than 100 g/L.
 14. Bond Breakers: VOC not more than 350 g/L.
 15. Clear Brushing Lacquers: VOC not more than 275 g/L.
 16. Concrete-Curing Compounds: VOC not more than 100 g/L.
 17. Concrete-Curing Compounds for roadways and bridges: VOC not more than 350 g/L.
 18. Fire-Proofing Exterior Coatings: VOC not more than 350 g/L.
 19. Fire Retardant Coatings, Clear: VOC not more than 650 g/L.
 20. Fire Retardant Coatings, Pigmented: VOC not more than 350 g/L.
 21. Graphic Arts (Sign) Coatings: VOC not more than 500 g/L.
 22. Japans/Faux Finishing Coatings: VOC not more than 350 g/L.
 23. Magnesite Cement Coatings: VOC not more than 450 g/L.
 24. Mastic Coatings: VOC not more than 300 g/L.
 25. Metallic Pigmented Coatings: VOC not more than 500 g/L.
 26. Multicolor Coatings: VOC not more than 300 g/L.
 27. Pigmented Lacquers: VOC not more than 275 g/L.
 28. Quick-Dry Enamels: VOC not more than 50 g/L.
 29. Quick-Dry Primers, Sealers, and Undercoaters: VOC not more than 100 g/L.
 30. Recycled Coatings: VOC not more than 250 g/L.
 31. Roof Coatings: VOC not more than 50 g/L.
 32. Aluminum Roof Coatings: VOC not more than 500 g/L.
 33. Roof primers, Bituminous: VOC not more than 350 g/L.
 34. Specialty Primers: VOC not more than 100 g/L.
 35. Swimming Pool Coatings, Repair: VOC not more than 340 g/L.
 36. Swimming Pool Coatings, Other: VOC not more than 340 g/L.
 37. Traffic Coatings: VOC not more than 100 g/L.
 38. Waterproofing Sealers: VOC not more than 100 g/L.
 39. Waterproofing Concrete, Masonry Sealers: VOC not more than 100 g/L.
 40. Wood Preservatives – Below-ground: VOC not more than 350 g/L.
 41. Other Coatings: VOC not more than 350 g/L.
- C. Credit IEQ 4.3: All Flooring must comply with the following:
1. Carpet installed in the building interior (i.e., inside the weatherproofing system) shall comply with the testing and product requirements established in the Carpet and Rug Institute Green Label' program.
 2. Carpet adhesive installed in the building interior (i.e., inside the weatherproofing system) shall comply with the requirements of IEQc 4.1 Adhesives and Sealants, which includes a VOC limit of 50 g/L.
 3. Hard surface flooring installed in the interior of the building (i.e., inside the weatherproofing system) shall be certified as compliant with the FloorScore2 standard. Flooring products covered by FloorScore include:
 - a. Vinyl.
 - b. Linoleum.
 - c. Laminate flooring.
 - d. Wood flooring.
 - e. Ceramic flooring.
 - f. Rubber flooring.
 - g. Wall base.

4. Tile setting adhesives and grout must meet South Coast Air Quality Management District (SCAQMD) Rule 1168. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
 5. FloorScore – Alternative Compliance Path: 100 percent of the non-carpet flooring installed in the interior of the building shall be certified as compliant with the FloorScore standard and must be at least 25 percent of the finished floor area. Examples of unfinished flooring include floors in mechanical rooms, electrical rooms and elevator service rooms.
 6. FloorScore – Alternative Compliance Path: 100 percent of the non-carpet flooring installed in the interior of the building shall be certified as compliant with the FloorScore standard and must be at least 25 percent of the finished floor area. Examples of unfinished flooring include floors in mechanical rooms, electrical rooms and elevator service rooms.
 7. Concrete, wood, bamboo, and cork floor finishes (such as sealer, stain and finish) installed in the building interior (i.e., inside the weatherproofing system) shall comply with the following limits for VOC content established in South Coast Air Quality Management District (SCAQMD) Rule 1168 (July 1, 2005 and rule amendment date January 7, 2005).
- D. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives installed in the building interior (i.e., inside the weatherproofing system) shall not contain urea-formaldehyde resins.
1. Composite wood and agrifiber products include, but are not limited to:
 - a. Particleboard.
 - b. Medium density fiberboard (MDF).
 - c. Plywood.
 - d. Wheatboard.
 - e. Strawboard.
 - f. Panel substrates and door cores.

PART 3 - EXECUTION

3.1 COMMISSIONING

- A. Prerequisite EAp1.0: Comply with the fundamental building commissioning requirements of LEED and Commissioning Sections 019113, 220800, 230800, and 260800.
- B. Credit EA 3.0: Comply with the additional (enhanced) commissioning requirements of LEED and Commissioning Sections 019113, 220800, 230800, and 260800.

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR 2: Comply with Division 01 Section 017419 "Construction Waste Management and Disposal."
 1. Track and keep a summary log of all construction waste generated by type, the quantities of each type that were diverted and landfilled, and the total percentage of waste diverted from landfill disposal. A project may choose to separate construction waste on-site or have comingled construction waste sorted at an off-site facility.
 2. Identify construction haulers and recyclers to handle the designated materials.
 3. Make sure job-site personnel understand and participate in construction debris recycling, and ask them to provide updates throughout the construction process.

3.3 CONSTRUCTION INDOOR-AIR QUALITY MANAGEMENT

- A. Credit IEQ 3.1: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction. Coordinate with requirements of Section 017320, "Indoor Air Quality (IAQ) Management Plan."
1. Protect stored, on-site or installed absorptive materials from moisture damage
 2. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section 015000 "Temporary Facilities and 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.
 3. Replace all air filters immediately prior to occupancy.
 4. HVAC Protection – protect all HVAC equipment from dust and odors and seal all duct and equipment openings with plastic. If the system is operated during construction, protect the return/negative pressure side of the system.
 5. Source Control – the construction team should recover, isolate, and ventilate containers housing toxic materials.
 6. Pathway Interruption – during construction, the contractor must isolate areas of work to prevent contamination of clean or occupied spaces. Depending on weather conditions, the contractor should ventilate using 100% outside air to exhaust contaminated air directly to the outside during installation of VOC-emitting materials.
 7. Housekeeping – the project building and maintenance teams should institute cleaning activities designed to control contaminants in building spaces during construction and before occupancy. The maintenance team should protect all porous building materials from exposure to moisture and store them in a clean area before installation. The team should use vacuum cleaners with high-efficiency particulate filters, increase cleaning frequency and use wetting agents for dust.
 8. Scheduling – the project team should coordinate construction activities to minimize or eliminate disruption of operations in the occupied portions of the building.
- B. Credit IEQ 3.2: Comply with:
1. Option 1. Flush-Out - Path 1: After construction ends, prior to occupancy and with all interior finishes installed, install new filtration media and perform a building flush-out by supplying a total air volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent.
 - a. Prior to flush-out, finalize all cleaning, complete the final test and balancing of HVAC systems, and make sure the HVAC control is functional prior to the flush-out.
 - b. If the building's HVAC system will be used, remove any temporary filters and duct coverings installed as part of the construction IAQ management plan. Replace the HVAC filtration media with new media; if the system is configured to filter only outside air, the filters do not need to be replaced. New filters that meet the design specification and that were installed prior to the start of the flush-out will also satisfy the requirements of IEQ 3.1 Construction IAQ Management Plan during Construction. When attempting to earn IEQ 5 Indoor Chemical and Pollution Source Control, these filters must be MERV 13 or better.
 2. Option 1. Flush-Out - Path 2: If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined in Prerequisite IEQ 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft. per sq. ft. of outside air has been delivered to the space.

3. Option 2. Air Testing: Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the LEED Reference Guide for Green Building Design and Construction, 2009 Edition.
 - a. During construction, avoid substitutions for the specified low-emitting materials.
 - b. Use low-VOC cleaning supplies to prevent short-term high-VOC levels that make affect test results. Vacuum cleaners with HEPA filtration will help capture particulates.
 - c. Projects also following the requirements or IEQ 3.1 Construction IAQ Management Plan during Construction should replace all filtration media after the final cleaning and complete the air test and balancing of the HVAC system before beginning the baseline IAQ testing.
 - d. Air-sample testing shall be conducted as follows:
 - 1) Select the sampling locations carefully to find concentrations in areas with the least ventilation and, potentially, the greatest presumed contaminant strength.
 - 2) Take at least 1 sample per 25,000 sq. ft. in each portion of the building served by a separate ventilation system.
 - 3) Take samples in the breathing zone, between 3 feet and 6 feet above the floor, during normal occupied hours with the HVAC system operating at normal daily start time and at the minimum outside airflow rate. Follow-up samples might be needed, so record the exact sample locations.
 - 4) If the sample exceeds the maximum concentration level, flush out the space by increasing the rate of outside air.
 - e. Demonstrate that the contaminant maximum concentrations listed below are not exceed:
 - 1) Formaldehyde: 27 ppb.
 - 2) Particulates (PM10): 50 micrograms/cu. m.
 - 3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
 - 4) 4-Phenylcyclohexene (4-PH*): 6.5 micrograms/cu. m.
 - 5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

*This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing are installed as part of the base building systems.

END OF SECTION

SECTION 01 81 13 – SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver certification (minimum allowable) under the LEED for New Construction and Major Renovations Rating System v.3 (2009) from the US Green Building Council and Green Building Certification Institute.
- B. 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.
- C. Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's and Engineer's design and other aspects of Project that are not part of the Work of the Contract.
- D. LEED credits dependent on material selection require the contractor to establish and maintain a Materials Tracking Log.
- E. A copy of the LEED Project checklist is attached at the end of this Section for information only.
- F. The General Contractor and subcontractors have essential roles in the credits related to products and procedures used for construction. Credits outlined in this section relate to the products and procedures used for construction which are the responsibility of the Contractor to implement and document. The full cooperation of the Contractor and subcontractors is essential to achieving final certification and achieving the goal of LEED Silver (minimum)
- G. The Contractor shall be familiar with the relevant LEED requirements and provide the necessary information and instruction to all subcontractors and installers.
 - 1. A copy of the LEED BD+C Reference Guide shall be kept onsite.
- H. This section summarizes the LEED credits requiring direct participation of the Contractor and subcontractors to achieve LEED certification.
 - 1. Some credits are dependent on proper performance by the Contractor and subcontractors.
 - 2. Other credits involve quantifying percentages by weight and cost; these require careful recordkeeping and reporting by the Contractor and cooperation from subcontractors.
- I. Related work specified in other sections. Sections that include requirements intended to achieve LEED credits include, but are not limited to, the following:
 - 1. Section 017320 Indoor Air Quality Management
 - 2. Section 017419 Construction Waste Management
 - 3. Sections 019113, 220800, 230800, and 260800 Commissioning

4. Divisions 3 through 10, 31 and 32 – Materials Requirements Product Information for LEED Submittals

1.3 DEFINITIONS

- A. Chain-of-custody Certificates: Certificates awarded to companies that produce, sell, promote or trade forest products after audits verify proper accounting of material flows and proper use of the FSC name and logo. The COC is listed on invoices for non labeled products to document that an entity as followed FSC guidelines for product accounting.
- B. Rapidly Renewable: Building materials and products made from plants that are typically harvested within a 10-year or shorter cycle.
- C. Regional Materials: Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured within 500 miles 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 percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer) or after consumer use (post-consumer). The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
 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.
 3. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
- E. MERV: Minimum Efficiency Reporting Value for filtration media, as determined by ASHRAE Standard 52.2-1999.

1.4 REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE); 1791 Tullie Circle NE, Atlanta, GA 30329. Tel: (404) 636-8400. Fax: (404) 321-5478.
www.ashrae.org.
 1. ASHRAE 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
- B. American National Standards Institute (ANSI); 1899 L Street NW, 11th Floor, Washington, DC 20036. Tel: (202) 293-8020. Fax: (202) 293-9287 / Business and Institutional Furniture Makers' Association (BIFMA); 678 Front Avenue NW, Suite 150, Grand Rapids, MI 49504-5368. Tel: (616) 285-3963. Fax: (616) 285-3765.
 1. X7.1-2007 Standard for Formaldehyde and TVOC Emissions of Low-Emitting Office Furniture Systems and Seating; www.bfma.org/standards/standards.html.
- C. California Department of Health Services (CDHS)

1. Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda; www.cal-iaq.org/VOC/Section01350_7_15_2004_FINAL_PLUS_ADDENDUM-2004-01.pdf.
- D. Carpet and Rug Institute (CRI) Green Label Plus Testing Program; www.carpet-rug.com.
- E. Environmental Technology Verification (ETV) Large Chamber Test Protocol for Measuring Emissions of VOCs and Aldehydes, effective September 1999; www.epa.gov/etv/pdfs/vp/07_vp_furniture.pdf.
- F. FloorScore™ Program, Resilient Floor Covering Institute; 115 Broad Street, Suite 201, LaGrange, GA 30240; www.rfci.com/int_Florescore.htm.
- G. Forest Stewardship Council (FSC); www.fscus.org.
- H. GREENGUARD™ Certification Program, Greenguard Environmental Institute; 2211 Newmarket Parkway, Suite 110, Marietta, GA 30067. Tel: (770) 984-9903. Fax: (770) 980-0072. www.greenguard.org.
- I. Green Seal; 1001 Connecticut Avenue NW, Suite 827, Washington, DC 20036-5525. Tel: (202) 872-6400. Fax: (202) 872-4324. www.greenseal.org.
 1. GC-03; www.greenseal.org/certification/standards/anti-corrosivepaints.pdf.
 2. GS-11; www.greenseal.org/certification/standards/paints_and_coatings.pdf.
 3. GS-36, effective October 19, 2000; www.greenseal.org/certification/standards/commercial_adhesives_GS_36.cfm.
- J. International Organization for Standardization (ISO); www.iso.org.
 1. ISO 14021-1999, Environmental labels and Declarations – Self Declared Environmental Claims (Type II Environmental Labeling)
- K. Sheet Metal and Air Conditioning Contractors National Association (SMACNA); 4201 Lafayette Center Drive, Chantilly, VA 20151-1219. Tel: (703) 803-2980. Fax: (703) 803-3732. www.smacna.org.
 1. IAQ Guidelines for Occupied Buildings under Construction, 2nd Edition, Chapter 3, November 2007
- L. South Coast Air Quality Management District (SCAQMD); 21865 E. Copley Drive, Diamond Bar, CA 91765. Tel: (909) 828-5100. www.aqmd.gov.
 1. Rule 1113 Architectural Coatings; www.aqmd.gov/rules/reg/reg11/r1113.pdf.
 2. Rule 1168 VOC Limits; www.aqmd.gov/rules/reg/reg11/r1168.pdf.
 3. Amendment to South Coast Rule 1168, VOC Limits, effective January 7, 2005; www.aqmd.gov/rules/reg/reg11/r1168.pdf.
- M. State of California Standard 1350, Section 9, Standard Practice for Testing of Volatile Organic Emissions, from Various Sources Using Small-Scale Environmental Chambers, Testing Criteria; www.dhsca.gov/ps/deodc/ehlb/iaq/VOCS/Section01350_7_15_2004_FINAL_PLUS_ADDENDUM-2004-01.pdfw.
- N. U.S. Environmental Protection Agency (EPA); www.epa.gov.
 1. EPA Office Water, 2003 EPA Construction General Permit; <http://cfpup.epa.gov/npdes/stormwater/cgp.cfm>.
 2. Compendium of Methods for the Determination of Air Pollutants in Indoor Air
- O. U.S. Green Building Council (USGBC) / Green Building Certification Institute (GBCI); 2101 L Street NW, Washington, DC 20037. Tel: (800) 795-1747. www.usgbc.org.

1. LEED™ Rating System, Version 3.0 – Green Building Rating System for New Construction
2. LEED™ BD&C Reference Guide.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect, LEED Consultant 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.

1.6 INFORMATIONAL SUBMITTALS

- A. Project Materials Cost Data: provide statement indicating total cost for materials in Divisions 2-10, 31 and 32 used for Project. Costs exclude labor, overhead, and profit. Provide breakout of costs for the following categories of items:
 1. Wood-based construction materials.
 2. Furniture (Division 12)
- B. LEED Action Plans: Provide preliminary submittals within 30 days of date established for Notice to Proceed indicating how the following requirements will be met:
 1. Credit MR 2: Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."
 2. Credit MR 4: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
 3. Credit MR 5: List of proposed regional materials. Identify each regional material, including its source, cost, and the fraction by weight that is considered regional.
 4. Credit MR 7: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products.
 5. Credit IEQ 3.1 and 3.2: Draft Plan for IAQ during construction that complies with Section 018119 Indoor Air Quality Requirements.
 6. LEED Report Schedule – Provide schedule for submitting progress LEED reports for SSp1, MR 2, MR 4, MR 5, IEQ 3.1, IEQ 3.2, IEQ 4.1, IEQ 4.2, IEQ 4.3 and IEQ 4.4. Reports shall be submitted to the Architect and LEED Consultant at no more than 60-day intervals.
- C. LEED Progress Reports: Submit reports summarizing progress in construction and purchasing activities related to the following credits:
 1. Credit SSp1: Work plan complying with Divisions 01 Section "Temporary Facilities and Controls," Division 31 Section "Site Clearing," and Division 32 Section "Earth Moving." Include date-stamped photos over course of site work activities to document the erosion and sedimentation control plan.
 2. Credit MR 2: Waste reduction progress reports complying with Division 01 Section 017419 "Construction Waste Management."
 3. Credit MR 4: Summary of product data and material costs collected for all recycled content materials that have been purchased or installed.
 4. Credit MR 5: Summary of manufacturer's information and material costs collected for all regional materials that have been purchased or installed.
 5. Credit MR 7: Summary of all product data and material costs for all wood-based products (excluding recycled wood) in the project. Include Forest Stewardship Council chain-of-custody certificate number on all materials which apply and on vendor receipts.

6. Credit IEQ 3.1: Include six photographs taken on at least three different occasions during construction showing implemented SMACNA measures complying with Division 01 Section "Indoor Air Quality Requirements."
7. Credit IEQ 3.2: Include flush out schedule in construction schedule or date for IAQ Testing.
8. Credit IEQ 4: Summary of product data collected for all adhesives, sealants, paints, coatings, carpeting, hard surface and resilient flooring systems, composite wood, agrifiber and laminate adhesives that is installed inside of the building's moisture barrier.

1.7 ACTION 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. LEED Documentation Submittals:
 1. Credit SSp1 – Construction Activity Pollution Prevention:
 - a. Storm Water Pollution Prevention Plan (SWPPP).
 - b. Construction Documentation: date-stamped photos which show the implemented measures and any corrective action that was taken.
 2. Credit EAp1& EAc3 – Fundamental and Enhanced Commissioning of the Building Energy Systems: Summary of all product data collected for all building energy systems materials and equipment that have been purchased and installed. Comply with Sections 019113 General Commissioning Requirements.
 - 3.
 4. Credit MR 2 – Construction Waste Management:
 - a. Comply with Section 017419 Construction Waste Management.
 - b. Complete LEED construction waste calculations.
 - c. Itemized waste hauling certificates/receipts for all waste removed from the Project site and documentation of recycling recovery rate for off-site sorting facilities (if waste is commingled).
 - 5.
 6. Credit MR 4 – Recycled Content:
 - a. Cut sheet, product literature or letter from manufacturer that clearly indicates the percentage by weight of post-consumer and pre-consumer (post-industrial) recycled content.
 - b. Material cost.
 - c. Complete LEED recycled content calculations.
 7. Credit MR 5 – Regional Content :
 - b. Cut sheet, product literature or letter from manufacturer indicating the location of harvest, processing and manufacturer proximity from the project site.
 - c. Cost for each regional material and the fraction by weight that is considered regional.
 - d. Complete LEED regional content calculations.
 8. Credit MR 7 – Certified Wood:

- a. List of all wood products used on project, including product type, manufacturer, material cost (excluding installation and labor) and chain of custody number for products claiming FSC certification.
 - b. Product Data and certificates of chain-of-custody for new (non-recycled content) wood products containing certified wood.
 - c. Vendor receipts with chain-of-custody number.
 - d. Calculations demonstrating quantity, by cost, of FSC certified wood used on project as a percentage of the total wood used.
 - e. Complete LEED certified wood calculations.
9. 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 each 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.
10. Credit IEQ 3.2:
- a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
 - b. Product data for filtration media used during flush-out and during occupancy.
 - c. Report from testing and inspecting agency indicating results of indoor-air-quality testing and documentation showing compliance with indoor-air-quality testing procedures and requirements.
11. Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used.
12. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used.
13. Credit IEQ 4.3: Product data for carpet and flooring systems indicating compliance per LEED.
14. 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. This requirement is for both shop and field applied.

1.8 QUALITY ASSURANCE

- A. 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 20 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.
 3. Recycled content of materials shall be defined according to the ISO 14021 Environmental Labels and Declarations – Self declared environmental claims (Type II environmental labeling).

2.3 REGIONAL MATERIALS

- A. Credit MR 5: Provide not less than 10 percent of building materials (by cost) that are regional materials (extracted, harvested or recycled AND processed AND manufactured within 500 linear miles from the project site).
1. Include Divisions 3-10 plus 31, 32 excluding labor and equipment costs.
 2. If only a fraction of the material complies, then only that percentage (by weight) may contribute to the regional value.

2.4 CERTIFIED WOOD

- A. Credit MR 7: Provide not less than 90 percent (50 percent minimum allowable) by cost of wood-based materials that are 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." Only applies to NEW wood (not-recycled content or salvaged wood).
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.
 - n. Furniture.

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 limits for VOC content established in South Coast Air Quality Management District (SCAQMD) Rule 1168 (July 1, 2005 and rule amendment date January 7, 2005) and Green Seal Standard for Commercial Adhesives GS-36 (October 19, 2000):

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. Indoor 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. Nonmembrane 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 limits for VOC content established in Green Seal Standard GS-11 (May 20, 1993), anti-corrosive and anti-rust paints shall comply with the following limits for VOC content established in Green Seal Standard GC-03 (January 7 1997), and clear wood finishes, floor coatings, stains, primers, and shellacs shall comply with the following limits for VOC content established in South Coast Air Quality Management District (SCAQMD) Rule 1113 (January 1, 2004).
1. Flat Paints and Coatings: VOC not more than 50 g/L.
 2. Nonflat Paints and Coatings: VOC not more than 50 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 100 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 275 g/L.
 9. Clear Wood Finishes, Lacquers: VOC not more than 275 g/L.
 10. Floor Coatings: VOC not more than 50 g/L.
 11. Shellacs, Clear: VOC not more than 730 g/L.
 12. Shellacs, Pigmented: VOC not more than 550 g/L.
 13. Interior Stains: VOC not more than 100 g/L.
 14. Bond Breakers: VOC not more than 350 g/L.
 15. Clear Brushing Lacquers: VOC not more than 275 g/L.
 16. Concrete-Curing Compounds: VOC not more than 100 g/L.
 17. Concrete-Curing Compounds for roadways and bridges: VOC not more than 350 g/L.
 18. Fire-Proofing Exterior Coatings: VOC not more than 350 g/L.
 19. Fire Retardant Coatings, Clear: VOC not more than 650 g/L.
 20. Fire Retardant Coatings, Pigmented: VOC not more than 350 g/L.
 21. Graphic Arts (Sign) Coatings: VOC not more than 500 g/L.
 22. Japans/Faux Finishing Coatings: VOC not more than 350 g/L.
 23. Magnesite Cement Coatings: VOC not more than 450 g/L.
 24. Mastic Coatings: VOC not more than 300 g/L.
 25. Metallic Pigmented Coatings: VOC not more than 500 g/L.
 26. Multicolor Coatings: VOC not more than 300 g/L.
 27. Pigmented Lacquers: VOC not more than 275 g/L.
 28. Quick-Dry Enamels: VOC not more than 50 g/L.
 29. Quick-Dry Primers, Sealers, and Undercoaters: VOC not more than 100 g/L.
 30. Recycled Coatings: VOC not more than 250 g/L.
 31. Roof Coatings: VOC not more than 50 g/L.
 32. Aluminum Roof Coatings: VOC not more than 500 g/L.
 33. Roof primers, Bituminous: VOC not more than 350 g/L.
 34. Specialty Primers: VOC not more than 100 g/L.
 35. Swimming Pool Coatings, Repair: VOC not more than 340 g/L.
 36. Swimming Pool Coatings, Other: VOC not more than 340 g/L.
 37. Traffic Coatings: VOC not more than 100 g/L.
 38. Waterproofing Sealers: VOC not more than 100 g/L.
 39. Waterproofing Concrete, Masonry Sealers: VOC not more than 100 g/L.
 40. Wood Preservatives – Below-ground: VOC not more than 350 g/L.
 41. Other Coatings: VOC not more than 350 g/L.
- C. Credit IEQ 4.3: All Flooring must comply with the following:
1. Carpet installed in the building interior (i.e., inside the weatherproofing system) shall comply with the testing and product requirements established in the Carpet and Rug Institute Green Label' program.
 2. Carpet adhesive installed in the building interior (i.e., inside the weatherproofing system) shall comply with the requirements of IEQc 4.1 Adhesives and Sealants, which includes a VOC limit of 50 g/L.
 3. Hard surface flooring installed in the interior of the building (i.e., inside the weatherproofing system) shall be certified as compliant with the FloorScore2 standard. Flooring products covered by FloorScore include:
 - a. Vinyl.
 - b. Linoleum.
 - c. Laminate flooring.
 - d. Wood flooring.
 - e. Ceramic flooring.
 - f. Rubber flooring.
 - g. Wall base.

4. Tile setting adhesives and grout must meet South Coast Air Quality Management District (SCAQMD) Rule 1168. VOC limits correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.
 5. FloorScore – Alternative Compliance Path: 100 percent of the non-carpet flooring installed in the interior of the building shall be certified as compliant with the FloorScore standard and must be at least 25 percent of the finished floor area. Examples of unfinished flooring include floors in mechanical rooms, electrical rooms and elevator service rooms.
 6. FloorScore – Alternative Compliance Path: 100 percent of the non-carpet flooring installed in the interior of the building shall be certified as compliant with the FloorScore standard and must be at least 25 percent of the finished floor area. Examples of unfinished flooring include floors in mechanical rooms, electrical rooms and elevator service rooms.
 7. Concrete, wood, bamboo, and cork floor finishes (such as sealer, stain and finish) installed in the building interior (i.e., inside the weatherproofing system) shall comply with the following limits for VOC content established in South Coast Air Quality Management District (SCAQMD) Rule 1168 (July 1, 2005 and rule amendment date January 7, 2005).
- D. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives installed in the building interior (i.e., inside the weatherproofing system) shall not contain urea-formaldehyde resins.
1. Composite wood and agrifiber products include, but are not limited to:
 - a. Particleboard.
 - b. Medium density fiberboard (MDF).
 - c. Plywood.
 - d. Wheatboard.
 - e. Strawboard.
 - f. Panel substrates and door cores.

PART 3 - EXECUTION

3.1 COMMISSIONING

- A. Prerequisite EAp1.0: Comply with the fundamental building commissioning requirements of LEED and Commissioning Sections 019113, 220800, 230800, and 260800.
- B. Credit EA 3.0: Comply with the additional (enhanced) commissioning requirements of LEED and Commissioning Sections 019113, 220800, 230800, and 260800.

3.2 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR 2: Comply with Division 01 Section 017419 "Construction Waste Management and Disposal."
 1. Track and keep a summary log of all construction waste generated by type, the quantities of each type that were diverted and landfilled, and the total percentage of waste diverted from landfill disposal. A project may choose to separate construction waste on-site or have comingled construction waste sorted at an off-site facility.
 2. Identify construction haulers and recyclers to handle the designated materials.
 3. Make sure job-site personnel understand and participate in construction debris recycling, and ask them to provide updates throughout the construction process.

3.3 CONSTRUCTION INDOOR-AIR QUALITY MANAGEMENT

- A. Credit IEQ 3.1: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction. Coordinate with requirements of Section 017320, "Indoor Air Quality (IAQ) Management Plan."
1. Protect stored, on-site or installed absorptive materials from moisture damage
 2. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 01 Section 015000 "Temporary Facilities and 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.
 3. Replace all air filters immediately prior to occupancy.
 4. HVAC Protection – protect all HVAC equipment from dust and odors and seal all duct and equipment openings with plastic. If the system is operated during construction, protect the return/negative pressure side of the system.
 5. Source Control – the construction team should recover, isolate, and ventilate containers housing toxic materials.
 6. Pathway Interruption – during construction, the contractor must isolate areas of work to prevent contamination of clean or occupied spaces. Depending on weather conditions, the contractor should ventilate using 100% outside air to exhaust contaminated air directly to the outside during installation of VOC-emitting materials.
 7. Housekeeping – the project building and maintenance teams should institute cleaning activities designed to control contaminants in building spaces during construction and before occupancy. The maintenance team should protect all porous building materials from exposure to moisture and store them in a clean area before installation. The team should use vacuum cleaners with high-efficiency particulate filters, increase cleaning frequency and use wetting agents for dust.
 8. Scheduling – the project team should coordinate construction activities to minimize or eliminate disruption of operations in the occupied portions of the building.
- B. Credit IEQ 3.2: Comply with:
1. Option 1. Flush-Out - Path 1: After construction ends, prior to occupancy and with all interior finishes installed, install new filtration media and perform a building flush-out by supplying a total air volume of 14000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent.
 - a. Prior to flush-out, finalize all cleaning, complete the final test and balancing of HVAC systems, and make sure the HVAC control is functional prior to the flush-out.
 - b. If the building's HVAC system will be used, remove any temporary filters and duct coverings installed as part of the construction IAQ management plan. Replace the HVAC filtration media with new media; if the system is configured to filter only outside air, the filters do not need to be replaced. New filters that meet the design specification and that were installed prior to the start of the flush-out will also satisfy the requirements of IEQ 3.1 Construction IAQ Management Plan during Construction. When attempting to earn IEQ 5 Indoor Chemical and Pollution Source Control, these filters must be MERV 13 or better.
 2. Option 1. Flush-Out - Path 2: If occupancy is desired prior to flush-out completion, the space may be occupied following delivery of a minimum of 3500 cu. ft. of outdoor air per sq. ft. of floor area to the space. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. of outside air or the design minimum outside air rate determined in Prerequisite IEQ 1, whichever is greater. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14000 cu. ft. per sq. ft. of outside air has been delivered to the space.

3. Option 2. Air Testing: Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air and as additionally detailed in the LEED Reference Guide for Green Building Design and Construction, 2009 Edition.
 - a. During construction, avoid substitutions for the specified low-emitting materials.
 - b. Use low-VOC cleaning supplies to prevent short-term high-VOC levels that make affect test results. Vacuum cleaners with HEPA filtration will help capture particulates.
 - c. Projects also following the requirements or IEQ 3.1 Construction IAQ Management Plan during Construction should replace all filtration media after the final cleaning and complete the air test and balancing of the HVAC system before beginning the baseline IAQ testing.
 - d. Air-sample testing shall be conducted as follows:
 - 1) Select the sampling locations carefully to find concentrations in areas with the least ventilation and, potentially, the greatest presumed contaminant strength.
 - 2) Take at least 1 sample per 25,000 sq. ft. in each portion of the building served by a separate ventilation system.
 - 3) Take samples in the breathing zone, between 3 feet and 6 feet above the floor, during normal occupied hours with the HVAC system operating at normal daily start time and at the minimum outside airflow rate. Follow-up samples might be needed, so record the exact sample locations.
 - 4) If the sample exceeds the maximum concentration level, flush out the space by increasing the rate of outside air.
 - e. Demonstrate that the contaminant maximum concentrations listed below are not exceed:
 - 1) Formaldehyde: 27 ppb.
 - 2) Particulates (PM10): 50 micrograms/cu. m.
 - 3) Total Volatile Organic Compounds (TVOC): 500 micrograms/cu. m.
 - 4) 4-Phenylcyclohexene (4-PH*): 6.5 micrograms/cu. m.
 - 5) Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.

*This test is only required if carpets and fabrics with styrene butadiene rubber (SBR) latex backing are installed as part of the base building systems.

END OF SECTION

SECTION 01 91 13 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. OPR and BOD documentation are included by reference for information only.

1.02 SUMMARY

- A. This section describes the scope of the formal commissioning process and the general requirements for the building systems outlined herein.
- B. Related Sections
 - 1. Division 22, Section 220800, Commissioning of DHW Systems.
 - 2. Division 23, Section 230800, Commissioning of HVAC Systems and Controls.
 - 3. Division 26, Section 260800, Commissioning of Electrical Systems and Lighting Controls

1.03 REFERENCES

- A. USGBC:
 - 1. LEED – NC 3.0: EA Prerequisite 1, Fundamental Commissioning.
 - 2. LEED – NC 3.0: Credit 3, Enhanced Commissioning.

1.04 DEFINITIONS

- A. Basis of Design (BOD): The documentation of design criteria and assumptions for systems, components, and methods chosen to meet the Owner's Project Requirements and applicable regulatory requirements, standards, and guidelines. The document includes narrative descriptions of the systems to be commissioned. The BOD is prepared by the Design Professionals.
- B. Building Automation System (BAS): The automated building system providing control and user interaction with select building systems, such as the HVAC, DHW and lighting systems.
- C. Commissioning Authority (CxA): An independent agent hired directly by the Owner and not otherwise associated with the Design Professional(s) or the Contractor. The CxA assists the Contractor with coordinating commissioning activities and witnesses the activities on behalf of the Owner.
- D. Commissioning Issue (Cx Issues): A condition that affects, prevents or inhibits commissioning, and must be resolved to complete the commissioning process.
- E. Commissioning Issues List (Cx Issues List): A log maintained by the CxA listing all Deficiencies and Cx Issues documented during the commissioning process. All issues require action, correction and closure.
- F. Commissioning Plan (Cx Plan): A document that outlines the organization, coordination, and requirements of the commissioning process in more detail.
- G. General Contractor (GC): The contractor directly contracted to the Owner with overall responsibility for the project and all commissioning activities described herein.
- H. Commissioning Coordinator (CxC): Individual within the General Contractor firm who plans, schedules, directs and coordinates all the Trade Sub-Contractor's commissioning activities, and serves as the CxA's single point of contact for all administrative, documentation and coordination functions.

- I. Deferred Testing: Testing performed at a later time, due to partial occupancy, equipment, load, seasonal requirements, design or other site conditions that disallow the test from being performed prior to substantial completion.
- J. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents. A Deficiency will be considered a Cx Issue and documented on the Cx Issues List.
- K. Functional Performance Test (FPT): A test of the dynamic function, operation and control sequences of equipment and systems to verify system performance to the fullest extent. Systems are tested under various operating modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, alarm, power failure, etc. The FPTs are performed using manual (direct observation) or monitoring methods.
- L. Installation Verification (IV): Field verification and documentation of proper installation of system equipment, assemblies and components prior to Startup. IV process is complete when systems are ready for Startup. IV's are organized and documented under the System Readiness Checklist (SRC) forms.
- M. Monitoring: The recording of parameters (flow, current, status, pressure, etc) of equipment operation shall be completed using data-loggers or the Trending capabilities of BAS or control systems.
- N. Owner's Project Requirements (OPR): A document describing the operational and functional requirements of a project, the expectations of how the facility will be used and operated, and the equipment and system expectations and requirements, as defined by the Owner. This document provides an explanation of the ideas, concepts, goals, success criteria, and supporting information for the project.
- O. Percent Sampling: Witnessing the startup or testing of a selected fraction of the total number of identical or near-identical pieces of equipment such as VAV boxes.
- P. Pre-Functional Checks & Tests (PFC): These are various checks and tests performed on a piece of equipment or system just before, during, or after the initial Startup and operation. They are performed to confirm that the equipment and individual components were installed correctly and are working properly. Examples include checking fan rotation, sensor calibration, actuator testing, and spot temperature, pressure and electrical measurements. They also include system specific tests such as pipe system pressure tests, duct leakage tests, mechanical system test and balance and electrical equipment NETA testing. They are organized under the System Readiness Checklist (SRC) forms and must be completed prior to FPTs.
- Q. Startup: Initial starting or activating of equipment usually performed by the Trade Sub-Contractor or the Manufacturer's authorized representative.
- R. System Readiness Checklist (SRC): A summary checklist, typically one page per equipment, covering the necessary commissioning tasks and required documentation to verify that a system is ready for FPTs, or system operation if no FPTs are performed. The tasks covered in the SRC include IV, Startup and PFC, and the Trade Sub-Contractor completed forms for these tasks are attached to the equipment specific SRC. The SRC must be completed and signed by the General Contractor prior to conducting the FPTs.
- S. TAB: Testing, Adjusting, and Balancing work on the air and water systems to ensure design flow conditions are met. Performed by the TAB Trade Sub-Contractor.
- T. Trade Sub-Contractor: Typically a subcontractor to the General Contractor who provides and installs specific building components and systems and/or provides certain services.
- U. Trending: Monitoring using the Building Automation System (BAS) or a control system, to aid in functional testing and to verify system operation and performance under actual operating conditions.

1.05 SYSTEMS TO BE COMMISSIONED

- A. This specification section is applicable to the following systems and equipment to be commissioned in this project:
 - 1. All equipment and controls of the HVAC systems (does not include any process refrigeration equipment).
 - 2. Building Automation System / HVAC System Controls
 - 3. Lighting system controls
 - 4. Domestic hot water heating systems
 - 5. Photovoltaic (PV) systems

1.06 SUMMARY DESCRIPTION OF COMMISSIONING

- A. Commissioning is a quality assurance process for achieving, verifying and documenting that building systems are installed and perform functionally as intended according to the OPR, BOD, and the requirements of the contract documents.
- B. Commissioning during the construction phase is intended to achieve the following specific objectives:
 - 1. Commissioning review of the Trade Sub-Contractor submittals for systems to be commissioned, concurrent with the Design Professional's review.
 - 2. Finalize the commissioning specific details within the Commissioning Plan.
 - 3. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry-accepted minimum standards and that they receive the required operational checkout and testing by the Trade Sub-Contractors.
 - 4. Verify and document proper performance of equipment and systems.
 - 5. Verify that operation and maintenance documentation is provided by the Trade Sub-Contractors and is complete.
 - 6. Develop a systems manual (for energy-related systems per LEED) that provides future operating staff the information necessary to optimally operate the commissioned systems.
 - 7. Verify that the Owner's facilities and operations personnel are trained per the contract document requirements.
- C. The commissioning process does not take away from or reduce the responsibility of the General Contractor to provide a finished and fully functioning building. The General Contractor has overall responsibility to assure that all systems are properly tested and commissioned, and that all required commissioning documents are completed and provided to the Owner.
- D. The Project will meet the Commissioning Requirements of LEED-NC v3.0, Energy & Atmosphere, Prerequisite 1 (Fundamental Commissioning) and Credit 3 (Enhanced Commissioning). The General Contractor, Trade Sub-Contractors, and suppliers are responsible to ensure all requirements for commissioning are met in their respective work.

1.07 GENERAL COMMISSIONING PROCESS

- A. Unless otherwise noted in the trade specific commissioning specification sections, the general commissioning process is as follows. See the trade specific commissioning specification sections for additional details on the commissioning process.
- B. Submittal Reviews by the CxA (concurrent with the Design Team reviews)
 - 1. The General Contractor shall include the CxA on the distribution of the Trade Sub-Contractor issued submittals to the Design Professionals, for the systems to be commissioned. The CxA will provide review comments to the Design Professionals.

C. Cx Plan and Form Development

1. The Commissioning Authority (CxA) prepares a Cx Plan that provides guidance in the execution of the commissioning process during construction.
2. The CxA develops the SRC and FPT forms and are provided to the General Contractor and Trade Sub-Contractors for review and comment.

D. System Readiness Activities

1. The Trade Sub-Contractors shall perform Installation Verification, Startup and Pre-Functional Check & Test activities. The Trade Sub-Contractors and the CxC shall document completion of these activities on the SRC forms and attach the completed Installation Verification, Startup, and Pre-Functional Check and Test forms to the SRC.
2. The CxA will perform various observation inspections during the installation phase and back-checks of the completed Installation Verification. The CxA will also witness a percent sampling of the Startups and Pre-Functional Checks & Tests, including TAB procedures.

E. Functional Testing

1. Once the SRC forms are completed, the FPTs are executed by the Trade Sub-Contractors and a sample are witnessed by the CxA, as defined in the Cx Plan. The FPTs may be achieved by any combination of manual testing, monitoring or trending.
2. Any deferred testing will be defined in the Cx Plan.

F. Deficiencies and Commissioning Issues

1. Throughout the process, the Commissioning Issues are recorded by the CxA on the Commissioning Issues List and distributed to the team. The General Contractor and Trade Sub-Contractors shall correct Commissioning Issues and retest the system(s) without delay at no additional cost to the Owner. The CxA will verify the completion of the issues and make all amendments to the issues list.

G. O&M Manuals, Training Verification and Final Documentation

1. The CxA will verify that complete operation and maintenance (O&M) manual documentation is provided by the Trade Sub-Contractors to the Owner.
2. The General Contractor shall submit to the CxA and Owner a training schedule and specific training agendas (for each training class), for review prior to conducting any training. The CxA will also verify completion of the training by receiving a copy of the training class sign-in sheets and any training materials / handouts, provided by the General Contractor.
3. The CxA will develop the Systems Manual (per LEED requirements) with assistance from the General Contractor and Trade Sub-Contractors. The systems to be included are the HVAC systems and controls, lighting controls, domestic hot water systems and controls, and any renewable energy systems.
4. The CxA will complete the Final Construction Phase Commissioning Report and documentation for the Owner with assistance from the General Contractor and Trade Sub-Contractors.

H. Post-Occupancy Warranty Phase Commissioning

1. No later than 90 days prior to the expiration of the first 12 month warranty period of building occupancy, the CxA will return to the facility to interview facility O&M staff, walk the facility and review systems operation and trend data where applicable. Key representatives from the General Contractor and Trade Sub-Contractors shall attend a site walk-through and meeting, as determined by the CxA.

2. Any performance issues, warranty items or problems identified will be reported by the CxA to the CxC via a Warranty Phase Commissioning Issues List for correction by the General Contractor and Trade Sub-Contractors prior to the end of the warranty period.

1.08 COMMISSIONING TEAM

- A. The Commissioning Team is responsible for performing the process and achieving successful commissioning results. The Commissioning Team is comprised of the following:
 1. Owner's Representatives
 2. Design Professionals (DP).
 3. Commissioning Authority (CxA).
 4. General Contractor
 5. General Contractor's Commissioning Coordinator (CxC)
 6. Trade Sub-Contractors responsible for specific types of systems being commissioned:
 - a. Mechanical Contractor
 - b. Electrical Contractor
 - c. HVAC Controls Contractor
 - d. Testing and Balance (TAB) Contractor
 - e. Plumbing Contractor

1.09 RESPONSIBILITIES

- A. General:
 1. The Commissioning Team and all others involved in the commissioning process shall follow the Cx Plan, attend the commissioning kickoff meeting, and attend additional commissioning meetings as necessary.
- B. Commissioning Authority (CxA)
 1. The primary role of the CxA is to oversee, organize and lead the commissioning team and assist the General Contractor and Trade Sub-Contractors in executing the commissioning process.
 2. Prepare the Cx Plan and develop the SRC and FPT forms.
 3. Work with the General Contractor to schedule commissioning activities.
 4. Leads commissioning team meetings, prepare meeting agendas and distribute meeting minutes.
 5. Observe on a sampling basis the system and equipment installation, start-up, checkout, and testing for compliance with the OPR, BoD, and Contract Documents; and review completion of commissioning documentation.
 6. The CxA will sample witness the execution of the FPTs by the Trade Sub-Contractors. The CxA will witness one re-test of any commissioned equipment or system.
 7. Is the authority on commissioning test results and other commissioning program elements completion. Prepares, maintains and distributes the Cx Issues List.
 8. Review and comment on training agendas and verify that training is completed and O&M manuals are delivered.
 9. Lead the effort in developing the Systems Manual for energy-related systems per LEED.

10. Assemble the commissioning documents and prepare the Commissioning Report.
11. The CxA is not responsible for:
 - a. Design concept or design criteria
 - b. Review for code compliance
 - c. Inspector of record services
 - d. Design and construction scheduling
 - e. Cost estimating
 - f. Construction management
 - g. Providing tools and test equipment used for commissioning.
 - h. Scheduling startup and testing
 - i. Coordinating the work of Trade Contractors and any special testing agents
 - j. Performing startup and testing

C. General Contractor:

1. The General Contractor is responsible for all commissioning tasks to be performed, including tasks assigned to Trade Sub-Contractors and ensures that all Trade Sub-Contractors execute their commissioning responsibilities according to the Contract Documents, Cx Plan, and schedule.
2. Include the cost for commissioning in the project cost.
3. Assign a CxC for the duration of the project with responsibilities outlined herein.
 - a. The CxC shall have at least five year's experience within the disciplines of construction.
 - b. The General Contractor shall submit the name of the person(s) assigned as the CxC to the CxA within a month of contract award.
4. Schedule and coordinate the commissioning meetings with the CxA.
5. Plan, schedule, coordinate and facilitate the commissioning work performed by the Trade Sub-Contractors. Provide sufficient lead-time of at least 10 days to notify the CxA in advance of commissioning activities. Update the master construction schedule periodically with commissioning progress and activities.
6. Review, comment and accept the Cx Plan prepared by the CxA.
7. Furnish continual updates of any construction related documents such as change orders, submittals, shop drawings, ASIs and RFIs to the CxA. Electronic files are acceptable.
 - a. The CxC shall ensure that the requested submittals for review by the CxA are also issued to the CxA when issued to the Design Team.
8. Obtain and review the Trade Sub-Contractor IV, Startup and PFC forms prior to use.
9. Using IV, Startup, PFC, SRC and FPT forms, document and certify that all work is complete and systems are installed, operational and functionally tested.
10. The General Contractor is responsible for organizing all Trade Sub-Contractor completed Cx forms to be submitted to the CxA for review.
11. Evaluate deficiencies identified on the Cx Issues List. Issues will be tracked according to the responsible entity. Collaborate with Trade Sub-Contractors and recommend corrective action. Assure all Cx Issues are resolved.
12. Prepare a training schedule along with the Trade Sub-Contractor training agendas and submit to CxA and Owner for review. Execute training of Owner's personnel per approved training schedule and agendas.
13. Prepare O&M Manuals in accordance with the Contract Documents.
14. Assist the CxA in developing the Systems Manual.

D. Trade Sub-Contractors:

1. See the trade specific commissioning specification sections for the Trade Sub-Contractor responsibilities.

PART 2 - PRODUCTS

2.01 TEST EQUIPMENT

- A. All standard testing equipment required to perform Startup, Pre-Functional Checks & Tests and FPTs shall be furnished by the Trade Sub-Contractor responsible for the systems.
- B. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerance specified in the Contract Documents. If not otherwise specified, the following minimum requirements apply:
 1. All equipment shall be calibrated according to the manufacturer's recommended intervals (or within one year if not otherwise specified) and recalibrated when dropped or damaged.
 2. Calibration tags shall be affixed or certificates readily available for all test equipment.

PART 3 -EXECUTION

3.01 SCHEDULING AND COORDINATION

- A. The CxA will provide an initial list of commissioning milestones and deliverables to the CxC for scheduling purposes.
- B. The General Contractor shall integrate all commissioning activities, milestones and deliverables into the master construction schedule with assistance and input from the CxA.
- C. The CxC shall provide sufficient notice to the CxA and Owner for scheduling and coordinating commissioning activities. A minimum 10 day's notice shall be provided to the CxA for witnessing equipment Start-ups, Pre-Functional Checks & Tests, and Functional Performance Testing.
- D. The Commissioning Team shall address scheduling problems and make necessary modifications in a timely manner in order to expedite the commissioning process.

3.02 MEETINGS

- A. When commissioning team member attendance is required, as determined by the CxA and CxC, be punctual and attentive during the meeting.
 1. The CxA will conduct a commissioning kick-off meeting, usually within 60 days of the commencement of construction. All team members involved in the commissioning process shall attend the kick-off meeting.
 2. The CxA will plan other commissioning meetings as deemed necessary as construction progresses. These meetings will cover planning and coordination, and Commissioning Issues resolution.
 3. The frequency of meetings will vary through construction, but generally increase during start-up and commissioning activities.
- B. The CxA will write and distribute meeting minutes documenting the meeting discussion, conclusions, and actions for each team member.

3.03 COMMISSIONING ISSUES, BACK-CHECKS AND RE-TESTING

- A. All Deficiencies and Commissioning Issues shall be corrected promptly. The responsible party shall correct the issue and inform the CxC and CxA of the resolution and completion date. The CxA will record completion on the Commissioning Issues List once the issue is successfully back-checked or verified.

1. For all Commissioning Issues identified during the pre-functional system readiness activities, the CxA will back-check and verify the completion of the issues where appropriate.
2. For all Commissioning Issues identified during FPT, retesting is required to verify the resolution of the issue and to complete the FPT.
3. The CxA will witness one re-test for each equipment and will perform one back-check verification of any completed system readiness issue. The Owner may back-charge the General Contractor for any additional fees from the CxA, resulting from any re-testing or repeated system readiness issues list back-checks beyond the first re-test or back-check.

3.04 COMMISSIONING ACCEPTANCE, CLOSEOUT AND REPORTING

- A. Completion of the main commissioning activities (system readiness checks, functional testing, training, and delivery of O&M manuals) shall be accomplished as a prerequisite for substantial completion. Completion of all commissioning issues and any re-testing shall be completed prior to final acceptance of commissioning by the Owner.
- B. After completion of the commissioning activities and following review of the completed commissioning documents that includes the draft Cx Report executive summary, all test results and the latest Cx Issues List with all remaining commissioning issues and deficiencies, the Owner will provide a formal written acceptance of the project construction phase commissioning. At that point, any remaining construction phase commissioning issues or seasonal/deferred testing will be transferred to the warranty phase and tracked by the CxA as part of the LEED Post-Occupancy Warranty Phase Commissioning.
- C. Upon completion of all commissioning activities, the CxA will prepare and submit to the Owner a Final Commissioning Report detailing all completed commissioning activities and documentation. The CxC shall support this effort by providing all General Contractor and Trade Sub-Contractor commissioning documentation.
- D. The Owner's written acceptance of construction phase commissioning will be included in the Final Commissioning Report.

END OF SECTION

DIVISION 02

EXISTING SITE CONDITIONS

SECTION 02 41 13 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Demolition and removal of selected site elements.
3. Repair procedures for selective demolition operations.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and salvage: Detach items from existing construction and deliver them to City.
- C. Remove and reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain City's property, demolished materials shall become Contractor's property and shall be removed from Project site.

1.4 SUBMITTALS

- A. Qualification data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Design Consultant's and City, and other information specified.
- B. Proposed dust-control and noise-control measures: Statement or drawing indicating the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- C. Schedule of selective demolition activities: Indicate the following.
1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure City's on-site operations are uninterrupted.
 2. Interruption of utility services.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Coordination of City's continuing occupancy of portions of existing building and of City's partial occupancy of completed Work.
- D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- E. Predemolition photographs or videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

1.5 ASSURANCE

- A. Demolition firm qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Predemolition conference: Conduct conference at Project site review methods and procedures related to selective demolition including, but not limited to, the following.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.

1.6 PROJECT CONDITIONS

- A. City will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so City's operations will not be disrupted. Provide not less than 72 hours' notice to City of activities that will affect City's operations.
- B. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
 - 1. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from authorities having jurisdiction.
- C. City assumes no responsibility for condition of areas to be selectively demolished.
 - 1. Conditions existing at time of inspection for bidding purpose will be maintained by City as far as practical.
- D. Hazardous materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Design Consultant and City. Hazardous materials will be removed by City under a separate contract.
- E. Services:
 - 1. Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 2. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

- A. Existing warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.
 - 1. If possible, retain original installer or fabricator to patch the exposed Work listed below that is damaged during selective demolition. If it is impossible to engage original Installer or fabricator, engage another recognized experienced and specialized firm.
 - a. Processed concrete finishes.
 - b. Roofing.
 - c. Firestopping.
 - d. Stucco.
 - e. HVAC enclosures, cabinets, or covers.

PART 2 - PRODUCTS

2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
 - 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 2. Use materials the installed performance of which equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Design Consultant.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES

- A. Existing utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.

- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by City and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to City and to authorities having jurisdiction.
 - 1. Provide at least 72 hours' notice to City if shutdown of service is required during changeover.
- C. Utility requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
 - 1. City will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
 - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
- D. Utility requirements: Refer to Divisions 22, 23 and 26 for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Dangerous materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.
- B. Pest control: Employ a certified, licensed exterminator to treat building and to control rodents and vermin before and during selective demolition operations.
- C. Existing facilities: Comply with City's requirements for using and protecting building facilities during selective demolition operations.
- D. Site access and temporary controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from City and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
 - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
 - 3. Protect existing site improvements, appurtenances, and landscaping to remain.
 - 4. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
- E. Temporary facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.

- F. Temporary enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
- G. Temporary shoring:

- 1. Provide and maintain shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- 2. Strengthen or add new supports when required during progress of selective demolition.

3.4 POLLUTION CONTROLS

- A. Dust control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
- B. Water control: Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as flooding, and pollution.
- C. Disposal:
 - 1. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 2. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- D. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows.
 - 1. Proceed with selective demolition systematically, from higher to lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials not to impose excessive loads on supporting walls, floors, or framing.
 - 9. Dispose of demolished items and materials promptly.

10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.

B. Concrete:

1. Demolish in sections. Except as specified below, cut concrete to a depth of at least 3/4-inch at junctures with construction to remain, by sawing. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
 2. Where cut edge of concrete will remain exposed in the Work, cut concrete full depth at junctures with construction to remain using power-driven saw.
- C. Concrete slabs-on-grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- E. Roofing: Remove no more existing roofing than can be covered in one day by new roofing. Refer to applicable Division 07 Section re-roofing requirements.
- F. Air-conditioning equipment: Remove equipment without releasing refrigerants.

3.6 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
- B. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's recommendations.
- C. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
1. Refinish patched portions of painted or coated surfaces to be invisible from untouched, adjacent surfaces as specified below.
 2. When existing surface finish cannot be matched, or when the result is unacceptable to the Design Consultant, refinish entire surface to nearest intersections.
- D. Transition from existing to new work
1. When new work abuts or finishes flush with existing work, make a smooth and clean transition. Patched work shall match existing adjacent work in texture and appearance so that the patch or transition is invisible at a distance of 5 feet.
 2. When finished surfaces are cut in such a way that a smooth and clean transition with the new work is not possible, notify Design Consultant. Terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface, or as otherwise directed by Design Consultant.

3.7 SALVAGE

- A. Removed and salvaged items: Comply with the following.
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to City.
 - 4. Transport items to City's storage area designated by City.
 - 5. Protect items from damage during transport and storage.
- B. Removed and reinstalled items: Comply with the following.
 - 1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- C. Existing items to remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Design Consultant, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off City's property and legally dispose of them.
- D. Comply with Santa Monica Public Works Waste Management Plan, including completion of required forms.

END OF SECTION

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DIVISION 03

CONCRETE

SECTION 03 10 00 - CONCRETE FORWORK

PART 1 - GENERAL

1.1 GENERAL

- A. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections

1.2 SCOPE

- A. Provide all labor, materials, equipment, services and transportation for formwork and related accessories required to complete all cast-in-place concrete work and the installation of embedded items as shown on Drawings, as specified herein, and as required by the job conditions.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- | | |
|--|------------------|
| A. Submittals | Division 1 |
| B. Quality Control | Division 1 |
| C. Thermal and Moisture Protection | Division 7 |
| D. Concrete Reinforcement and Embedded Assemblies | Section 03 20 00 |
| E. Cast-in-Place Concrete | Section 03 30 00 |
| F. "SUSTAINABLE DESIGN REQUIREMENTS":
LEED Requirements | Section 01 81 13 |

1.4 CODES, STANDARDS AND REFERENCES

- A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the drawings.
- B. Standards:
 - 1. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 – Standard Specification for Structural Concrete.
 - 3. ACI 318 – Building Code Requirements for Reinforced Concrete.
 - 4. ACI 347 – Guide to Formwork for Concrete.
 - 5. ACI 347.2R – Guide for Shoring/Reshoring of Concrete Multistory Buildings
- C. References:
 - 1. US Green Building Council (USGBC), www.usgbc.org
- D. Definitions:
 - 1. The term "Contract Documents" in this specification is defined as the design drawings and the specifications.
 - 2. The term "SER" in this specification is defined as the Structural Engineer of Record for the structure in its final condition.
 - 3. The term "Design Professionals" in this specification is defined as the Owner's Architect and SER.

4. The term "Contractor" in this specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Concrete Contractor and their sub-contractors.
5. The term "Owner Testing Agency" in this specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing of concrete construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.
6. The terms "for record" and "submit for record" in this specification are defined as Contractor submittals that do not require a response from the Design Professionals.
7. Working Days: Monday through Friday, excluding federal or state holidays.

1.5 QUALITY ASSURANCE

- A. Design Criteria: Formwork shall conform to American Concrete Institute's "Recommended Practice for Concrete Formwork" (ACI 347).
- B. Formwork:
 - a. Shall prevent leakage or washing out of cement mortar.
 - b. Shall resist spread, shifting, and settling.
 - c. Shall reproduce accurately required lines, grades, and surfaces within tolerances specified.
2. Safety: The Contractor shall be responsible for adequate strength and safety of all formwork including falsework and shoring.

1.6 CONTRACTOR QUALIFICATIONS

- A. The work of this section shall be performed by a company which specializes in the type of concrete formwork required for this Project, with a minimum of 10 years of documented successful experience and shall be performed by skilled workers thoroughly experienced in the necessary crafts.
 1. Work shall be performed in compliance with Owner's insurance underwriters' requirements.
- B. Contractor's Testing Laboratory Services: Required as specified in Division 1, and herein.
- C. Materials and installed work may require testing and retesting at anytime during progress of work, as directed by Design Professionals. Tests, including retesting of rejected materials for installed work will be done at Contractor's expense.

1.7 SUBMITTALS

- A. Where the SUBMITTALS section of this specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Do not submit items not requested.
 1. Submittal Schedule: See Section 03 30 00.
 2. Formwork Shop Drawings:
 - a. Submit for Record: Formwork shop drawings sealed and signed by a registered design professional licensed to practice as a Professional Engineer in the state where the project is located. Shop drawings shall clearly indicate but not be limited to the following:
 - 1) Size, type and quality of form materials including conditions at tops and ends of walls. (If wood is used, indicate species.)

- 2) Form construction indicating structural stability and jointing including special form joints or reveals required by Contract Documents
 - 3) Location and pattern of form tie placement, and other items that affect the appearance of concrete that will remain exposed to view.
 - 4) Form finish clearly indicating proper locations and full coordination with concrete finishes required by Contract Documents.
 - 5) Layout, procedures, and sequencing of shoring and reshoring that correlates with the information contained in the shoring/reshoring calculations described below.
 - 6) Comprehensive (a single drawing per area/element) layout drawings showing openings in structural members, including floor slab, shearwalls, columns and beams. Drawings shall consolidate the work of all trades and shall be coordinated by the Contractor. Submit with or prior to reinforcement submittal for same element/area.
- b. Submit for Review
- a) Location of proposed construction joints in walls, floors, slabs, beams per specification Section 03 30 00.
3. Shoring/Reshoring Calculations: Submit for Record. Calculations sealed and signed by a registered design professional licensed to practice as a Professional Engineer in the state where the project is located. Calculations shall clearly address but not be limited to the following:
- a. Shoring removal and reshoring installation procedure including timing and sequencing.
 - b. Concrete age and strength at the time of each shoring/reshoring operation.
 - c. Description of construction loads assumed including concrete, formwork, and construction live load in accordance with ACI 347.
 - d. A description of the distribution of construction loads between the shored/reshored levels.
 - e. The total construction load imposed on all levels supporting shoring/reshoring at each stage of the shoring/reshoring cycle.
 - f. A written statement by the Professional Engineer that the total construction load imposed on any level supporting shoring/reshoring, at all stages of the shoring/reshoring cycle, accounting for concrete age and relative strength at time of loading, meets the requirement of Section 3.2.
4. Product Data - Submit copies of manufacturers' product data and installation instructions for proprietary materials used in exposed concrete work, including form liners, release agents, manufactured form systems, ties, and accessories.
5. Samples - At request of Architect, submit samples of form ties and spreaders
6. Compatibility Certification - Submit for record a written statement certifying that form release agent used is compatible with subsequent architectural finish materials applied to concrete surfaces. Submit along with manufacturer's data.
7. Asbestos and PCB Certification: Submit for record. After completion of installation, but prior to Substantial Completion, Contractor shall certify in writing that products and materials installed, and processes used, do not contain asbestos or polychlorinated biphenyls (PCB), using format in General Conditions.
8. Hazardous Materials Notification: Submit for record. In the event no product or material is available that does not contain hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- B. Submittal Process: See Section 03 30 00
- C. SER Submittal Review: See Section 03 30 00

- D. Substitution Request: See Section 03 30 00
- E. Request for Information (RFI): See Section 03 30 00

1.8 FORMWORK DESIGN

- A. Design of Formwork, Shoring/Reshoring, and its removal is the Contractor's responsibility.
- B. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads per SEI/ASCE 37-02 that might be applied, until such loads can be supported by the concrete structure.
- C. Design Requirements:
 - 1. Forms shall be designed for fabrication and erection in accordance with Design Professionals' requirements and recommendations of ACI 301, 318 and 347.
 - 2. Design formwork in a manner such that the total construction load does not at any time exceed the total design load of new or existing construction and accounts for concrete age and relative strength at time of loading. See Section 3.2 for shoring/reshoring requirements.
 - 3. Design formwork for loads and lateral pressures outlined in Section 2.2, ACI 347, and wind and seismic loads as specified by SEI/ASCE 37-02 unless otherwise controlled by local building code.
 - 4. Design formwork to include loads imposed during construction, including weight of construction equipment, concrete mix, height of concrete drop, rate of filling of formwork, vibrator frequency, ambient temperature, foundation pressures, lateral stability, temporary imbalance or discontinuity of building components, and other factors pertinent to safety of structure during construction.

1.9 DELIVERY, HANDLING, STORAGE

- A. Comply with General Conditions and Division 1, including the following:
 - 1. Store forms and form materials clear of ground and protect from damage.
 - 2. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

1.10 JOB CONDITIONS

- A. Sequencing Schedule:
 - 1. Ensure timely delivery of embedded items. Be responsible for cutting and patching necessitated by failure to place embedded items.
 - 2. Plan erection and removal to permit proper sequence of concrete placing without damage to concrete.

1.11 WARRANTY

- A. Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:
 - 1. Discoloration of concrete scheduled to remain exposed to view.
 - 2. Damage of concrete finishes caused by forms.
 - 3. Damage of concrete caused by form stripping.
 - 4. Non-compliance with form finishes required for designated architectural finishes.
 - 5. Non-compatibility of form release agent with subsequent architectural finish materials applied to concrete surfaces.
 - 6. Excessive and/or noticeable bowing in placed concrete members caused by deflection of formwork during concrete placement.

1.12 LEED REQUIREMENTS

- A. See Division 1 Section "LEED Requirements" for additional LEED requirements.
- B. LEED Submittals
 - 1. LEED Submittal Credit MR7.0: Letter of Certification(s) for Sustainable Forestry for wood formwork – Submit for Record:
 - a. Forest Stewardship Council (FSC): Provide letter of certification signed by lumber supplier. Indicate compliance with FSC "Principles for Natural Forest Management" and identify certifying organization.
 - 1) Submit FSC certification numbers; identify each certified product on a line-item basis.
 - 2) Submit copies of invoices bearing the FSC certification numbers.
 - b. Sustainable Forestry Board: Provide letter of certification signed by lumber supplier. Indicate compliance with the Sustainable Forestry Board's "Sustainable Forestry Initiative" (SFI) and identify certifying organization.
 - 1) Submit SFI certification numbers; identify each certified product on a line-item basis.
 - 2) Submit copies of invoices bearing the SFI certification numbers.
 - c. Canadian Standards Association (CSA): Provide letter of certification signed by lumber supplier. Indicate compliance with the CSA and identify certifying organization.
 - 1) Submit CSA certification numbers; identify each certified product on a line-item basis.
 - 2) Submit copies of invoices bearing the CSA certification numbers.
 - d. Indicate total cost for all wood.
 - 2. LEED Submittal Credit Credit EQ 4.2: VOC
 - a. Submit Product Data and material safety data sheets stating compliance with VOC limits. Refer to Section 01 35 20/LEED Requirements for additional requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products of the manufacturers specified in this section establish the minimum functional, aesthetic and quality standards required for work of this section.
- B. Substitutions: Comply with General Conditions using form in Division 1.

2.2 FORMWORK REQUIREMENTS

- A. General Requirements:
 - 1. Formwork shall meet construction safety regulations for locality in which this Project is located.
 - 2. Forms shall be removable without impact, shock or damage to concrete surfaces, the structure and adjacent materials.

3. Forms shall be tight-fitting, designed and fabricated for required finishes and to withstand concrete weight and maintain tolerances as specified in ACI 117 for the following designations: (See architectural drawings for locations).
 - a. Class A – For surfaces prominently exposed to public view where appearance is of special importance.
 - b. Class B – Coarse-textured concrete-formed surfaces intended to receive plaster, stucco or wainscoting.
 - c. Class C – General Standard for permanently exposed surfaces where other finishes are not specified.
 - d. Class D - Minimum quality surface where roughness is not objectionable, usually applied where surfaces will be concealed.
4. Furnish forms in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings, using form materials with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
5. Butt Joints: Shall be solid and complete with backup material to prevent leakage of cement paste.

B. Form Finishes for Exposed Surfaces:

1. Type: Straight, smooth, free of cement paste leaks at butt-joints, surface imperfections and other irregularities detrimental to appearance of finished concrete, fully coordinated with requirements for required finish material.
2. Form exposed areas of columns, beams, ledges, balcony fascias to achieve true alignment and level soffit of spandrel beams and concrete edges. All such areas must be sharp, straight and true to line and level. Spandrel beams and concrete canopies and ledges must have adequate shoring to prevent any visible amount of sag and sufficient bracing to prevent any lateral movement during construction.

2.3 FORM MATERIALS

- A. General: Plywood, fiberglass, metal, metal-framed plywood faced, or other acceptable panel-type materials.
 1. Provide materials with sufficient strength to prevent warping.
- B. Plywood: Of species and grade suitable for intended use, sound undamaged sheets with clean true edges.
 1. Panel Forms: Minimum 5/8-inch thick exterior grade plywood with sealed edges, United States Voluntary Product Standard for Construction and Industrial Plywood (PS1) grade Plyform Class I and II B-B Exterior or HDO Exterior.
 - 2.
 3. Board Forms: Shiplap or tongue and groove lined with PS 1 grade Plyform Class I and II Exterior 1/2-inch or HDO Exterior 1/2-inch or 3/16-inch thick fiberboard conforming to FS LLL-B-810a(1), type I.
 4. Other Acceptable Sheet Materials: 14 gauge sheet steel or fibrous glass reinforced resin.
- C. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials, to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.
- D. Lumber: Construction grade or better Douglas Fir without loose knots for other defects.
 1. Use only where entire width can be covered with one board 11-1/4" or less in width.

- E. Forms for Cylindrical Columns and Supports: Metal, glass-fiber reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications.
 - 1. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.
 - 2. Columns Forms: SONOTUBE or equal product substituted per Section 01 25 00, and as required for other configurations
- F. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to support weight of placed concrete without deformation.
 - 1. Pan Joist forms: Provide removable forms, Ceco Corporation or equal. Forms shall have adequate strength to maintain their shape during placing of concrete and shall permit easy removal without damage to concrete surfaces. Forms shall be true to shape, free from bulges, tears or other damage, and shall be free from oil, grease, paint, dirt or other deleterious coatings. Forms shall fit close, tight and straight. Forms shall be cleaned up before reuse.
- G. Chamfer for Form Corners:
 - 1. Types: Chamfer strips of wood, metal, PVC or rubber fabricated to produce smooth form lines and tight edge joints, 3/4" size, maximum possible lengths.
 - 2. Required for all exposed corners of beam, walls and column forms.
- H. Form Ties:
 - 1. Type: Factory-fabricated metal, adjustable length, designed to prevent form deflection and to prevent spalling concrete upon removal.
 - 2. Ties used for architecturally exposed concrete shall be galvanized.
 - 3. Ties shall not leave metal closer than 1-1/2" to exposed surface.
 - 4. When removed, ties shall not leave holes larger than 1" diameter in concrete surface. Ties shall not leave fractures, spalls, depressions, or other surface disfigurations greater than 3/4-inch.
 - 5. Removable Ties: Use type with tapered cones, 1" outside diameter, for concrete walls which will remain exposed to view and scheduled for architectural finishes.
 - 6. Snap-Off Ties: Use for concrete walls below grade and walls which will not remain exposed to view and are not scheduled for architectural finishes.
 - 7. Wire Ties: Not acceptable.
- I. Nails, Spikes, Lag Bolts, Thru-Bolts, Anchorages:
 - 1. Type: Of size, strength and quality to meet the required quality of formwork.
- J. Expansion Joint Filler:
 - 1. Fiber Type: Premolded asphalt-impregnated fiber, ASTM D1751, 1/4-inch thick unless otherwise noted. Same as W. R. Meadows, Inc.'s "Sealtight Fiber Expansion Joint"; Grace Construction Materials "Serviced Fiber Expansion Joint Filler, Code 1390"; National Expansion Joint Co.'s "Fiber Joint Filler No. 12"; Burke Concrete Accessories, Inc.'s "Burke Fiber Expansion Joint"; or equal product substituted per Section 01 25 00.
 - 2. Cork Type: Preformed cork, ASTM D1752, Type II, 1/4-inch size unless otherwise noted. Same as W. R. Meadows, Inc.'s "Sealtight Cork Expansion Joint"; Sonneborn-Contech's "Sonoflex Cork"; Grace Construction Materials' "Serviced Standard Cork Expansion Joint Filler, Code 4323; or equal product substituted per Section 01 25 00.
- K. Form Sealer: Same as Grace Construction Material's "Formfilm"; or equal product substituted per Section 01 25 00.

L. Form Release Agent:

1. Type: Commercial formulation form release agent of non-emulsifiable type which will not bond with, stain, or adversely affect concrete surfaces. Form release agent shall not impair subsequent treatment of concrete surfaces requiring bond or adhesion, or impede the wetting of surfaces to be cured with water or curing compounds. Form release agent shall be compatible with subsequent architectural finish materials applied to concrete surfaces. Apply in compliance with manufacturers' instructions.
2. Form release agent shall meet, at a minimum, all federal and state requirements for volatile organic compounds (VOC's).
3. In compliance with LEED Credit EQ 4.2, acceptable products include but are not limited to:
 - a. "Bio-Form," Leahy-Wolf Company, Franklin, IL
 - b. "Enviroform," Conspec Marketing and Manufacturing Co., Inc., Kansas City, KS
 - c. "Soy Form Away," Natural Soy Products, Watkins, IA
 - d. "Soy Form Away," Midwest Biologicals, Inc., Woodburn, IN
4. For Steel Forms: Non-staining rust-preventative type.

M. Foam Board: Extruded close cell polystyrene foam, channeled for drainage, with a minimum compressive strength of 60 psi at 0.1-inch deformation when tested in accordance with ASTM D1621-73, and meeting requirements of FS-HH-I-524b, Type II, Class B. Same as The Dow Chemical Co.'s "Styroform Plazamate" or equal product substituted per Section 01 25 00.

O. Reglets: Provide sheet metal reglets formed of same type and gauge as flashing metal, unless indicated otherwise on Drawings. Where resilient or elastomeric sheet flashing, or bituminous membranes are terminated in reglets, provide reglets of not less than 26 gauge galvanized sheet metal. Fill reglet or cover face opening to prevent intrusion of concrete or debris.

P. Coordinate with materials as specified in Section 03 20 00: Concrete Reinforcement and Embedded Assemblies.

Q. Form Liners: Where indicated, line forms with Dayton Superior 6 inches "Cedar Form Liner." or equal provided in as long length as are available from the manufacturer. Install liner with tight joints, sealed when recommended by the liner manufacturer, so that when cast and de-formed, the concrete will match the approved mockup.

2.4 SOURCE QUALITY CONTROL

A. Plywood shall bear American Plywood Association's "Guide to Plywood Grades" (APA) grade-trademark.

PART 3 - EXECUTION

3.1 FORMWORK

A. General:

1. Inspect areas to receive formwork.
 - a. Immediately report to Owner's Testing Agency and Design Professionals in writing the conditions that will adversely affect the Work.
 - b. Verify that excavations are sufficient to permit placement, inspection and removal of forms.
 - c. Verify that excavations for earth forms have been neatly and accurately cut.

- d. Verify that conditions are otherwise proper for formwork construction.
 2. Do not start work until unsatisfactory conditions have been corrected.
 3. Construct forms to sizes, shapes, lines, and dimensions shown on Contract Documents, and to obtain accurate alignment, location, grades, level and plumb work in finished structures.
 4. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins, and to maintain alignment.
 5. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, drips, bevels, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in the Work.
 6. Comply with shop drawings, ACI 301, 318, 347 and Contract Documents.
 7. Maintain formwork and finished work construction tolerances complying with ACI 301, 117, and 347.
 8. Provide shore and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof.
 9. Erect forms for easy removal without hammering or prying against concrete surfaces.
 10. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
 11. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only.
 12. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.
 13. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce smooth lines and tight edge joints.
 14. Design, erect, support, brace and maintain formwork and shoring to support loads until such loads can be safely supported by the concrete structure.
 15. Where specifically shown on the Contract Documents as monolithic, upturned beams, curbs and similar members in connection with slabs shall be formed so that they can be poured integrally with slabs.
- B. Walls and Other Formed Elements:
1. Erect outside forms for exposed exterior walls first and obtain the Architect's approval before reinforcement is placed. Obtain Architect's approval of the reinforcement before interior form is erected.
 2. Carefully align inside and outside forms before tightening ties.
 3. Plywood Forms: Insure vertical joints are plumb and horizontal joints are level; arrange joints and ties in geometrical pattern as approved by the Architect.
 4. Form inside corners at exposed conditions with mitered boards or plywood so that no concrete is placed against form ends.
 5. After erection, seal all cracks, holes, slits, gaps, and apertures in forms so that they will withstand the pressure and will remain completely watertight.
 6. Provide a means to seal the bottom of forms at construction joints such as foam tape or other gasket devices.
 7. Apply a coating of release agent prior to the erection of formwork. Follow approved manufacturer's recommendations.
- C. Formwork Loads on Grade
1. Where loads from formwork bear on grade, provide suitable load-spreading devices for adequate support and to minimize settlement. In no event shall frozen ground or soft ground be utilized directly as the supporting medium.
- D. Earth Forms:

1. Construct wood edge strips at top sides of excavations.
 2. Provide forms for footings wherever concrete cannot be placed against solid earth excavation.
 3. Remove loose dirt and debris prior to concrete pours.
 4. Foundation concrete may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Architect (Structural Engineer), subject to the approval of the Geotechnical Engineer.
 - a. The horizontal dimensions of unformed concrete footings shall be increased 1 inch at every surface at which concrete is placed directly against the soil.
 - b. The minimum formwork shown on the drawings is mandatory to ensure clean excavations immediately prior to and during the placing of concrete.
- E. Footings and Grade Beams:
1. Provide forms for footings and grade beams if soil or other conditions are such that earth trench forms are unsuitable.
 2. When trench forms are used, provide an additional 1" of concrete on each side of the minimum design profiles and dimensions indicated.
- F. Slab Forms:
1. Establish levels and set screeds.
 2. Depress slabs where required to receive special floor finishes.
- G. For slabs-on-grade, secure edge forms in such a manner as to not move under weight of construction loads, construction and finishing equipment, or workers
- H. Concrete Accessories and Embedded Items:
1. Obtain necessary information for coordination of formwork with items to be embedded in concrete and other related work.
 2. Install into forms concrete accessories, sleeves, inserts, anchor bolts, anchorage devices and other miscellaneous embedded items furnished by other trades or that are required for other work that is attached to or supported by cast-in-place concrete.
 - a. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached.
 3. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
 4. Install dovetail anchor slots in concrete structures as indicated on drawings or required by other trades.
 5. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces.
 6. Coordinate with Section 03 20 00 Concrete Reinforcement and Embedded Assemblies.
 7. Install accessories and embedded items straight, level, plumb and secure in place to prevent displacement by concrete placement.
 8. Use templates to ensure accurate placement of anchor bolts, inserts, and other embedded items.
- I. Temporary Openings:
1. Locate temporary openings in forms at inconspicuous locations.
 2. For clean-outs and inspection before concrete placement, locate temporary openings where interior area of formwork would otherwise be inaccessible.

3. For cleaning and inspections, locate openings at bottom of forms to allow flushing water to drain.
 4. Securely brace temporary openings and set tightly in forms to prevent loss of concrete.
 5. Close temporary openings with tight fitting panels, flush with inside face of forms, neatly fitted so that joints will not be noticeable on exposed concrete surfaces.
- J. Provisions for Other Trades: Coordinate and provide openings in concrete formwork to accommodate work of other trades.
1. Determine size and location of openings, recesses, chases, offsets, openings, depressions, and curbs from information provided by trades requiring such items.
 2. Accurately place and securely support items built into forms.
- K. Cleaning:
1. Normal Conditions
 - a. Thoroughly clean forms and adjacent surfaces to receive concrete.
 - b. Remove chips, wood, sawdust, dirt, standing water or other debris just before placing concrete.
 - c. Flush with water or use compressed air to remove remaining foreign matter.
 - d. Verify that water and debris can drain from forms through clean-out ports.
 2. During Cold Weather:
 - a. Remove ice and snow from within forms.
 - b. Do not use de-icing salts.
 - c. Do not use water to clean out completed forms, unless formwork and concrete construction will proceed within heated enclosure.
 - d. Use compressed air or other means to remove foreign matter.
- L. Form Release Agents
1. Before placing reinforcing steel and miscellaneous embedded items, coat contact surfaces of forms with an approved non-residual, low VOC form release agent in accordance with manufacturer's published instructions.
 2. Do not allow release agent to accumulate in forms or come into contact with reinforcement or concrete against which fresh concrete will be placed.
 - a. Coat steel forms with nonstaining, rust-preventative material.
 3. Remove form release agent and residue from reinforcement or surfaces not requiring form coating.
- M. Before Placing Concrete:
1. Inspect and check completed formwork, shoring and bracing to ensure that work is in accordance with formwork requirements of this section and Contract Documents, and that supports, fastenings, wedges, ties, and parts are secure.
 - a. Make necessary corrections or adjustment to formwork to meet tolerance requirements.
 2. Retighten forms and bracing before concrete placement to prevent mortar leaks and maintain proper alignment.
 3. Notify Owner's Testing Laboratory sufficiently in advance of placement of concrete to allow inspection of completed and cleaned forms.

N. During Concrete Placement:

1. Maintain a check on formwork to ensure that forms, shoring, ties and other parts of formwork have not been disturbed by concrete placement methods or equipment.
2. Use positive means of adjustment as required for formwork settlement during concrete placing operations.

O. Camber:

1. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.
2. Camber bottom forms where indicated on the drawings. Whenever forms are cambered, screeded levels for establishing top of concrete must be cambered to the same amount and to the same profiles such that scheduled depth of member is not reduced by lifting of forms. Check camber and adjust forms before initial set as required to maintain camber.

P. Expansion Joints:

1. Provide in exterior concrete paving on grade at maximum 24-feet on center or as noted and at intersections with vertical surfaces, curbs, manholes or other penetrations through paving.
2. Use fiber type expansion joint fillers typically and depress 1/4-inch unless otherwise noted.
3. Use cork type expansion joint fillers at conditions with non-bituminous waterproofing, liquid waterproofing or sealant systems

Q. Construction Joints:

1. Provide where shown on the drawings as directed by the Architect and per CBC Section 1906.4.
2. Provide key indentations at all joints.
3. Provide pour strips on inside face of forms at horizontal joints, but remove strips and thoroughly clean out reglets before placing subsequent portions of wall.
4. Prevent formations of shoulders and ledges.
5. Provide means for drawing forms into firm contact with concrete before placing additional concrete over previous pours where shrinking and warping has separated concrete from forms.

R. Surface Defects:

1. Install forms substantially free of surface defects.

3.2 SHORES AND RESHORES

A. Comply with ACI 347.2R for shoring and reshoring in multistory construction, and as specified herein.

1. For non-post tensioned flat plate concrete structures of five supported levels or more, extend shoring/reshoring at least four levels below the floor or roof being placed (shore formwork, reshore three levels below)
2. For non-post tensioned flat plate concrete structures of less than five supported levels, extend shoring/reshoring to ground.
3. For all other concrete structures of four supported levels or more, extend shoring/reshoring at least three levels below the floor or roof being placed (shore formwork, reshore two levels below)
4. For all other concrete structures of less than four supported levels, extend shoring/reshoring to ground.

5. For shoring/reshoring placed on mud sills, adjustments shall be made by contractor to account for ground settlement.
6. Locate shores/reshores such that the factored (ultimate) construction load imposed onto any slab or beam at any time during the construction cycle does not exceed 90% of the factored (ultimate) design load for that slab or beam, scaled down to reflect effect on capacity of lower concrete strength at time of loading.
7. Construction load shall include the weight of wet concrete, total weight of formwork and shoring/reshoring, and a minimum construction live load of 50 psf (increase if construction operations will produce higher loading). Design load includes self weight of the slab, and superimposed dead and live loads as indicated on the drawings.
8. For comparison of construction loads to design loads, compare factored (ultimate) construction loads to factored (ultimate) design loads. Use the same load factors for the construction load that were used for the design of the slabs.
9. For flat plate or flat slab construction “backshores” or “reshores” as defined in ACI 347 shall be permitted only if appropriate calculations and construction sequences are provided demonstrating that the accumulation of shore loads will not overload any slab. In the absence of such calculations and construction sequences, shores must be removed and reshores installed in a sequence such that each floor is permitted to deflect and carry its own weight prior to the installation of reshores.
10. Reshores shall not be removed until the concrete has attained its specified 28 day strength.
11. Two levels of shoring or one level of shores over one level of reshores shall be maintained below any newly cast level until it has attained design strength and is at least 28-days old.

B. General

1. Adequately brace and maintain shoring to safely support vertical, lateral, and asymmetrical loads until completed structure has attained design strength.
2. Distribute shoring loads over area where shoring is erected and protect against undermining or settlement.
3. Provide means for making vertical adjustments to compensate for settlement either before or during placing of concrete.
4. Construct shores for soffits of beams to permit removal of forms without removing shores.
5. Reshoring will be permitted. Shores and reshores shall be designed by a Civil Engineer registered in the State of California and installed under his/her direction. This Civil Engineer shall be employed by the Contractor.

3.3 REMOVING FORMS

- A. Secure the Architect's approval for time and sequence of form removal.
- B. Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50°F (10°C) for 12 hours after placing concrete, provided concrete is sufficiently hard to avoid damage by form-removal operations, and provided curing and protection operations are maintained after removal of formwork.
- C. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed until concrete has attained at least 75% of design compressive strength as proven by cylinder test. If stripping occurs before [3] days, 100% strength must be achieved.
 1. Results of the cylinder break shall be presented to the Architect to demonstrate compliance with above specified strength requirements prior to form removal.
 2. Provide reshores as required per ACI 347.
 3. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members

- D. Remove formwork progressively using methods to prevent shock loads or unbalanced loads from being imposed on structure. Forms shall be removed without damage to the concrete. Comply with ACI 347.
- E. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against concrete surfaces.
- F. Reshore structural members where required due to design requirements, construction requirements, or construction conditions.
 - 1. Reshore on same day shoring and forms are removed.
- G. Whenever formwork is removed during the curing period, the exposed concrete shall be cured per requirements of Section 03 30 00.
- H. All wood formwork, including that used in void spaces, pockets and other similar places shall be removed.
- I. Form tie holes shall be filled as per approved samples submitted to the Architect and Engineer.
- J. The Contractor shall assume responsibility for all damage due to removal of the forms.

3.4 RE-USING FORMS

- A. Before forms can be re-used, surfaces that will be in contact with freshly poured concrete must be thoroughly cleaned, damaged areas repaired, projecting nails withdrawn, and forms must be straight and free from dirt or hardened concrete.
 - 1. Split, frayed, delaminated or otherwise damaged form-facing material will not be acceptable.
 - 2. Apply new form release agent on re-used forms.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joints to avoid offsets. Reuse of formwork with repairs or patches which would result in adverse effects to architectural concrete finish will not be permitted.
- C. Forms for exposed concrete may be reused only if the surfaces have not absorbed moisture and have not splintered, warped, discolored, stained, rusted or peeled, subject to acceptance by the Design Professionals. The Design Professionals reserve the right to require the Contractor to remove and reconstruct such formwork as will produce subsequent areas that are acceptable. Do not use "patched" forms for exposed concrete surfaces, unless approved by the Design Professionals.
- D. Clean and repair any damage caused by placing, removal, or storage.
- E. Store formwork in manner to prevent damage or distortion.
- F. Reseal as required to achieve concrete of specified quality.

3.5 FIELD QUALITY CONTROL

- A. General: The Owner's Testing Laboratory shall inspect concrete formwork as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such a defect is discovered, nor shall it obligate Design Professionals for final acceptance.
- B. Testing Laboratory shall provide qualified personnel at site to inspect formwork using the latest Contract Documents and approved shop drawings as follows:
 - 1. Prior to placement of reinforcement, inspect formwork for grade, quality of material, absence of foreign matter, and other imperfections that might affect suitability of concrete placement and tolerances stated herein.
 - 2. Inspect forms for location, configuration, compliance with specified tolerances, block outs, camber, shoring ties, seal of form joints and compliance with Contract Documents.

3. Verify condition of bond surfaces, locations and sizes of all accessories, embedment items, and anchorage for prevention of displacement.
 4. Verify proper use/application of form release agents.
 5. Inspect concrete surfaces immediately after removal of formwork and prior to any patching or repair work.
- C. Submit inspection, observation, and/or test reports to the Design Professionals and provide an evaluation statement in each report stating whether or not concrete formwork conforms to the requirements of Specifications and Drawings. Specifically note deviations.
- D. Immediately report deficiencies to the Contractor. Contractor shall correct the deficiency at no cost to the Owner.

END OF SECTION

SECTION 03 12 30 – PERMANENT RISER STADIUM SEATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Straight Riser system for floor mounted seating.
2. Step Forms.
3. Loop Handrails.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 03 Section "Cast-in-place Concrete" for concrete reinforcing and slabs poured on top of permanent form system.
3. Division 05 Section for miscellaneous metal screws and power actuated fasteners.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Shop Drawings: Show layout and dimensions of each permanent riser form area. Indicate location, size, and gage of riser and step forms. Provide cross section of each form area indicating height and depth of each tier and thickness of each Geofoam layer. Provide plan view of each layer of Geofoam with each part identified and dimensioned.
- B. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content.
 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 4. Credit MR 6, Rapidly Renewable Materials.
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal parts from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal parts, protect with a waterproof covering, and ventilate to avoid condensation.
- C. Protect plastic insulation as follows:
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver plastic insulating materials to project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Stadium Savers, LTD (basis of design.)
- B. Stadium Seating Enterprises, Inc.
- C. Or equal.

2.2 MATERIALS

- A. Steel Sheet: ASTM-A569 Hot-rolled Steel, ASTM-A366 Cold-rolled steel, or ASTM-A621 Hot-rolled Pickled & Oiled Steel.
- B. Molded, Rigid Cellular Polystyrene Geofoam Blocks: Comply with manufacturer's requirements, ASTM D6817 for Type EPS15, and the following:
 1. Minimum density: 0.90 pounds per cubic foot
 2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
 3. Minimum Compressive Resistance: at 1% deformation = 3.6 pounds per square inch (518 pounds per square foot).
 4. Blocks shall contain no CFC's, HCFC's, HFC's, or formaldehyde.

2.3 METAL RISERS FOR FLOOR MOUNTED SEATING

- A. Steel risers for straight rows: Manufacturer's standard Z-shaped formed primed steel riser, punched for connector brackets and foam brackets, and as follows:
 1. Minimum Uncoated-Steel Thickness: 16 gage.
 2. Height: As indicated.
 3. Length: 10 feet.

2.4 MISCELLANEOUS PARTS

- A. General: Manufacturer's standard 16-gage oiled steel parts for connecting risers end-to-end and connecting risers to Geofoam.
 1. Foam Brackets: Fabricated to interlock with slots in risers without the need for welds or other fasteners. Provide barbs for positive attachment to foam.
 2. Connector Brackets: Fabricated to interlock with slots at the end of adjacent risers without the need for welding or other fasteners.
- B. Gripper Plates: Manufacturer's standard galvanized barbed plates for installation between Geofoam layers.

- C. Embedded Anchor Bolts for Stadium Riser Chair Installation: 3/8-inch diameter proprietary bolt assembly with self positioning plastic sleeve.
 - 1. Furnish washers, nut, and protective thread cover with each bolt assembly.
 - D. Step Forms: Manufacturer's standard 16-gage, primed steel formed and welded step forms as follows:
 - 1. Height, Width, and Depth: As indicated on drawings.
 - 2. Inserts: Provide square sleeve welded to step for handrail installation.
 - E. Loop Handrails: Manufacturer's standard pipe handrail, ASTM A 53, for individual step locations and as follows:
 - 1. Type F, or Type S, Grade A, standard weight (Schedule 40.)
 - 2. Size: As indicated on the Drawings.
- 2.5 FABRICATION
- A. Fabricate foam blocks, square, and true to dimension.
 - B. Factory-cut individual blocks for delivery to site and installation without the need for subsequent field cutting.
 - 1. Collect cut-off waste at factory for recycling as post-industrial content. Do not dispose field-cut foam in the field.
 - C. Marking and Identification: Identify Individual blocks with layer I.D. letter and part number.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install system in compliance with Design Consultant's Drawings and approved shop drawings.
- B. Foam block installation: Install blocks in layers at locations indicated on shop drawings.
 - 1. Place gripper plates between each layer of foam in quantities as noted on shop drawings.

- C. Metal Riser Installation: Install metal risers plumb and square. Brace riser to foam units with foam brackets inserted into slots in the riser face. Connect risers end-to-end with connector brackets inserted into slots in the riser ends. Trim end riser in each row to fit field-verified row dimension.
1. Do not weld risers or cut risers with torch in the same room as installed or stored foam. Protect foam against ignition at all times.
 2. Position risers to align seating bolt location with dimensions on shop drawings and seating plans.
- D. Step form installation: Install step forms in locations shown on shop drawings. Screw step forms to metal riser face with self-tapping sheet metal screws.

END OF SECTION

SECTION 03 20 00 - CONCRETE REINFORCEMENT AND EMBEDDED ASSEMBLIES

PART 1 - GENERAL

1.1 GENERAL

- A. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.

1.2 SCOPE

- A. Provide all labor, materials, equipment, services and transportation for reinforcing steel, accessories, embedments and miscellaneous anchorage accessories, joint fillers, and waterstops for cast-in-place concrete work as shown on Drawings, as specified herein, and as required by the job conditions.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Submittals Division 1
- B. Quality Control Division 1
- C. Concrete Formwork Section 03 10 00
- D. Cast-in-Place Concrete Section 03 30 00
- E. Thermal and Moisture Protection Division 7
- F. "SUSTAINABLE DESIGN REQUIREMENTS": Section 01 81 13
LEED Requirements

1.4 CODES, STANDARDS AND REFERENCES

- A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the drawings.

1.5 STANDARDS:

- A. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 1. ACI 301 – Standard Specification for Structural Concrete.
 - 2. ACI 315 – Details and Detailing of Concrete Reinforcement.
 - 3. ACI 318 – Building Code Requirements for Reinforced Concrete.
 - 4. American Society for Testing and Materials "ASTM Standards in Building Codes", various standards as referenced herein, latest edition.
 - 5. AWS D1.1 – Structural Welding Code-Steel.
 - 6. AWS D1.4 – Structural Welding Code-Reinforcing Steel.
 - 7. AWS D12.1 – Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.
 - 8. CRD C 572 – Specification for Polyvinylchloride Waterstops.
 - 9. Concrete Reinforcing Steel Institute "Manual of Standard Practice"
 - 10. ASTM D3963 Fabrication and Jobsite Handling of epoxy Coated Steel Reinforcing Bars.
- B. References:
 - 1. US Green Building Council (USGBC), www.usgbc.org

C. Definitions:

1. The term "Contract Documents" in this specification is defined as the design drawings and the specifications.
2. The term "SER" in this specification is defined as the Structural Engineer of Record for the structure in its final condition.
3. The term "Design Professionals" in this specification is defined as the Owner's Architect and SER.
4. The term "Contractor" in this specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Concrete Contractor and their sub-contractors.
5. The term "Testing Agency" in this specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing of concrete construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.
6. The terms "for record" and "submit for record" in this specification are defined as Contractor submittals that do not require a response from the Design Professionals.
7. Working Days: Monday through Friday, excluding federal or state holidays.

1.6 CONTRACTOR QUALIFICATIONS

- A. The work of this section shall be performed by a fabricator specializing in reinforcing steel fabrication of type for cast-in-place concrete work required for this Project, with a minimum of 10 years of documented successful experience, and have the facilities capable of meeting all requirements of Contract Documents.
1. Welders shall be qualified in accordance with AWS D1.1, within 12 months before starting the work.
 - a. Make qualification records available to the Design Professionals upon request.
- B. Manufacturers shall specialize in manufacturing the types of concrete accessories required for cast-in-place concrete work, with a minimum of 10 years of documented successful experience and shall have the facilities capable of meeting all requirements of Contract Documents as a single-source responsibility and warranty for each type of accessory.

1.7 SUBMITTALS

- A. Where the SUBMITTALS section of this specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Do not submit items not requested.
1. Submittal Schedule: See Section 03 30 00.
 2. Shop Drawings: Submit shop drawings that shall clearly indicate, but not be limited to:
 - a. All details, dimensions and information required for fabrication and placement of concrete reinforcement in accordance with Contract Documents, prepared in accordance with ACI 315 recommendations.
 - b. Elevations, plans, sections, and dimensions of concrete work with required reinforcement clearances.
 - c. Ledges, brackets, openings, sleeves, anchor rods, embedments, prefabricated bent-in dowel keyway systems, electrical conduit and items of other trades including interference with reinforcing materials.
 - d. Sizes, grade designations, spacing, locations, and quantities of wire fabric, reinforcement bars, temperature and shrinkage reinforcement dowels.

- 1) Do not use dimensions scaled from Contract Drawings to determine bar lengths.
 - 2) Hooks and bends not specifically dimensioned shall be detailed per ACI 318.
 - e. Bending and cutting schedules, assembly diagrams, splicing and connection requirements, details, and laps.
 - f. Each type of supporting and spacing devices, including miscellaneous accessories.
 - g. Construction joint type, details and locations. Contractor shall coordinate with concrete pour schedule and submit for action by the Design Professionals.
 - h. Submit comprehensive (a single drawing per area/element) layout/placement drawings. Drawings shall consolidate the work of all trades and shall be coordinated by the Contractor. Submit with or prior to reinforcement submittal for same element/area. Drawings shall include:
 - 1) Concrete accessories and embedded items, including fabrication details of items to be placed (exclusive of reinforcement.)
 - 2) Opening in structural members, including floor slab, shearwalls, columns and beams.
 - i. Reproduction of structural drawings is not permitted.
 3. Product Data – Submit for record for each type of product identified in Part 2. Product Data shall be clearly marked to indicate all technical information which specifies full compliance with this section and Contract Documents, including published installation instructions and I.C.C reports, where applicable, for products of each manufacturer specified in this section.
 4. Mill Reports: Submit for record.
 5. Hazardous Materials Notification: Submit for record. In the event no product or material is available that does not contain hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation.
- B. Submittal Process: See Section 03 30 00
C. SER Submittal Review: See Section 03 30 00
D. Substitution Request: See Section 03 30 00
E. Request for Information (RFI): See Section 03 30 00
- 1.8 DELIVERY, HANDLING, STORAGE
- A. Comply with General Conditions and Division 1, including the following:
1. Deliver reinforcing steel to Project site bundled, tagged and marked.
 - a. Use weatherproof tags indicating bar sizes, lengths and other information corresponding to markings shown on placement diagrams.
 2. Deliver welded wire fabric in sheets. Do not deliver in rolls.
 3. During construction period, properly store reinforcing steel and accessories to assure uniformity throughout the Project.
 4. Deliver and store welding electrodes in accordance with AWS D1.4.
 5. Immediately remove from site materials not complying with Contract Documents or determined to be damaged.
 6. Store reinforcing steel above ground so that it remains clean.

- a. Maintain steel surfaces free from materials and coatings that might impair bond.
- b. Keep covered.
- c. Protect against corrosion or deterioration of any kind.

1.9 WARRANTY

- A. Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:
 1. Bars with kinks or bends not indicated on drawings or on approved shop drawings.
 2. Bars damaged due to bending, straightening or cutting.
 3. Bars heated for bending.

1.10 LEED SUBMITTALS

- A. Credit MR 4.1, 4.2: Recycled Content – Reinforcement Steel, Reinforcing Wire Fabric, Supports for Reinforcement:
 1. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 2. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
- B. Credit MR 5.1, 5.2 Regional Materials, Manufactured & Harvested / Extracted Locally– Reinforcement Steel:
 1. Manufacturing (fabrication) location(s): Indicate location of manufacturing (fabrication) facility; indicate distance between manufacturing facility and the project site.
 2. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 3. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

PART 2 - PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel:
 1. Type: Deformed billet steel bars, ASTM A 615, Grade 60 or 75 as indicated on drawings.
 2. Size: As indicated on structural drawings.
 3. Where indicated on drawings, reinforcing steel shall be hot-dipped galvanized after fabrication in accordance with ASTM A 767, Class II, with galvanizing material protected from embrittlement during galvanizing process in accordance with ASTM A 143.
 - a. Galvanized finish shall meet the bend and shear test requirements of ASTM A 615.
 4. Epoxy-Coated: ASTM A 775 where indicated on drawings.
 5. Weldable reinforcement: ASTM A 706 where indicated on drawings.
- B. Welded Wire Reinforcement:

1. Type: steel wire, plain finish, ASTM A 82.
2. Type: steel wire, deformed, ASTM A 496.
3. Size: As indicated on structural drawings.

4. Where indicated on drawings, welded wire reinforcement shall be hot-dipped galvanized after fabrication in accordance with ASTM A 767, Class II, with galvanizing material protected from embrittlement during galvanizing process in accordance with ASTM A 143.
 - a. Galvanized finish shall meet the bend and shear test requirements of ASTM A 615.
5. Plain Steel Welded Wire Reinforcement: ASTM A 185.
6. Deformed Steel Welded Wire Reinforcement: ASTM A 497.
7. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A.

2.2 ACCESSORIES

A. Tie Wire:

1. Type: Minimum 16 gauge (1.5mm) annealed steel wire, ASTM A 82.
2. Wire Bar Type: Comply with CRSI.

B. Mechanical Splicing Systems:

1. Mechanical tension and compression splicing systems shall be used where indicated on drawings.
2. Acceptable Products: Lenton Cadweld by Erico, Solon, OH or Bar-Lock by Dayton Superior, Dayton, OH, TX, Grip-Twist by Bar Splice, Dayton, OH or Lenton Couplers by Erico, Solon, OH. Splices shall be installed in compliance with manufacturer's requirements.
3. Mechanical and welded tensile mechanical splicing systems shall be capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength (Type 1) except where indicated as Type 2 (100% of specified tensile strength).
4. Mechanical compression splices shall be such that the compression stress is transmitted by end bearing held in concentric contact.

C. Mechanical Bar Terminators:

1. For bar sizes #11 (Ø36) or smaller where specifically detailed on drawings, mechanical bar terminators shall be used.
2. Acceptable Products: Lenton Terminator by Erico, Solon, OH or Grip-Twist Doughnut by Bar-Splice, Dayton, OH.

D. Supports for Reinforcement:

1. Types: Bolsters, chairs, spacers, clips, chair bars, and other devices for properly placing, spacing, supporting, and fastening the reinforcement, hot-dip galvanized after fabrication, in accordance with ASTM A 123, or epoxy coated to match supported reinforcement.
2. For Contact with Forms: Use types with not less than 3/32" (2.5mm) of plastic between metal and concrete surface.
 - a. Plastic tips shall extend not less than 1/2" (12mm) on metal legs.
3. Individual and continuous slab bolsters and chairs shall be of type to suit various conditions encountered and must be capable of supporting 300 pound (1.5kN) load without damage or permanent distortion.

4. Unless otherwise indicated on drawings, bottom reinforcing bars in footings shall be supported by precast concrete bricks or individual high chairs with welded sand plates on bottom.
5. For Slabs on Grade: Use supports with sand plates or horizontal runners where base material will not support chair legs.

E. Deformed Bar Anchors:

1. Type: Automatic end welded, ASTM A 496 quality.
2. Size and Grade: As indicated on structural drawings by Nelson Stud Welding.

F. Anchor rods and dowels:

1. Types and Sizes: Provide sizes and types of anchor rods and dowels as indicated on the drawings. Each type of anchor shall be manufactured of structural quality steel, designed for cast-in-place concrete applications and be of sizes as indicated on drawings, complete with washers, nuts, plates and miscellaneous accessories required to meet Contract Document requirements.
2. Adhesive Anchors for anchor rods and dowels in existing concrete:
 - a. HIT-RE 500-SD by Hilti, Inc., Tulsa, OK
 - b. PE 1000+ by Powers Fasteners, Inc., Brewster, NY
 - c. Epcon A7 by ITW Red Head, Addison, IL
 - d. SET-XP by Simpson Strong-Tie Co., Pleasanton, CA

G. Prefabricated Bent-In Dowel Keyway System:

1. Type, Size and Grade as indicated on drawings.
2. Acceptable Products: Lenton Form Savers by Erico, Solon, OH or Stabox by Meadow Burke, Tampa, FL.
3. Installation: Per Manufacturer's instructions.

2.3 ANCHORAGE ACCESSORIES

A. General: Miscellaneous anchorage accessories for anchoring structural, architectural, electrical, and mechanical items to poured concrete shall include but not be limited to the following:

1. Concrete Anchors: Headed or bent studs ASTM A 108/Grade 1015 through 1020, minimum yield strength of 50,000 psi (345MPa), minimum tensile strength of 60,000 psi (415MPa).
2. Anchor Rods: ASTM F1554, Grade as noted on drawings.
3. Threaded Inserts: Manufactured by Dayton/Richmond Screw Anchor Co. or Powers Fasteners, Inc.
4. Adhesive Anchors:
 - a. HIT-RE 500-SD by Hilti, Inc., Tulsa, OK
 - b. PE 1000+ by Powers Fasteners, Inc., Brewster, NY
 - c. Epcon A7 by ITW Red Head, Addison, IL
 - d. SET-XP by Simpson Strong-Tie Co., Pleasanton, CA
5. Expansion Anchors:
 - a. Kwik Bolt TZ or Kwik Bolt 3 by Hilti, Inc., Tulsa, OK
 - b. Power Stud+ SD1 or SD2 by Powers Fasteners, Inc., Brewster, NY
 - c. Trubolt or Trubolt+ by ITW Red Head, Addison, IL
 - d. Strong-Bolt by Simpson Strong-Tie Co., Pleasanton, CA
6. Threaded Anchors:

- a. HUS-H by Hilti, Inc., Tulsa, OK
 - b. Wedge Bolt+ by Powers Fasteners, Inc., Brewster, NY
 - c. Tapcon by ITW Red Head, Addison, IL
 - d. Titan HD by Simpson Strong-Tie Co., Pleasanton, CA
7. Inserts and Coil Rods: Yield strength 65,000 psi (450MPa), ASTM B 633, manufactured by Acrow-Richmond Limited or Dayton Superior, Dayton, OH.
 8. Welding Electrodes: AWS 5.5, Series E70.
 9. Welded Deformed Bar Anchors: Welded by full-fusion process, as furnished by TRW Nelson Stud Welding Division or equivalent.

B. Dovetail Anchor Slots:

1. Type: Formed 22 gauge (0.85mm) galvanized steel manufactured by Heckmann Building Products/Chicago, Illinois or Hohmann and Barnard/Hauppauge, New York.
2. Location of Use: Continuous installation of anchor slots, full height of masonry walls, where masonry walls abut poured concrete walls.
3. Fill slot with temporary filler or cover face opening to prevent intrusion of concrete or debris.
4. Finish: Hot-dip galvanized or zinc-plated steel.
5. Stainless steel anchors are acceptable.

2.4 JOINT FILLERS

A. Permanent Compressible Joint Filler:

1. Type: W. R. Meadows: "Cerammar" closed-cell expansion joint filler, ultraviolet stable, minimal moisture absorption, non-impregnated, nonstaining and nonbleeding, inert and compatible with cold-applied sealants.
2. Location of Use: Slabs and curbs as indicated on drawings or required.
3. Thickness: As indicated on drawings or required.

B. Temporary Compressible Joint Filler:

1. Type: White molded polystyrene beadboard.
2. Location of Use:
 - a. In slabs, curbs, and walls which must be removed prior to joint sealant installation.
 - b. Vertically to isolate walls from columns or other walls.

C. Noncompressible Joint Filler:

1. Type: Dow Chemical's "STYROFOAM 40" rigid closed-cell extruded polystyrene board, square edges, 40 psi (275kPa) compressive strength, ASTM C 578, Type IV.
2. Thickness: As indicated on drawings.
3. Location of Use: As indicated on drawings or required.

D. Asphalt-Impregnated Joint Filler:

1. Type: W.R. Meadows Asphalt Expansion Joint Filler, preformed, ASTM D 994.
2. Thickness: ½" (12mm) maximum, as indicated on drawings or required.
3. Location of Use: Sidewalks at foundation walls and as indicated on drawings or required.

E. Asphalt-impregnated fiberboard expansion joint filler for interior work:

1. Type: ASTM D1751.

- F. Self-expanding cork board expansion joint filler for exterior work:
 - 1. Type: ASTM D1752.
- G. Construction Joints:
 - 1. Type: Tongue and groove type profile of galvanized steel, with knock-out holes at 6" (150mm) on center to receive dowelling, complete with anchorage.

2.5 WATERSTOPS

- A. Preformed Bentonite Waterproofing Strips especially formulated for concrete cold joints at footings, walls, or slabs.
 - 1. Acceptable Products:
 - a. Volclay Waterstop RX by CETCO Building Materials Group, Hoffman Estates, IL
 - b. Adcor ES by W. R. Grace & Co., Cambridge, MA
 - 2. Size: 3/4" (20mm) by 3/8" (10mm) strips minimum, 25 ft. (7.5m) long, and weighing at least 0.165 lbs/ft (0.245kg/m).
 - 3. Location of Use: Concrete cold joints at footings, walls and slab joints.
 - 4. Comply with manufacturer product application and installation instructions.
- B. Polyvinyl Chloride Waterstops:
 - 1. Type: "PVC Waterstops" by Bometals, Inc. Carrollton, GA, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections and directional changes. U.S. Corp of Engineers Specification CRD C 572.
- C. LEED REQUIREMENTS
 - 1. LEED Credit MR 4.1, 4.2: Recycled Content: Minimum 25 percent post-consumer recycled content.
 - 2. LEED Credit MR 5.1, 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally: Reinforcing steel fabrication and milling facility should be within 500 miles (800km) of project site.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Reinforcing Steel Fabrication:
 - 1. Fabricate in accordance with approved shop drawings, ACI 315 and Contract Documents.
 - 2. Heating of Reinforcement: Will be permitted only with specific prior approval of the SER.
 - 3. Welding: Comply with ANSI/AWS D1.4; use E9018 electrodes or approved electrodes.
 - 4. Tolerances: Comply with ACI 117.
 - 5. Unacceptable Materials: Reinforcement with any of following defects will not be permitted in Work.
 - a. Bar lengths, depths, and bends exceeding ACI fabrication tolerances.
 - b. Bends or kinks not indicated on Drawings or final shop drawings.
 - c. Bars with reduced cross-section due to excessive rusting or other cause.

B. Welded Wire Reinforcement:

1. Type: As fabricated in accordance with CRSI, unless otherwise noted.

C. Templates:

1. Required for all footing and column dowels, and where required for proper alignment of reinforcing.

D. Assemblies:

1. Fabricate and assemble structural steel items in shop in conformance with AISC and AWS D1.1. Shearing, flame cutting, and chipping shall be done carefully and accurately. Cut, drill, or punch holes at right angles to the surface of the metal. Do not make or enlarge holes by burning. Holes shall be clean-cut without torn or ragged edges.
2. Welding of deformed bar anchors and headed stud anchors shall be installed by full-fusion process equivalent to TRW Nelson Stud Welding Division or KSM Welding Services Division, Omark Industries.
3. Welding of reinforcement shall be done in accordance with AWS requirements. Welding shall be performed subject to the observance and testing by Owner's Testing Laboratory.
4. Galvanizing where required, shall be applied after fabrication and prior to casting concrete.
5. Welding of crossing bars (tack welding) for assembly of reinforcement is not permitted without use of weldable reinforcement and express written consent of SER.

3.2 INSTALLATION OF REINFORCEMENT

A. General:

1. Perform the work of this section in accordance with approved shop drawings, ACI 318 and CRSI recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as specified.
2. Before placing reinforcement steel, inspect forms for proper fitting and compliance with allowable tolerances.
3. Reinforcement shall be free of form coatings, sealers, powdered and scaled rust, loose mill scale, earth, ice, and other materials which will reduce or destroy bond with concrete.
4. Do not place concrete until the completed reinforcement steel work has been observed and accepted by Owner's Testing Laboratory.
5. Reinforcement steel is not permitted to be "floated into position".
6. Bend bars cold.
 - a. Do not heat or flame cut bars.
 - b. No field bending of bars partially embedded in concrete is permitted, unless specifically approved by the SER and tested by Independent Testing Laboratory for cracks.
7. Weld only as indicated.
 - a. Perform welding per ANSI/AWS D12.1 and/or ANSI/AWS D1.4.
 - b. See structural drawings for additional requirements.
8. Tag reinforcement steel for easy identification.

B. Placement of Reinforcement Bars:

1. Comply with approved shop drawings, ACI 318 and Contract Documents.
2. Accurately position, support and secure reinforcement in a manner to prevent displacement before and during placement of concrete.
 - a. Place reinforcement bars within tolerances specified in ACI 117.
 - b. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, hangers and other accessories for fastening reinforcing bars and welded wire reinforcement in place.
3. If bars are displaced beyond specified tolerance when relocating the bars to avoid interference with other reinforcement or embedded items, notify the Design Professionals for approval prior to concrete placement.
4. Avoid cutting or puncturing vapor retarder during reinforcement placement.
 - a. Repair damages before placing concrete.
5. Concrete Coverage: Maintain concrete cover around reinforcement as indicated on drawings.
6. Bar Supports: Use type specified in this section.
7. Tie Wires: After cutting, turn tie wires to the inside of section and bend so that concrete placement will not force ends to be exposed at face of concrete.

C. Placement of Wire Reinforcement:

1. Install in lengths as long as practicable.
2. Support in position adequately to prevent bending of reinforcement between supports before and during placement of concrete.
3. Overlap the wire reinforcement 6" (150mm) or one panel width + 2" (50mm), whichever is larger.
 - a. Securely tie together with wire.
4. Offset laps of adjoining widths to prevent continuous laps in either direction.
5. Locate wire fabric in the top third of slabs, unless noted otherwise on structural drawings.

D. At Construction Joints:

1. Reinforcement bars and wire reinforcement shall be continuous through construction joints, unless otherwise indicated on Drawings. See Drawings for scheduled lap splices.

E. At Expansion Joints:

1. Reinforcing bars and wire fabric shall NOT be continuous through expansion joints, unless otherwise indicated on drawings.

F. Splicing:

1. Unless otherwise indicated on drawings provide lap splices for bar sizes #11 (Ø36) and smaller by lapping ends, placing bars in contact, and tying tightly with wire in accordance with requirements of ACI 318 for lap lengths indicated on drawings.
2. At all #14 (Ø43) and #18 (Ø57) bars and where mechanical splices are specifically indicated on drawings, comply with requirements specified in this Specification section under "Mechanical Splicing Systems".
3. Do not splice reinforcement except as indicated on structural drawings.
4. Tension couplers may be used and installed per manufacturer's specifications where indicated on drawings or as approved by Engineer.

G. Dowels in Existing Concrete:

1. Install dowels and dowel adhesive in accordance with supplier's recommendations.
2. Minimum embedment length shall be 12 bar diameters, unless noted otherwise.

3.3 INSTALLATION OF ACCESSORIES

- A. Install concrete accessories in accordance with manufacturer's published instructions and Contract Documents.
1. Set and secure embedments, including embedded plates, bearing plates, and anchor bolts, per approved setting drawings and in such a manner to prevent movement during placement of concrete and to allow removal of formwork without damage.
 2. Inspect locations to receive concrete accessories.
 3. Immediately report to the Design Professionals in writing of conditions that will adversely affect the Work or fails to meet Contract Document requirements.
 4. Do not place concrete until reinforcement, accessories and other built-in items have been inspected and accepted by Owner's Testing Laboratory.
- B. Construction and Contraction (Control) Joints:
1. Construction and contraction (control) joints indicated on drawings are mandatory and must not be omitted.
 - a. Provide construction joints in accordance with ACI 318.
 - b. Provide 1-1/2" (40mm) deep key type construction joints at end of each placement for slabs, beams, walls and footings.
 - 1) Bevel forms for easy removal.
 2. Provide waterstops in construction joints as indicated on the Contract Documents in sizes to suit joint.
 3. Install waterstops to form continuous diaphragm in each joint.
 4. Support and protect exposed waterstops during progress of Work.
 5. Field-fabricate joints in waterstops according to manufacturer's printed instructions.
- C. Coordinate the installation of pipes, bolts, hangers, anchors, flashing and other embedded items with the work of other trades.

3.4 FIELD QUALITY CONTROL

- A. General: The Owner's Testing Laboratory shall test and inspect concrete reinforcement and embedded assemblies as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Design Professionals for final acceptance.
- B. Owner's Testing Laboratory shall provide qualified personnel at site to inspect reinforcement and embeds using the latest Drawings and reviewed shop drawings, as follows:
1. Prior to placement, inspect reinforcement and embeds for grade, quality of material, absence of foreign matter, and for suitable storage.
 2. Provide continuous inspection of reinforcement and embedded assemblies during placement and immediately prior to concreting operations for: size, quantity, vertical and horizontal spacing and location, correctness of bends and splices, mechanical splices, clearances, compliance with specified tolerances, security of supports and ties, concrete cover, and absence of foreign matter.
 3. Inspect epoxy-coated reinforcement for coating damage and required applied coatings.

- C. Owner's Testing Laboratory shall submit inspection, observation, and/or test reports to the Design Professionals as required herein and shall provide an evaluation statement in each report stating whether or not concrete reinforcement and embedded assemblies conforms to requirements of Specifications and Drawings and shall specifically note deviations there from.
- D. Immediately report deficiencies to the Contractor. Contractor shall prepare proposed remedy for deficiency. Contractor shall present proposal to the Design Professionals for approval. After an approved proposal is accepted by the Design Professionals, the Contractor shall correct the deficiency at no cost to the Owner.

END OF SECTION

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL

- A. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections

1.2 SCOPE

- A. Provide all labor, materials, equipment, services and transportation required to complete all concrete work as shown on Drawings, as specified herein, and as required by the job conditions. This specification is not intended to address the particular requirements of Architectural Concrete.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- | | |
|---|------------------|
| A. Submittals | Division 1 |
| B. Quality Control | Division 1 |
| C. Concrete Formwork | Section 03 10 00 |
| D. Concrete Reinforcement and Embedded Assemblies | Section 03 20 00 |
| E. Concrete Finishes | Section 03 35 00 |
| F. Structural Steel Framing | Section 05 12 00 |
| G. Metal Fabrications | Section 05 50 00 |
| H. Thermal and Moisture Protection | Division 7 |

1.4 CODES, STANDARDS AND REFERENCES

- A. Building Code: Concrete work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the drawings.
- B. Standards:
 - 1. ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 – Standard Specifications for Structural Concrete.
 - 3. ACI 304 -- Recommended Practice for Measuring, Mixing and Placing Concrete
 - 4. ACI 318 – Building Code Requirements for Structural Concrete.
 - 5. American Concrete Institute "Manual of Concrete Practice", various committee reports as referenced herein, latest edition.
 - 6. American Society for Testing and Materials "ASTM Standards in Building Codes", various standards as referenced herein, latest edition.
 - 7. ASTM C1202 – Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
 - 8. AASHTO T259 – Method of Test for Resistance of Concrete to Chloride Ion Penetration
 - 9. AASHTO T277 – Standard Method of Test for Rapid Determination of the Chloride Permeability of Concrete
 - 10. AASHTO T318 – Standard Method of Test for Water Content of Freshly Mixed Concrete Using Microwave Oven Drying.

11. State of California, Business and Transportation Agency Division of Highways' "Materials Manual," (CMM).

C. References:

1. US Green Building Council (USGBC), www.usgbc.org

D. Definitions:

1. The term "Contract Documents" in this specification is defined as the design drawings and the specifications.
2. The term "SER" in this specification is defined as the Structural Engineer of Record for the structure in its final condition.
3. The term "Design Professionals" in this specification is defined as the Owner's Architect and SER.
4. The term "Contractor" in this specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Concrete Contractor and their sub-contractors.
5. The term "Testing Agency" in this specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing of concrete construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.
6. The terms "for record" and "submit for record" in this specification are defined as Contractor submittals that do not require a response from the Design Professionals.
7. Working Days: Monday through Friday, excluding federal or state holidays.

1.5 CONCRETE CONTRACTOR QUALIFICATIONS

- A. The work of this section shall be performed by a company which specializes in the type of concrete work required for this Project and shall be performed by skilled workmen thoroughly experienced in the necessary crafts.
- B. Contractor's Testing Laboratory Services: Required as specified in Division 1, and herein.
- C. Materials and installed work may require testing and retesting at anytime during progress of work, as directed by Design Professionals. Tests, including retesting of rejected materials for installed work will be done at Contractor's expense.

1.6 SUBMITTALS

- A. Where the SUBMITTALS section of this specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Do not submit items not requested.
 1. Submittal Schedule: The contractor shall submit for approval a schedule at least twenty (20) working days prior to commencing submittals.
 - a. This schedule shall include a list, in order of date to be submitted, of all drawings and other required submittal items scheduled to be submitted. The schedule shall list the proposed submittals for each week, as well as their formats. Once shop drawing submissions have commenced any modification or addition to this schedule must be submitted for approval at least twenty (20) working days before the modification or addition is proposed to take place.
 - b. If at any time the total number of shop drawings received in any one week period exceeds the amount in the approved schedule by more than 10% for that week, the Design Professionals have the right to add two days to the average turnaround time for each 20% increment in excess of the scheduled quantity for that week's submissions. For example if the weekly total exceeds the schedule by 10% to 20%, two days may be added; if it is exceeded by 21%

to 40%, four days may be added. The return dates for subsequent submittals may be extended based on the additional review time stated above

2. The Contractor's Testing Laboratory's certificate of compliance per ASTM E329.
3. Mix Designs: Submit concrete mix designs for each type and strength of concrete required for this Project at least thirty (30) days before placing concrete. The Contractor shall perform test or assemble the necessary data indicating conformance with specifications.
 - a. Mix designs shall be prepared or reviewed by an approved independent testing laboratory retained by the Contractor in accordance with requirements of ACI 301 and ACI 318, signed by a registered design professional licensed to practice as a Professional Engineer in the state where the project is located, and shall be coordinated with design requirements and Contract Documents.
 - b. Before submitting to Owner's Testing Agency, submit complete mix design data for each separate mix to be used on the Project in a single submittal.
 - c. Provide a completed "Concrete Mix Design Submittal Form" (attached to the end of this Specification Section) for each proposed concrete mix.
 - d. Data shall be from the same production facility that will be used for this Project.
 - e. Samples shall be provided only as requested by the Architect.
 - 1) Certification from vendor that samples originate from and are representative of each lot proposed for use.
 - f. Mix Design data shall include but not be limited to the following:
 - 1) Locations on the Project where each mix design is to be used corresponding to Structural General Notes on the Drawings.
 - 2) Design Compressive Strength: As indicated on the Drawings.
 - 3) Proportions: ACI 301 and ACI 318.
 - 4) Gradation and quality of each type of ingredient including fresh (wet) unit weight, aggregates sieve analysis.
 - 5) Water/cementitious material ratio.
 - 6) Certification that portland cement meets Specification requirements.
 - 7) Evaluate and classify fly ash in accordance with ASTM D 5759.
 - 8) Report chemical analysis of fly ash in accordance with ASTM C 311.
 - 9) Classify blast furnace slag in accordance with ASTM C 989.
 - 10) Slump: ASTM C 143.
 - 11) Certification and test results of the total water soluble chloride ion content of the design mix for concrete exposed to sea water, de-icing salts or other sources of chlorides - AASHTO T260 or ASTM C 1218.
 - 12) Air content of freshly mixed concrete by the pressure method, ASTM C 231, or the volumetric method, ASTM C 173.
 - 13) Unit Weight of Concrete: ASTM C 138.
 - 14) Design strength at 28, 56 or 90 days, as indicated on Contract Documents: ASTM C 39.
 - a) Document strength based on basis of previous field experience or trial mixtures per ACI 301. Proportioning by Water-Cement Ratio is not permitted.
 - b) Submit strength test records, mix design materials, conditions, and proportions for concrete used for record of tests, standard deviation calculation, and determination of required average compressive strength. Submitted compression strength test reports shall conform to CBC Section 1905

- c) If early concrete strengths are required, contractor shall submit trial mixture results as required.
 - 15) Test records to support proposed mixtures shall be no more than 12 months old and use current cement and aggregate sources. Test records to establish standard deviation may be older if necessary to have the required number of samples.
 - 16) Manufacturer's product data for each type of admixture.
 - 17) Manufacturer's certification that all admixtures used are compatible with each other.
 - 18) All information indicating compliance with Contract Documents including method of placement and method of curing.
 - 19) Normalweight Concrete: Density per ASTM C 138. Design the mix to produce the strength, modulus of elasticity and density as indicated on the Contract Documents.
 - 20) Certification from a qualified testing agency indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity in accordance with ASTM C 33
- 4. Hot and Cold Weather Procedures: Submit for record to Design Professional's written procedures for placement of concrete in hot and cold weather conditions. Hot and Cold weather are as defined in the Concrete Placement section of this specification.
 - 5. Product Data: Submit product data clearly marked to indicate all technical information which specifies full compliance with this section and Contract Documents, including published application instructions, product characteristics, compatibility and limitations for each of the following:
 - a. Bonding agents.
 - b. Curing compound and liquid sealer densifier. Submit for record to Design Professionals a written statement guaranteeing that the compound will not leave discoloration on concrete to be left exposed, or affect the bond for paint or other applied finishes. Include provision in written statement that in the event of failure of applied finishes to bond to membrane cured concrete, to remove the curing compound and leave suitable surfaces for bonding such finishes.
 - c. Absorptive covers and moisture retaining covers.
 - d. Vapor Retarder: See Division 7, Thermal and Moisture Protection.
 - e. Self-leveling concrete topping.
 - f. Grout: Submittal of Grout not by manufacturers listed herein must be accompanied by independent certification of ASTM C 1107 compliance without modification of standard methods.
 - g. Other products proposed by contractor
 - 6. Submit Concrete Weighmaster affidavit if continuous inspection of batch plant has been waived per Section 1.9 F.
 - 7. Concrete Joint Locations: Submit plans indicating locations and details of construction joints, contraction joints, waterstops, sleeves, embedments, etc that interact with the joints. Contractor to coordinate joint location with reinforcement shop drawings. Reinforcement shop drawings shall indicate additional reinforcement bars where required at construction joints.
 - 8. Joint locations for concrete slabs to receive a terrazzo or similar finish subject to reflective cracking must be coordinated with layout of finish drawings.
 - 9. Preconstruction Survey: Submit for record. Where interface with existing construction occurs, before related shop drawings are prepared survey the existing construction and submit the survey prepared by a professional surveyor employed by the Contractor to the Design Professionals.

10. Survey of Flat Plate or Flat Slab Concrete Floors during construction: Submit for record. Survey requirements are described on Drawings. Based on survey results, SER may propose adjustments to formwork and camber.
11. Survey of As-built Floor Conditions: Submit for Record. Survey and report flatness (F_F), levelness (F_L), and final elevations of finished floors prior to shoring removal. For slabs that include camber, do not test for levelness (F_L). Perform F_F/F_L testing in accordance with ASTM E 1155 requirements.
12. Structural Repairs: Submit procedures and product information.
13. Patching Defective Concrete Finishes: Submit procedures and product information.
14. Hazardous Materials Notification: Submit for Record. In the event no product or material is available that does not contain hazardous materials as determined by the Owner, a "Material Safety Data Sheet" (MSDS) equivalent to OSHA Form 20 shall be submitted for that proposed product or material prior to installation. Submit for Record.

B. Submittal Process

1. Submittal of shop drawings and other submittals by the Contractor shall constitute Contractor's representation that the Contractor has verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each drawing with other drawings and other trades. The Contractor shall place their shop drawing stamp on all submittals confirming the above.
2. Shop drawings: Submit in complete packages so that individual parts and the assembled unit may be reviewed together. This Specification Section and the applicable drawings used in the development of the shop drawings shall be referenced on each shop drawing to facilitate checking.
3. If the Contractor and Design Team agree to process shop drawings electronically, Contractor shall submit one hardcopy and one electronic copy to the SER. The naming convention of each drawing must follow the submittal numbering system and include the submittal number, specification number, revision number and drawing number in the prefix of the drawing name.
4. All modifications or revisions to submittals and shop drawings must be clouded, with an appropriate revision number clearly indicated. The following shall automatically be considered cause for rejection of the modification or revision whether or not the drawing has been approved by the Design Professionals:
 - a. Failure to specifically cloud modifications
 - b. Unapproved revisions to previous submittals
 - c. Unapproved departure from Contract Documents
5. Resubmittals: Completely address previous comments prior to resubmitting a drawing. Resubmit only those drawings that require resubmittal. Do not include new content not previously reviewed.
6. Resubmittals Compensation: The Contractor shall compensate the Design Professionals for submittals that must be reviewed more than twice due to contractors' errors. The Contractor shall compensate the Design Professionals at standard billing rates plus out-of-pocket expenses incurred at cost + 10%.
7. The Contractor shall deliver to the Design Professionals at the completion of the job two (2) copies of the electronic version of the final as-built shop drawings on a CD-ROM or other media acceptable to the Design Professionals.

C. SER Submittal Review

1. The Design Professionals' review and approval of shop drawings and other submittals shall be for general conformance with the design intent of the work and

with the information given in the Contract Documents only and will not in any way relieve the Contractor or the Contractor's Engineer from:

- a. Conforming to the Contract Documents.
 - b. Coordination with other trades.
 - c. Responsibility for all required detailing and proper fitting of construction work.
 - d. The necessity of furnishing material and workmanship required by drawings and specifications which may not be indicated on the shop drawings.
 - e. Control or charge of construction means, methods, techniques, sequences or procedures, for safety precautions and programs in connection with the work.
2. TYPE 1 Stamp - For shop drawings for building elements designed by the SER, the responses on the shop drawing review stamp used by the SER require the following actions:
 - a. APPROVED indicates that the SER has found that the information presented on the shop or erection drawing appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
 - b. APPROVED AS NOTED indicates that the SER requires the shop or erection drawing to be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected shop or erection drawing for record.
 - c. REVISE and RESUBMIT indicates that the SER requires resubmission of the shop or erection drawing after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.
 - d. NOT APPROVED indicates that the shop or erection drawing does not conform to the Contract Documents and must be extensively revised before re-submittal. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.
3. TYPE 2 Stamp - For submittals for building elements which are not designed by the SER but are performance specified, for items that do not form part of the completed structural system but impose loads on the structure, and for construction items or activities which have an effect on the final structure, a second stamp will be used. The responses on the stamp used by the SER require the following actions:
 - a. NO EXCEPTION TAKEN indicates that the SER has found that the information presented on the submittal appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
 - b. EXCEPTIONS NOTED indicates that the SER requires the submittal be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected document for record.
 - c. REJECTED indicates that the SER requires resubmission of the submittal after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed. Contractor

to revise and resubmit until SER response of No Exceptions or Exceptions Noted is received.

D. Substitution Request

1. Requests for any departure from Contract Documents must be submitted in writing by the Contractor and accepted in writing by the Design Professionals, prior to receipt of submittals.
2. All substitutions must be requested using the structural substitution request form included at the end of this section. Acceptance using the structural substitution request form indicates acceptability of the structural concept only. Contractor must submit shop drawings reflecting accepted substitutions for review in accordance with this Specification. The structural substitution request form, even if accepted, does not constitute a change order.
3. Accepted substitutions or modifications shall be coordinated and incorporated in the work at the sole expense of the Contractor.
4. The acceptance by the Design Professionals of a specific and isolated request by the contractor to deviate from these requirements does not constitute a waiving of that requirement for other elements of, or locations in the project, unless specifically addressed as such and permitted by the Design Professionals in writing.
5. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated for the review and/or incorporation of the Contractor-requested substitution, including indirect effects on other portions of the work, the Contractor is responsible for paying for additional work performed by the Design Professionals at the standard billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Owner shall also be compensated by the Contractor.
6. Contractor is responsible for means and methods and any impacts on other portions of the work that may arise from this substitution.

E. Request for Information (RFI)

1. RFIs shall be submitted by the General Contractor or Construction Manager. RFIs submitted by other entities will be returned with no response.
2. Limit RFI to one subject.
3. Submit RFI immediately upon discovery of the need for interpretation or clarification of the Contract Documents. Submit RFI within timeframe so as not to delay the Construction Schedule while allowing the full response time described below.
4. The response time for answering an RFI depends on the category in which it is assigned.
 - a. Upon receipt by the SER, each RFI will be assigned to one of the following categories:
 - 1) No cost clarification
 - 2) Shown in Contract Documents
 - 3) Change to be issued in future document revision
 - 4) Previously answered
 - 5) Information needs to be provided by others.
 - 6) Request for corrective field work
 - 7) Request for substitution
5. RFIs in categories 1, 2, 3, 4 and 5 will be turned around by the SER in number of days referenced in Division 1.
6. RFIs in categories 6 and 7 will be rejected and must be submitted as submittals or requests for substitution.

1.7 STORAGE, HANDLING AND DELIVERY

- A. Comply with General Conditions and Division 1.
- B. Storage:
 - 1. Store materials in accordance with ACI 304R.
 - 2. Store cement and supplementary cementitious materials in weathertight buildings, bins or silos that will exclude moisture and contaminants.
 - 3. Store admixtures to avoid contamination, evaporation, damage, and in accordance with manufacturer's temperature and other recommendations.
 - 4. Keep packaged material in original containers with seals unbroken and labels intact until time of use.
- C. Handling:
 - 1. Handle fine and coarse aggregates as separate ingredients.
 - 2. Arrange aggregate stockpiles to avoid excessive segregation, and prevent contamination with other materials or with other sizes of like aggregates.
 - 3. Do not use frozen or partially frozen aggregates.
 - 4. Allow sand to drain until it has reached relatively uniform moisture content before use.
 - 5. Protect liquid admixtures from freezing and temperature changes that would adversely affect characteristics, and in accordance with manufacturer's recommendations.

1.8 PRE-INSTALLATION CONFERENCE

- A. At least 30 working days prior to the start of concrete construction, the Contractor shall hold a meeting to review the approved concrete mix designs and to determine the procedures for producing proper concrete construction. The Contractor shall notify the Design Professionals of the meeting and require responsible representatives of every party who is concerned with the concrete Work to attend the conference, including but not limited to the following:
 - 1. Contractor.
 - 2. Owner's Testing Agency representative
 - 3. Concrete Subcontractor.
 - 4. Ready-mix concrete producer.
 - 5. Admixture manufacturer(s).
- B. Minutes of the meeting shall be recorded and distributed by the Contractor to all parties concerned within five working days of the meeting. One copy of the minutes shall also be furnished to the following:
 - 1. Design Professionals.
 - 2. Owner's Representative.
- C. The minutes shall include a statement by the concrete contractor and admixture manufacturer(s) indicating that the proposed mix design and placing, finishing, and curing techniques can produce the concrete properties and quality required by these specifications.

1.9 QUALITY ASSURANCE BY OWNER'S TESTING AGENCY

- A. Quality assurance is testing and inspection to assist the Owner in evaluating the Contractor's performance.
- B. Cost: Except as specifically noted otherwise, the testing agencies for quality assurance shall be engaged and paid by the Owner.

- C. Coordination with Owner's Testing Agency: The Contractor shall have sole responsibility for coordinating their work with the testing agency to assure that all test and inspection procedures required by the Contract Documents and Public Agencies are provided. The Contractor shall cooperate fully with the Owner's Testing Agency in the performance of their work and shall provide the following:
1. Information as to time of starting field construction and concrete placement schedule, one week prior to the beginning of the work. This information shall be shared with the Architect.
 2. Site File: At least one copy of each approved shop drawing shall be kept available in the contractor's field office. Drawings not bearing evidence of approval and release for construction by the Design Professionals shall not be kept on the job.
 3. Full and ample means of assistance for testing and inspection of material
 4. Proper facilities, including scaffolding, temporary work platforms, safety equipment etc., for inspection of the work in shop and field
- D. Duties of the Owner's Testing Agency:
1. Reports: The Testing Agency shall prepare daily reports of the concrete work including progress and description/area of work, tests made and results. The daily reports shall be collected and delivered to the Design Professionals and Owner weekly
 2. Rejection: The Owner's Testing Agency has the right to reject any material, at any time, when it is determined that the material or workmanship does not conform to the Contract Documents. The Testing Agency shall report deficiencies to Owner, Design Professionals, and Contractor immediately.
 3. Remedial Work: The Testing Agency shall indicate to the Contractor where remedial work must be performed and will maintain a current list of work not in compliance with the Contract Documents. This list shall be submitted to the Design Professionals and Owner on a weekly basis.
 4. Certification: When all work has been approved by the Testing Agency, the Testing Agency shall certify in a letter to the Design Professionals and Owner that the installation is in accordance with the design and specification requirements.
- E. Source Quality Control
1. The Owner's Testing Agency shall conduct concrete quality evaluations for compliance with Specifications as follows:
 - a. Review and test Contractor's proposed materials and certificates of compliance.
 - b. Review and test Contractor's proposed concrete mix designs.
 - c. Confirm production samples at plants or stockpiles are consistent with approved mix designs. Additionally confirm the following:
 - 1) Test for free water in aggregate
 - 2) Confirm supplier's documentation of compliance with ASTM standards for mix components
 - 3) Aggregates are from a single source throughout the project for exposed concrete
 - 4) Portland Cement is the same brand from a single source
 - d. Take one grab sample for each 100 tons of Portland cement except that, when used in bulk loading ready-mix plants where separate bins for pretested cement are not available, take grab samples for each shipment of cement placed in bin with not less than one sample being taken for each day's pour and subsequently test such samples if required by the Architect.

- e. Test both coarse and fine aggregate by use of solution of sodium or magnesium sulfate, or both whenever in the judgment of the Architect such tests are necessary to determine quality of material. Perform such tests in accordance with ASTM C88. Loss shall not exceed 6-percent of either fine or coarse aggregate. Aggregate failing to comply with this requirement may be used in the Work provided it contains less than 2- percent of shale and other deleterious particles and shows a loss in soundness test of not more than 10-percent when tested in the sodium sulphate solution.
- f. Test for sand equivalent of fine aggregate in accordance with California Test 217.
- g. Test for cleanness value of coarse aggregate in accordance with California Test 227.
- h. Inspect plant prior to any work to verify that batching and mixing operations comply with ASTM C94. This inspection includes at minimum the following:
 - 1) Batch plant shall be certified to comply with the requirements of the National Concrete Ready Mix Association.
 - 2) Ensure equipment and plant will afford accurate weighing, minimize segregation and will efficiently handle all materials to satisfaction of the Architect and the Owner's Testing Agency.
 - 3) Replace at no additional expense equipment the Architect and the Owner's Testing Agency deem inadequate or unsuitable.
 - 4) Plant is equipped with approved metering devices for determining moisture content of fine aggregate.
 - 5) Other plant quality controls are adequate.
- i. Continuously inspect quality and quantity of materials used in transit mixed concrete, in batched aggregates and ready-mixed concrete at mixing plant or other location per CBC Section 1916 and 17 where other materials are measured.

F. Field Quality Assurance

- 1. General: The Owner's Testing Agency shall test and inspect concrete materials and operations as Work progresses. Failure to detect any defective work or material shall not in any way prevent later rejection when such defect is discovered nor shall it obligate the Design Professional for final acceptance. Perform testing in accordance with ACI 318 and CBC Section 1903, 1905, 1916 and 17.
- 2. Owner's Testing Agency is responsible for monitoring concrete placement as follows:
 - a. Owner's Testing Agency shall provide qualified personnel at site to monitor concreting operations as follows:
 - 1) Verify use of required design mix
 - 2) Record location of point of concrete discharge of each batch truck tested, cross referenced to grid lines.
 - 3) Record temperature of concrete at time of placement.
 - 4) Record weather conditions at time of placement, including temperature, wind speed, relative humidity, and precipitation.
 - 5) Record types and amounts of admixtures added to concrete batches, including that added after departure of concrete trucks from batch plant.
 - 6) Record amounts of and monitor dosing of high-range water-reducing admixtures added at site for site-added admixtures and redosing for plant-added admixtures.
 - 7) Record amounts of and monitor dosing of high-range water-reducing admixtures added at site for site-added admixtures and redosing for plant-added admixtures.

- 8) Record amount of water added at the site and verify that total water content does not exceed amount specified in the mix design. Addition of water at the site is subject to prior approval by the Design Professional.
 - 9) Monitor consistency and uniformity of concrete.
 - 10) Monitor preparation for concreting operations, placement of concrete, and subsequent curing period for conformance with Specifications for following procedures:
 - a) Concrete curing.
 - b) Hot weather concreting operations.
 - c) Cold weather concreting operations.
3. Owner's Testing Agency shall conduct tests of concrete as follows:
- a. Testing frequency: Sample sets for all tests listed below of each concrete design mix placed each day shall be taken not less than once a day, nor less than once for each **50** cu.yd. of concrete, nor less than once for each 2500 square feet of surface area for slabs or walls. Additional tests shall be performed if deemed necessary by the Owner's Testing Agency and Design Professionals. Sample all columns, regardless of other frequencies listed above.
 - b. Obtain each test sample from different batches selected on a strictly random basis before commencement of concrete placement. Record location in structure of sampled concrete.
 - c. Determine air content of normal weight concrete in accordance with either ASTM C 231 or ASTM C 138. Determine air content of lightweight concrete in accordance with ASTM C 173.
 - d. Determine unit weight of normal weight concrete in accordance with ASTM C 138 and lightweight concrete in accordance with ASTM C 567.
 - e. For concrete with air content specified in Contract Documents, conduct one test for air content for each strength test required or for every 50 cubic yards of fly ash concrete placed, whichever is less. Test in accordance with ASTM C 173 or ASTM C 231.
 - f. The water content of freshly mixed concrete will be tested on a random basis, a minimum of once per 100 cubic yards or every 5000 square feet of concrete placement, during placement in accordance with AASHTO T 318 for the following concrete types:
 - 1) Architecturally exposed hard troweled slabs
 - 2) Slab to receive a bonded finish floor material
 - 3) Concrete with specified compressive strength exceeding 6000 psi
 - g. Conduct slump tests in accordance with ASTM C 143 and ASTM C172. Take samples for slump test at the point of placement of concrete.
 - h. Conduct slump tests for concrete enhanced with high-range water-reducing admixtures as follows:
 - 1) Concrete with plant added high-range water-reducing admixtures shall be sampled immediately upon arrival at job site. Batches delivered to site with slumps in excess of the range defined in the mix design submittal or with excessive segregation as defined in the ACI Manual of Standard Practice Part I shall be rejected.
 - 2) Concrete with site added high-range water-reducing admixtures shall be sampled immediately upon arrival at job site and after addition of high-

- range water-reducing admixtures for conformance to initial water slump and final slump requirements.
- 3) Concrete shall also be sampled at point of initial discharge for conformance to slump and/or slump-flow requirements. Visually observe slump-flow at point of concrete placement. If slump loss is visually observed to exceed the range specified for mix design, perform additional slump test at point of discharge from concrete pump hose.
- i. Conduct strength tests of concrete as follows:
- 1) Test concrete for required compressive strength in accordance with CBC Section 19056.
 - 2) Secure sample sets in accordance with ASTM C 172.
 - 3) Mold cylinders in accordance with ASTM C 31 and cure under standard moisture and temperature conditions in accordance with ASTM C 31, Section 7 (a). Quantity of cylinders listed below is based on a cylinder size of 4 inch diameter x 8 inches long. If 6 inch diameter by 12 inch long cylinders are used, the total quantity of cylinders may be reduced by one with two cylinders instead of three tested at the age designated for determination of f'_c .
 - 4) Transport specimen cylinders from job to laboratory after cylinders have cured for 24-hours on site.
 - 5) Test cylinders in accordance with ASTM C 39. For specified concrete strength of 10,000 psi and above, cylinders shall be ground and not capped.
 - 6) For 28 day mixes mold six cylinders. Test two cylinders at seven days and three cylinders at 28 days. The 28 day strength shall be the average of the three 28 day cylinders. One cylinder shall be retained in reserve for later testing if required.
 - 7) For 56 day mixes mold seven cylinders. Test one cylinder at seven days, two cylinders at 28 days, and three cylinders at 56 days. The 56 day strength shall be the average of the three 56 day cylinders. One cylinder shall be retained in reserve for later testing if required.
 - 8) For 90 day mixes mold eight cylinders. Test one cylinder at seven days, one at cylinder at 28 days, two cylinders at 56 days, and three cylinders at 90 days. The 90 day strength shall be the average of the three 90 day cylinders. One cylinder shall be retained in reserve for later testing if required.
 - 9) When high early strength concrete is required by contractor, additional cylinders shall be made and tested as required at Contractor's expense.
 - 10) If one cylinder in a test manifests evidence of improper sampling, molding or other damage, discard cylinder and base test results on that of remaining cylinder.
4. Owner's Testing Agency shall evaluate concrete for conformance with Specifications as follows:
- a. Slump:
 - 1) Owner's Testing Agency shall maintain a slump moving average, comprised of the average of all batches or most recent five (5) batches tested, whichever is fewer.
 - b. Strength test:
 - 1) Owner's Testing Agency shall maintain a compressive strength moving average, comprised of three (3) consecutive strength test results, for each mix design used in Work.

- 2) Strength level of concrete will be considered satisfactory provided averages of all sets of three (3) consecutive strength test results (i.e. moving average) equal or exceed specified 28-day strength, and no individual strength test result falls below specified 28-day strength by more than 500 psi.
 - 3) If strength tests fail to meet minimum requirements, concrete represented by such tests shall be considered questionable and shall, if deemed appropriate by the SER, be subject to further evaluation by core testing as specified herein.
 - c. Conduct core tests on questionable concrete in accordance with ACI 318 and ASTM C 42. Contractor to pay the Owner's Testing Agency for the cores.
 - 1) Location of cores shall be coordinated with Design Professionals so as to least impair strength of structure. Before testing cores, discard and replace any that show evidence of having been damaged subsequent to or during removal from structure or which have reinforcement present.
 - 2) Cores from structure exposed to soil or constant moisture in service (e.g. basement walls, retaining walls, slab-on-grade, piers, footings, etc.) shall be tested in a fully saturated condition. Cores for all other concrete may be tested dry. Prior to commencement of coring, verify with Design Professionals whether cores are to be tested wet or dry.
 - 3) Fill core holes with low slump concrete or mortar with a strength equal to or greater than that specified for area cored.
 - d. Concrete in area represented by core test will be considered adequate if average strength of cores is equal to at least 85% of, and if no single core is less than 75% of, specified strength.
 5. Floor flatness and levelness tolerance compliance testing is to be performed within 72 hours of concrete placement by Owner's Testing Agency, and prior to the removal of shores and forms.
- G. Owner's Testing Agency shall submit inspection, observation, and/or test reports to the Owner and Design Professionals, as required herein and shall provide an evaluation statement in each report stating whether or not concrete placement conforms to requirements of Specifications and Drawings and shall specifically note deviations therefrom.
- H. Immediately report deficiencies to the Contractor, Owner and Design Professionals.
- 1.10 QUALITY CONTROL BY CONTRACTOR
- A. The Contractor shall provide a program of quality control to ensure that the minimum standards specified herein are attained. The Contractor shall bear burden of proof that concrete meets minimum requirements.
 - B. The Owner's general review during construction and activities of the Owner's Testing Agency are undertaken to inform the Owner of performance by the Contractor but shall in no way replace or augment the Contractor's quality control program or relieve the Contractor of total responsibility for quality control.
 - C. The Contractor shall immediately report to the Design Professionals any deficiencies in the work which are departures from the Contract Documents. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Design Professionals. After proposed corrective action is accepted by the Design Professionals and Owner, the Contractor shall correct the deficiency at no cost to the Owner.
- 1.11 OBSERVATIONS AND CORRECTIONS BY DESIGN PROFESSIONALS

- A. Review: The Design Professional will observe the construction for general compliance with the provisions of the Contract Documents during various phases of construction.
- B. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated by failure of the Contractor to perform the work in accordance with the Contract Documents, the Contractor is responsible for paying for the additional work at the Design Professionals' standard firm-wide billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Owner shall also be compensated by the Contractor.

1.12 PERMITS AND WARRANTY

- A. Permits: The Contractor shall apply for, procure, renew, maintain, and pay for all permits required by City, State, or other governing authorities, necessary to execute work under this Contract. Contractor shall furnish copies of all permits to the Owner and Design Professionals.
- B. Warranty: Comply with General Conditions, agreeing to repair or replace specified materials or Work that has failed within the warranty period. Failures include but are not limited to the following:
 - 1. Oily, waxy or loose residue which may interfere with the bonding or discoloration of various applied Architectural finish materials.
 - 2. Discoloration of concrete surfaces scheduled to remain exposed as a finish.
 - 3. Areas which show surface failure or defects.
 - 4. Areas which puddle water.
 - 5. Areas which are not properly prepared to receive Architectural finish materials. If necessary, the Contractor, at his own expense, shall have the Owner's Testing Agency perform appropriate tests for bond and discoloration.
 - 6. Patches that become crazed, cracked or sound hollow when tapped.
 - 7. Self-leveling concrete topping that has cracked, spalled and/or not performed in accordance with manufacturer's design criteria.

1.13 LEED REQUIREMENTS

- A. See Division 1 Section "LEED Requirements" for additional LEED requirements.
- B. LEED Submittals
 - 1. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants: Product data for curing compound and sealers that confirm VOC limits are not exceeded.
 - 2. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally – aggregates:
 - a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 - b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - c. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 - d. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.
 - 3. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally – water:

- a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 - b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - c. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
4. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally – cement:
- a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 - b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - c. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
5. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally– supplementary cementitious materials (SCM):
- a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 - b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - c. Product Value: Contractor to indicate dollar value of product containing local/regional materials; include materials cost only.
6. Credit MR 4.1 & 4.2, Recycled Content - Fly ash:
- a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
7. Credit MR 4.1 & 4.2, Recycled Content - Ground Granulated Blast-furnace Slag:
- a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
8. Credit EQ 4.1, 4.2: VOC
- a. Submit Product Data and material safety data sheets stating compliance with VOC limits for Curing and Sealing Compounds. Refer to Division 1/LEED Requirements for additional requirements.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS & PRODUCTION

A. Portland Cement:

- 1. ASTM C150, Type I or Type II

2. ASTM C150, Type III, High-early Strength Portland Cement may be used subject to review and approval of Structural Engineer. The specified 28-day concrete compressive strength shall occur within 7 days for concrete using Type III Portland Cement.
3. ASTM C150, Type V or Type II/V
4. Provide the same brand of Portland Cement from a single source throughout the project, as required to meet Design Professionals' requirements.

B. Aggregates for Normalweight Concrete:

1. ASTM C 33
2. Coarse Aggregates: Crushed stone or gravel with a total water-soluble chloride ion content below 0.02%. It shall be free from oil, organic matter or other deleterious substances and shall not contain more than two percent by weight of shale or cherty material. "Cleanness value shall not be less than 75 when tested per MM Test Method, 227 and conforming to CBC Section 1903A.5
3. Fine Aggregate: Natural sand, or sand prepared from stone or gravel, clean, hard, durable, uncoated and free from silt, loam and clay. Sand equivalent shall be not less than 75 when tested as per ASTM D2419.
4. Combined Aggregate Gradation: Combined aggregate gradation for slabs and other designated concrete shall be 8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100.
5. If the source of aggregates is changed during the Project, the Contractor shall supply test data showing that the new aggregates have a successful history of use with the portland cement used on the job.
6. Provide aggregates from a single source throughout the project for exposed concrete.
7. The acceptability of aggregates for the work will depend on proof that their potential alkali reactivity is not deleterious to the concrete.
8. Do not use fine or coarse aggregates that contain substances that cause spalling.
9. Maximum coarse aggregate size shall conform to the requirements as specified in ACI 301 but shall not exceed the following:
 - a. Size no. 57 for footings, drilled piers and caissons, slabs-on-grade, and mass concrete
 - b. Size no. 67 for all other locations
 - c. Size no. 467 or 457 for non-reinforced concrete at locations noted on drawings.
10. Contractor shall furnish concrete with maximum 3/8" aggregate at no additional cost to the Owner if areas of high reinforcement density require it for placement and consolidation.
11. Frozen aggregates shall not be permitted.

C. Aggregates for Lightweight Concrete:

1. ASTM C 330.
2. Expanded shale type with cleanliness value and sand equivalent not less than 75.
3. Classification of Aggregates: As required to meet Design Professionals' requirements.
4. Provide aggregates from a single source throughout the project for exposed concrete.
5. Aggregate shall contain the minimum absorbed moisture content recommended by the manufacturer for the project prior to batching.
6. Maximum coarse aggregate size shall conform to the requirements as specified in ACI 301 but shall not exceed ¾".

- D. Water: ASTM C 94. Clean, and free from injurious amounts of oil, acids, alkali, salts, organic material, or other deleterious materials.
- E. Supplementary Cementitious Material
 - 1. Fly Ash:
 - a. ASTM C 618, Class C or Class F.
 - b. Shall not be used unless part of an approved mix design.
 - c. Limit Loss on Ignition to 2.5%
 - 2. Ground Granulated Blast-furnace Slag (GGBFS)
 - a. ASTM C 989 Grade 100 or Grade 120.
 - b. Shall not be used unless part of an approved mix design.
 - 3. Silica Fume (Microsilica):
 - a. ASTM C 1240
 - b. Example acceptable products:
 - 1) "Force 10,000"; W.R. Grace & Co.
 - 2) "Eucon MSA"; The Euclid Chemical Co.
 - 3) "Rheomac SF100"; BASF.
 - 4) Sika Corporation "Sikacrete 950 DP"
 - 4. Limit the maximum content of supplementary cementitious materials for concrete exposed to deicing chemicals to values shown in ACI 318, Table 4.2.3
 - 5. The exact percentages used shall be based on successful test placement on site. Resubmit mix design if percentages change based on test placement.
 - 6. The fly ash or natural pozzolan supplier shall have an effective quality control program in place to guard against contamination of the fly ash and assure compliance with specifications.
 - 7. Fly ash and GGBFS used shall be from one source throughout the project. Substitution of sources will be acceptable only if testing of concrete mixes containing the substituted material show similar test results and if the color of concrete produced with the substituted material matches the color of previously poured concrete to the satisfaction of the Architect.
- F. Ready Mixed Concrete:
 - 1. Shall be batch-mixed and transported in accordance with ASTM C 94.

2.2 CONCRETE MIX DESIGN

- A. Concrete Strength:
 - 1. Shall be as indicated on the Structural Drawings
 - 2. Mix shall be designed, tested, and adjusted if necessary in ample time before first concrete is scheduled to be placed.
- B. Concrete Density (Unit Weight):
 - 1. Shall be as indicated on the Structural Drawings.
 - 2. The range for lightweight concrete shall be +/- 3 pcf of the density specified in the General Notes.
- C. Air Entrainment
 - 1. For concrete exposed to freeze/thaw cycles or deicing chemicals, and concrete intended to be watertight, provide entrained air content of 6% ± 1.5%, unless

specified otherwise. This includes, but is not limited to, concrete at the following locations:

- a. Concrete at the exterior of the structure with at least one surface exposed to weather, such as exterior face of grade beams and foundation walls.
 - b. Concrete in parking garages.
 - c. Ramps and loading docks.
2. For lightweight concrete less than 120 pscf density, air content may be up to 7% regardless of exposure condition.
 3. For concrete with a specified compressive strength (f'_c) greater than 5000 psi, required air content may be reduced to $5\% \pm 1.5\%$.
 4. Entrained air content noted above shall occur at point of delivery.
 5. No entrained air content is required in concrete placed in the foundation with no surface exposed to weather.
 6. All interior steel trowel finished, normalweight slabs shall have a maximum air content of 3%.

D. Water-Cementitious Materials (W/cm) Ratio for Normalweight Concrete

1. Unless lower limits are stated in the contract documents, all concrete exposed to freezing and thawing in moist condition and/or required to be watertight or used in slabs-on-grade shall have a maximum W/cm ratio of 0.45.
 - a. Where the above mixes are to be pumped, water-reducing admixture (low- or high-range as required) shall be used.
2. All concrete exposed to deicing salts, brackish water seawater or spray from these sources shall have a maximum W/cm ratio of 0.40.
3. Absent the above conditions, all concrete with required strength of 4000 psi or higher shall have a maximum W/cm ratio of 0.50.
4. The water-cementitious materials ratio shall not exceed values indicated, including any water added to meet specified slump in accordance with the requirements of ASTM C 94.
5. Weight of fly ash or pozzolanic admixtures shall be included with the weight of cementitious materials used to determine the water-cementitious materials ratio.

E. Slump

1. Concrete design mixes shall be proportioned to meet the following slump limitations. Slump should be measured as described in the owner's testing agency responsibilities:
 - a. Concrete without high range water-reducing admixture: 4" +/-1" maximum.
 - b. Concrete for drilled piers: 6" +/-1" maximum.
 - c. Concrete with high range water-reducing admixture: Concrete slump prior to addition of high range water-reducing admixture shall not exceed 3" for normal weight concrete and 4" for lightweight concrete. After addition of water-reducing admixture, the concrete shall have a maximum slump of 9" unless otherwise approved by the SER.

F. Shrinkage Limit

1. Proportion all concrete for a maximum allowable length change of 0.04% measured at 28 days after curing in lime-saturated water for seven days in accordance with ASTM C 157 (using air storage thereafter).

G. Chloride Ion Content

1. The total water-soluble chloride ion content of the mix including all constituents shall not exceed the limits defined in ACI 318 4.4 unless corrosion inhibiting admixtures are added to the mixture to offset the additional chloride.
2. If the specified level of water-soluble chloride ion content cannot be maintained, appropriate level of corrosion inhibiting admixture shall be added to the mix in accordance with the manufacturer's recommendation to offset the excess amount of chloride at no additional cost to the Owner.

H. Durability Requirements

1. Where concrete is noted as "durable" on contract documents, limit chloride ion permeability to [1200] coulombs, when tested at 56 days according to either ASTM C 1218, AASHTO T259, or AASHTO T277.

2.3 ADMIXTURES

A. General:

1. Admixtures specified below can be used only when established in the mix design with Design Professionals' prior written approval.
2. Each admixture approved by Design Professionals shall be used in strict compliance with manufacturer's published instructions.
3. Concrete supplier shall certify all admixtures to be compatible with each other. (See Submittals Section in Part 1)

B. Air Entraining Admixture:

1. ASTM C 260
2. Example acceptable product: BASF "MICRO-AIR" or "MB-AE-90"
3. Example acceptable product: W. R. Grace's "Darex Series" or "Daravair Series"
4. Example acceptable product: Euclid Chemical's "AEA -92 or Air 40"
5. Sika Corporation "Sika Air Series" or "Sika AEA Series"

C. Low-Range Water-Reducing Admixture:

1. ASTM C 494, Type A, non-lignin sulfonate.
2. Example acceptable product: BASF' "POZZOLITH 220-N"
3. Example acceptable product: Euclid Chemical's "EUCON NW" or "EUCON WR 91"
4. Example acceptable product: W. R. Grace's "WRDA' Series or "Zyla" Series
5. Example acceptable product: Sika Corporation "Plastocrete Series"

D. Retarding Admixture:

1. ASTM C 494, Type B
2. Example acceptable product: BASF POZZOLITH 100-XR"
3. Example acceptable product: The Euclid Chemical Company "EUCON RETARDER 100"
4. Example acceptable product: W. R. Grace's "Daratard 17"
5. Example acceptable product: Sika Corporation "Plastiment Series"

E. Non Corrosive Accelerating Admixture:

1. ASTM C 494, Type C
2. Example acceptable product: BASF "POZZUTEC 20
3. Example acceptable product: The Euclid Chemical Company "ACCELGUARD 80", "ACCELGUARD NCA" or "ACCELGUARD 90"
4. Example acceptable product: W. R. Grace's "Daraset" Series, "Polarset", or "DCI"
5. Example acceptable product: Sika Corporation "Sikaset NC" or "Plastocrete 161 FL" or "Sika Rapid-1"

- F. Water-Reducing and Retarding Admixture:
1. ASTM C 494, Type D
 2. Example acceptable product: BASF "POZZOLITH 100-XR"
 3. Example acceptable product: The Euclid Chemical Company "EUCON RETARDER 75" or "EUCON DS"
 4. Example acceptable product: W. R. Grace's "Daratard 17"
 5. Example acceptable product: Sika Corporation "Plastiment Series"
- G. Water-Reducing and Accelerating Admixture:
1. ASTM C 494, Type E
 2. Example acceptable product: BASF "POZZUTEC 20"
 3. Example acceptable product: The Euclid Chemical Company "ACCELGUARD 80" or "ACCELGUARD 90"
 4. Example acceptable product: W. R. Grace's "Libricon NCA"
 5. Example acceptable product: Sika Corporation "Sikaset NC" or "Plastocrete 161 FL"
- H. Mid-Range Water-Reducing Admixture:
1. ASTM C 494, Type A
 2. Example acceptable product: W. R. Grace's "Daracem" or "Mira" Series
 3. Example acceptable Product: Sika Corporation "Sikaplast Series"
 4. Example acceptable Product: Euclid Chemical Company: "Eucon MR" or "Eucon MRX"
- I. High-Range Water-Reducing Admixture (Super-plasticizer):
1. ASTM C 494, Type F
 2. Example acceptable product: BASF "RHEOBUILD 1000" or "GLENIUM SERIES"
 3. Example acceptable product: Euclid Chemical's "EUCON 37" or "PLASTOL SERIES"
 4. Example acceptable product: W. R. Grace's "Daracem" or "ADVA" Series
 5. Example acceptable product: Sika Corporation "Viscocrete Series" or "Sikament Series"
- J. High-Range Water-Reducing and Retarding Admixture (Super-plasticizer):
1. ASTM C 494, Type G
 2. Example acceptable product: The Euclid Chemical Company "EUCON 537"
 3. Example acceptable product: W. R. Grace's "Daracem 100"
- K. Viscosity Modifying Admixture (VMA) for Self-Consolidating Concrete (SCC):
1. Example acceptable product: BASF "Rheomac VMA"
 2. Example acceptable product: Sika Chemical "Sika Stabilizer VMA"
 3. Example acceptable product: W.R. Grace "V-MAR3"
 4. Example acceptable product: "EUCON ABS" or "EUCON WO", The Euclid Chemical Company
 5. Example acceptable product: Sika Corporation "Sika Stabilizer Series"
- L. Corrosion Inhibiting Admixtures:
1. ASTM C 494, Type C, 30% \pm 2% solution of Calcium Nitrite
 2. Example acceptable product: W.R. Grace's "DCI or DCI-S"
 3. Example acceptable product: The Euclid Chemical Company's "EUCON CIA"
 4. Example acceptable product: Sika Chemical "Sika CNI"
- M. Shrinkage Reducing Admixtures:
1. ASTM C 157
 2. Example acceptable product: W.R. Grace's "ECLIPSE 4500", or "ECLIPSE FLOOR"

3. Example acceptable product: The Euclid Chemical Company's "EUCON SRA"
4. Example acceptable product: Sika Corporation "Sika Control 40"

2.4 ADHESIVES

A. Bonding Agent for Cured Concrete:

1. ASTM C 881 Type I and IV, Grade 3, Class B and C.
2. Example acceptable product: BASF "CONCRETSIVE PASTE (LPL)" , Class C Only
3. Example acceptable product: Euclid Chemical's "EUCCO #452 EPOXY SYSTEM".
4. Example acceptable product: Euclid Chemical's "DURALCRETE SERIES".
5. Example acceptable product: Sika Corporation "Sikadur 31 Hi-Mod Gel (1:1 Mix Ratio)"

B. Bonding Agent for Uncured Concrete:

1. ASTM C 881, Type II and V, Grade 2, Class B and C.
2. Example acceptable product: BASF "CONCRETSIVE LIQUID (LPL)" , Class C Only
3. Example acceptable product: Euclid Chemical's "FLEXOCRETE SYSTEM".
4. Example acceptable product: Euclid Chemical's "DURALCRETE SYSTEM".
5. Example acceptable product: Sika Corporation "Sikadur 32 Hi-Mod"

C. Anti-Corrosive Epoxy Cementitious Bonding Compound:

This adhesive shall be a water-based epoxy/cementitious compound for adhesion and corrosion protection of reinforcing members (20 hour maximum open time).

1. Example acceptable products: "DURALPREP AC" by The Euclid Chemical Co.
2. Example acceptable products: "ARMATEC 110" by Sika Chemical Co.

2.5 CURING COMPOUNDS AND SEALERS

A. Interaction with finishes:

1. See architectural drawings for finish material applied over concrete.
2. Use only curing and sealer compounds that are compatible with finish material.
3. Manufacturer's certification is required.
4. Where finish material is liquid rubberized asphalt, use only strippable type curing compound.

B. Curing and Sealing Compound (VOC Compliant, 350 g/l) :

1. ASTM C1315, Type I, Class A and ASTM C 309, Type I, Class A or B
2. Example acceptable product: Euclid Chemical's "Super Diamond Clear VOX"
3. Example acceptable product: Euclid Chemical's "Super Aqua Clear VOX"
4. Example acceptable product: Symons "Kure 1315"
5. Example acceptable product: Sonneborn "Cure & Seal 1515 UV"
6. Example acceptable product: CreteSeal "New Pour CS2000"
7. Liquid type membrane-forming curing compound, clear styrene acrylate type.

C. Curing Compound (Strippable):

1. ASTM C 309, Type I, Class A or B
2. Example acceptable product: Euclid Chemical's "Kurez RC VOX" or "Kurez RC Off".

2.6 SEALERS

A. Surface Sealer:

1. ASTM C 309, Type I, Class A or B, no stearates, no darkening or change of color allowed.
2. Example acceptable product: Euclid Chemical's "DIAMOND CLEAR VOX"
3. Example acceptable product: Sonneborn "Kure-N-Seal W"
4. Example acceptable product: Symons "Spec-Cure C309"

B. Liquid Densifier/Sealer:

1. The liquid densifier compound shall be a silicate based sealer which penetrates concrete surfaces, increases abrasion resistance and provides a "low-sheen" surface that is easy to clean and eases the problem of tire mark removal. The compound must contain a minimum solids content of 20% of which 50% is silicate. No stearates, no darkening or change of color.
2. Example acceptable product: The Euclid Chemical Company "Euco Diamond Hard"
3. Example acceptable product: Sonneborn "Kure-N-Harden"

C. Wax Sealer:

1. Heavy penetrating type as manufactured by approved manufacturer of clear hardener.

2.7 HARDENERS

A. Mineral Aggregate Hardener:

1. The specified mineral aggregate hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a factory-blended mixture of specially processed graded mineral aggregate, selected Portland cement and necessary plasticizing agents
2. Example acceptable product: The Euclid Chemical Company's, "Surflex"
3. Example acceptable product: BASF, "Mastercure"
4. Curing Compound: Euclid Chemical, "Kurex DR VOX" (for use with "Surflex")
5. Curing Compound: BASF, "Masterkure 200W" (for use with "Mastercure")

B. Non-Oxidizing Metallic Hardener:

1. The specified non-oxidizing metallic floor hardener shall be formulated, processed and packaged under stringent quality control at the manufacturer's owned and controlled factory. The hardener shall be a mixture of specially processed non-rusting aggregate, selected Portland Cement and necessary plasticizing agents.
2. Example acceptable product: The Euclid Chemical Company's, "Diamond-Plate"
3. Example acceptable product: BASF, "Lumiplate" (for flat floor applications).
4. Curing Compound: Euclid Chemical, "Kurex DR VOX" (for use with "Diamond-Plate")
5. Curing Compound: BASF, "Masterkure 200 W" (for use with "LumiPlate")

2.8 MISCELLANEOUS CONCRETE PRODUCTS

A. Nonshrink Grout

1. Provide pre-packaged natural aggregate grout, high-precision, nonshrink, ready-to-use, complying with the following requirements:
 - a. See General Notes for grout minimum compressive strength.
 - b. Grout shall conform to ASTM C 1107, Grade B
2. All material used including water, mixer and pre-packaged grout must be initially at the 45°F and 90°F limits when testing is initiated.
3. Example acceptable product: BASF "MASTERFLOW 928"

4. Example acceptable product: Euclid Chemical's "HI-FLOW GROUT"
5. Example acceptable product: Five Star Products "Five Star Grout"
6. Example acceptable product: Sika Chemicals "Sikagrout 328"

B. Self-Leveling Concrete Topping - Underlayment for Interior Applications:

1. Use self-leveling underlayment concrete formulated to level concrete floors without shrinking, cracking or spalling, and capable of being placed from feathered edge to 1" thickness without aggregate in one pour. If greater than 1" thickness is required, aggregate shall be used in accordance with manufacturer's requirements. Appropriate primer shall be utilized for all underlayment applications.
2. Example acceptable product: Ardex Engineered Cements "ARDEX K-15"
3. Example acceptable product: Euclid Chemical's "Flo-Top or Super Flo-Top"
4. Example acceptable product: Sika Corporation "Sika Level Series"

2.9 MISCELLANEOUS PRODUCTS

A. Evaporation Retarder:

1. Example acceptable product: BASF "CONFILM"
2. Example acceptable product: Euclid Chemical "Eucobar".
3. Example acceptable product: Sika Corporation "Sika Film"

B. Moisture-Retaining Covers:

Conforming to ASTM C171. A naturally colored, non-woven polypropylene fabric with a 4-mil non-perforated reflective (white) polyethylene coating containing stabilizers to resist degradation from ultraviolet light. Fabric shall exhibit low permeability and high moisture retention and be fungus resistant.

1. .Hydracure S-16 by PNA Construction Technologies, Inc., Matthews, NC
2. Transguard 4000 by Reef Industries (Armorlon Division), Incorporated, Houston TX

C. Sand Cushion: Clean, manufactured or natural sand.

D. Structural Polystyrene used as Typical Fill

1. Material: Extruded polystyrene foam insulation board.
2. Comply with the requirements of ASTM C 578, Type IV or VI.
3. Compressive strength, 25 psi at 0.1-inch deformation when tested in accordance with ASTM D 1621.
4. Flexural strength, 50 psi, ASTM C 203.
5. Thickness as indicated on drawings.
6. Example acceptable product: Styrofoam Deckmate Plus, The Dow Chemical Company
7. Example acceptable product: FOAMULAR 400, Owens Corning.

E. Structural Polystyrene used as Fill for Wheel Load Applications

1. Material: Rigid cellular polystyrene thermal insulation with closed cells formed by expansion of polystyrene base resin in an extrusion process.
2. Comply with the requirements of ASTM C 578, Type V.
3. Compressive strength, 100 psi, ASTM D 1621.
4. Compressive modulus, min 3700 psi, ASTM D 1621.
5. Flexural strength, 100 psi, ASTM C 203.
6. Thickness as indicated on drawings.
7. Example acceptable product: STYROFOAM Highload 100, The Dow Chemical Company
8. Example acceptable product: FOAMULAR 1000, Owens Corning.

F. Vapor Retarder: See Division 7, Thermal and Moisture Protection

1. [Minimum 15-mil thick polyolefin geomembrane
2. Manufactured with prime virgin resins
3. Water Vapor Retarder: ASTM E 1745, meets or exceeds Class A
4. Water Vapor Transmission Rate: ASTM E 96, 0.008 gr./ft²/hr. or lower
5. Permeance Rating: ASTM E 96, 0.03 perms or lower for new material and after conditioning tests in accordance with applicable sections of ASTM E 154
6. Puncture Resistance: ASTM E 1745, minimum 2400 grams
7. Tensile Strength: ASTM E 1745, minimum 45.0 lbs./in.
8. Example acceptable product: W.R.Grace's "Florprufe 120"
9. Example acceptable product: W. R. Meadows, "Perminator"
10. Example acceptable product: Stego Industry LLC, "Stego Wrap"
11. Example acceptable product: Raven Industries, "Raven Vapor Block 15".]

G. Non-Slip Aggregate:

1. Abrasive aggregate shall be composed of an aluminum oxide abrasive bonded by a vitreous ceramic material. Use hard, homogeneous, non-glazing, rustproof aggregate which is unaffected by moisture or cleaning compounds.
2. Example acceptable product: Euclid Chemical Company "NON-SLIP AGGREGATE"
3. Example acceptable product: "Alundum" by North Company
4. Example acceptable product: Anti-Hydro International "A-H A-2 Emery Shake-On"
5. Example acceptable product: Anti-Hydro International "A-H Alox" by Anti-Hydro International Abrasive

H. Semi Rigid Joint Filler:

1. Example acceptable product: Euclid Chemical "Euco 700"
2. Example acceptable product: Euclid Chemical "Euco QWIKjoint 200"
3. Example acceptable product: Sika Chemical Corporation "Sikadur 51 SL"

I. Dowels:

1. Example acceptable product: Diamond Plate Dowels: PNA's "Diamond Dowel System."

2.10 CONCRETE REPAIR MATERIALS

A. Polymer Repair Mortar

1. The following patching mortars may be used when color match of the adjacent concrete is not required. Prior approval by the Design Professionals is required.
2. Example acceptable products (Horizontal Repairs): "Thin Top Supreme or Tammspatch II" by Euclid Chemical Company (for 1/16" to 3/8" thickness), or "Concrete Top Supreme" (for 3/8" to 2" thickness).
3. Example acceptable products (Horizontal Repairs): "Sikatop 121 Plus" or "Sikatop 122 Plus" by Sika Chemical Corporation.
4. Example acceptable products (Vertical and Overhead Repairs): Verticoat, Verticoat Supreme, or Duraltop gel by Euclid Chemical Corporation
5. Example acceptable products (Vertical and Overhead Repairs): Chemical Corporation's, "Sikatop 123 Plus" by Sika Chemical Corporation.
6. Example acceptable products: Degussa's, "EMACO R" Series.

B. High Strength Flowing Repair Mortar

1. For forming and pouring structural members, or large horizontal repairs, provide the flowable one-part, high strength microsilica modified repair mortar with 3/8" aggregate.
2. The product shall achieve 9000 psi @ 28-days at a 9-inch slump.
3. Prior approval by the Design Professionals is required for cold weather applications
4. Example acceptable product: The Euclid Chemical Company's, "Eucocrete"
5. Example acceptable product: Degussa's, "EMACO S" Series.
6. Example acceptable product: Sika Corporation "Sika Repair 211 SCC Plus"

C. Repair Topping

1. Latex and microsilica modified cementitious mortar topping, which meets or exceeds the bond strength requirements of ASTM C 1059.
2. Resistance to wear: The finished topping shall show a depth of wear of 0.02 mm (0.0079") or less when tested at 28 days with a Chaplin Abrasion Tester.
3. Example acceptable product: The Euclid Chemical Company, "Thin-Top Supreme or Tammspatch II"
4. Example acceptable product: Sika Corporation "Sika Repair 211 SC Plus"

2.11 LEED REQUIREMENTS

- A. LEED Credit MR 5.1, 5.2 Regional Materials, Manufactured & Harvested / Extracted Locally: Extraction and fabrication facility for all aggregates shall be within 500 miles of project site.
- B. LEED Credit MR 4.1, 4.2 Recycled Content: Weight of fly ash or slag is limited to a maximum of 50% of the total cementitious material content for foundations, walls and columns.
- C. Sealers: Products must meet VOC requirements of LEED Credit EQ 4.2. See Division 1, LEED Requirements for additional requirements.
- D. Curing Compounds: Products must meet VOC requirements of LEED Credit EQ 4.2. See Division 1, LEED Requirements for additional requirements.
- E. See Division 1 Section "LEED Requirements" for additional LEED requirements.

PART 3 - EXECUTION

3.1 PREPARATION

A. General:

1. Ensure availability of sufficient labor, equipment and materials to place concrete correctly in accordance with scheduled casting. Verify conveying equipment is clean and properly operating.
2. Confirm that the Architect has reviewed formwork and reinforcing steel and that preparations have been checked with the Project Inspector.
3. Protect finished surfaces adjacent to concrete-receiving places.
4. Clean transportation and handling equipment at frequent intervals and flush thoroughly with water before each day's run. Do not discharge wash water into concrete form.

B. Subgrade:

1. Dampen subgrades not covered with membrane by sprinkling immediately before placing concrete. Do not saturate.
 - a. Omit when subgrade is already damp.

2. Do not place on water-saturated subgrade unless placing can be done without damage to subgrade (surface is stable) and loading the subgrade does not drive free water to the surface.
3. Do not place concrete on frozen ground.
4. Verify depths of depressed slab conditions are correct for delayed finish noted and for proper bonding to concrete.

C. Forms:

1. Coordinate with Section 03 10 00 Concrete Formwork.
2. Verify that construction of formwork is complete and form ties at construction joints are tight.
3. Remove dirt, sawdust, nails and other foreign material from formed space.
4. Dampen wood forms by sprinkling immediately before placing.
5. Cool metal forms by sprinkling immediately before placing.

D. Concrete Accessories:

1. Coordinate with Section 03 10 00 Concrete Formwork.
2. Ensure required reinforcement, inserts, and embedded items are in place.

E. Dewatering:

1. Remove water from concrete formwork.
2. Divert any flowing water to sump and remove by pumping.
3. Refer to Division 1 for additional dewatering requirements.

F. Vapor Retarder Placement:: See Division 7, Thermal and Moisture Protection.

1. [Vapor retarder installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
2. Place vapor retarder under slabs-on-grade in position with longest dimension parallel with direction of pour.
3. Joints: Lap 6" minimum and seal with manufacturer's recommended mastic or pressure-sensitive tape.
4. Prevent damage to moisture barrier.
5. If moisture barrier is damaged, place a piece of moisture barrier over damaged area (6" larger all around) and tape in place with type of tape recommended by moisture barrier manufacturer.
6. Seal laps and intersections of walls with compatible trowel mastic or pressure-sensitive sealing tape.
7. Seal around pipes and other penetrations with compatible trowel mastic.
8. The vapor barrier must be approved prior to concrete placement.]

3.2 JOINTS IN CONCRETE

A. Locate construction and contraction joints as indicated on Drawings and on approved joint location submittal.

1. Do not use contraction joints in framed floors or composite slabs.
2. Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Design Professionals.
3. Coordinate location of construction and contraction joints with locations of joints in finish materials where they exist.
 - a. Construction and contraction joints in slabs or slab on grade with terrazzo finish must be reviewed and approved by the Design Professionals.

B. Construction Joints:

1. Construction joints shall be located within the central third of the span. Any concrete spilling over or through the bulkhead shall be removed at the completion of the pour. All surfaces of the concrete shall have reinforcing extending through the joint.
- 2.
3. Horizontal Joints: Horizontal construction joints other than those shown on the drawings will not be permitted unless approved by the Architect.
- 4.
5. Joint Preparation: Forms shall be removed in time to permit roughening of construction joints of structural members by chipping and wire brushing to remove all loose and foreign material. The joints shall be dampened prior to depositing concrete. Where designated in the Construction Documents, the specified bonding compound shall be applied, and new concrete shall be placed while the bonding grout or epoxy adhesive is still tacky. The anti-corrosive epoxy cementitious adhesive has a 20-hour open time.

C. Isolation Joints:

1. Interrupt structural continuity resulting from bond, reinforcement or keyway at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls and other locations, as indicated.

D. Contraction (Control) Joints in Floor Slabs-on-Grade:

1. Space joints at 36 times slab thickness unless a smaller spacing is indicated on the Drawings, located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
2. Maximum slab area controlled by jointing is 400 square feet.
3. Contraction joints can be provided by sawcuts 1/8" by 1/4 slab depth, formed joints or appropriately detailed construction joints.
4. Sawcuts shall be made as soon as possible after slab finishing as may be safely done without dislodging aggregate or breaking edges. The Soff-Cut saw shall be used to a depth of 1/4 of slab thickness immediately after final finishing. Conventional saw shall be used as soon as possible after final finish without raveling to a depth as indicated on the drawings.
5. Where contraction joints coincide with construction joints, detail joint as indicated on drawings.

E. Joint Fillers: Coordinate with Section 03 20 00 Concrete Reinforcement and Embedded Assemblies and Division 7 requirements.

3.3 MIXING

A. Measurement of Materials: Conforming to ASTM C 94

B. Mixing: All concrete shall be ready-mixed conforming to ASTM C 94 except as follows:

1. Provide concrete materials, proportions and properties as herein specified in lieu of ASTM C 94.
2. Method of mixing shall comply with CBC Section 1905.8.
3. Adjust grading to improve workability; do not add water at batch plant unless otherwise directed.
4. Measure fine and coarse aggregates separately according to approved method that provides accurate control and easy checking.
5. Thoroughly clean concrete equipment before use for architectural concrete mixes to avoid contamination.
6. Use automatic metering dispenser to introduce admixture into mix. Dispenser shall be recommended and calibrated by admixture manufacturer.

7. Water, beyond that required by the mix design, shall not be added at the Project site. Addition of water at the Project site shall be made only in the presence of the Owner's Testing Agency.
 8. Furnish delivery ticket with each load of concrete delivered to the site to the Contractor conforming to the requirements of ASTM C 94.
 9. Mix concrete in transit mixers five minutes immediately prior to discharge in addition to mixing as called for by ACI 304 and ASTM C94.
- C. High range water reducing agents (superplasticizer), if added at the batch plant, may be added again at the Project site.
1. If superplasticizers are added at the batch plant, the concrete mix design must account for the delivery time, workability, finishability, and setting time required on the jobsite for proper placing and finishing procedures.
 2. If the superplasticizer is redosed at the jobsite in air entrained concrete, air content must be checked after mixing.
- D. Discharge of the concrete shall be completed within 1-1/2 hours or before the drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates.

3.4 CONCRETE PLACEMENT

- A. Prior to Concrete Placement:
1. Mechanical vibrators are required and must be available for placing concrete. Ensure availability of spare vibrators in case of failures.
 2. Place no concrete where weather conditions prevent proper finishing and curing.
 3. Remove debris from space to be occupied with concrete.
 4. Notify Design Professionals and Owner's Testing Agency 48 hours prior to starting concrete placement.
 5. Approved mix designs must be maintained on file in Contractor's Field Office.
 6. Reinforcement and accessories shall be in proper locations, clean, free of loose scale, dirt or other foreign coatings that may reduce bond to concrete, and in accordance with Section 03 20 00 and Drawings.
 7. Fog spray forms, reinforcing steel, and subgrade just before pouring concrete.
 8. Do not place concrete having a slump outside of allowable slump range.
 9. Place concrete before initial set has occurred, but in no event after it has been discharged from the mixer more than 30 minutes. All concrete shall be placed upon clean, damp surfaces, free from puddled water, or upon properly consolidated fills, undisturbed soil or lean concrete with a minimum strength of 1500 psi. Placement upon soft mud or dry earth is not permitted.
 10. Unless adequate protection is provided, concrete shall not be placed during rain.
 11. Rain water shall not be allowed to increase mixing water or to damage the surface finish.
 12. Do not use aluminum equipment in placing and finishing concrete.
 13. Keep subgrade moisture uniform without puddles or dry areas.
 14. Place vapor retarder directly below slabs on grade as specified in contract documents.
- B. For Conduits and Pipes Embedded in Concrete:
1. For concrete slab, wall, beam or column, conform to requirements of ACI 318, Chapter 6. For variations from these requirements, submit a written request for Design Professionals' review and response.
 2. Conduits and pipes shall not be embedded in concrete slabs on steel deck without approval of Design Professional.

3. Provide sleeves for pipes passing vertically through concrete.
 4. Do not embed aluminum materials.
 5. Do not cut, bend or displace the reinforcement to facilitate placement of embedded pipes and conduits.
- C. Pumping: Pumping shall be done in strict accordance with ACI 304.2R.
1. The Contractor shall demonstrate that the pumping equipment has a record of satisfactory performance under similar conditions and using a similar mix.
- D. Placing Concrete in Forms:
1. Clean and prepare forms as specified in Section 03 10 00/Concrete Formwork.
 2. Place concrete continuously without interruption between predetermined construction and contraction joints in walls.
 3. Deposit concrete in forms in horizontal layers no deeper than 24" and in a manner to avoid inclined construction joints. Level top surface upon stopping work.
 4. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 5. Avoid free falls in excess of six feet where reinforcement will cause segregation and in typical conditions unless the Architect approves otherwise.
 6. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping.
 - a. Use equipment and procedures for consolidation of concrete in accordance with ACI 309R.
 7. Do not use vibrators to move fresh concrete laterally inside forms from discharge point; shift discharge point as needed.
 8. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine to achieve timely consolidation around reinforcement, embedded items and into corners of forms.
 9. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer.
 10. Do not insert vibrators into lower layers of concrete that have begun to set.
 11. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.
- E. Placing Concrete Slabs:
1. Place concrete continuously without interruption between predetermined construction and contraction joints in floors.
 - a. Place slabs on grade by the long strip cast method. Refer to ACI 302.1R for recommended methods of placement.
 2. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section. Employ mechanical vibrating equipment in accordance with ACI 309R as required to achieve thorough consolidation.
 3. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 4. Bring slab surfaces to correct level with a straightedge and strike off.
 - a. Use highway straight edges, bullfloats or darbies to smooth surface free of humps or hollows.
 - b. Do not disturb slab surfaces prior to beginning finishing operations.
 5. Maintain reinforcing in proper position on chairs during concrete placement.

6. Do not place materials on slabs or impose loads during period of setting.
7. Take precautions to avoid damage to under-slab moisture barrier and displacement of reinforcement and formwork.

F. Placing Concrete on Steel Decks

1. Exercise care during concrete placement on steel decks to prevent concentrated loads or high pile-ups of concrete and to avoid impacts caused by dumping or dropping of concrete on steel decks.
2. Do not use buggies on unprotected areas of deck. If buggies are used to place concrete, furnish and install planked runways to protect deck from damage.

G. Placing Concrete at Construction Joints:

1. To secure full bond at construction joints, horizontal surfaces to receive concrete in a subsequent placement shall be left in a roughened state or intentionally roughened by raking while plastic.
2. Before new concrete is placed in contact, horizontal surfaces of hardened concrete already placed shall be thoroughly cleaned of foreign materials and laitance.
3. Dampen hardened concrete at joints with water where no bonding agents are used. Leave no standing water.
4. Apply specified bonding agent per manufacturer's specifications. Place new concrete while the bonding agent is still tacky.

H. Cold-Weather Placement:

1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306R and as specified in this section.
2. When air temperature has fallen to or is expected to fall below 40°F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50°F, and not more than 80°F, at point of placement.
3. Do not use frozen materials or materials containing ice or snow.
 - a. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
4. Remove frost, snow and ice from forms, reinforcement and other embedments immediately prior to concrete placement.
5. Concrete shall be maintained at temperature no lower than 50 degrees Fahrenheit for minimum 7-day period after placement by means of blanket insulation, heaters, or other methods as approved by the Architect. The Contractor shall keep a record of concrete surface temperature for first 7-days after each pour. This record shall be open to inspection by the Architect.
6. Use only the specified non-corrosive accelerating admixture previously approved as part of the cold weather mixture. Addition of calcium chloride, salt, thiocyanates or admixtures containing more than 0.05 percent chloride ions is not permitted.

I. Hot-Weather Placement:

1. Hot weather is defined as air temperature at the time of delivery, protection and curing which exceeds 90°F or any combination of high temperature, low humidity and/or high wind velocity which causes a rate of evaporation in excess of 0.2 pounds per square feet per hour as determined by ACI 305R.
2. When hot weather conditions exist, place concrete in compliance with ACI 305R and as specified in this section.
3. Cool ingredients before mixing to maintain concrete temperature at time of placement below **[90°F (32°C)]**.

4. Mixing water may be chilled, or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water.
5. Use of liquid nitrogen to cool concrete is Contractor's option.
6. When concrete placement will occur late in the day and reinforcing steel will be heated by the sun, cover reinforcing steel with water-soaked burlap so that steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
7. When concrete operations must be performed in direct sun, wind, high temperatures, low relative humidity, or other adverse placing conditions, the specified evaporation retarder shall be applied one or more times during the finishing operation to prevent plastic cracking.

3.5 CONCRETE FINISHES

A. General:

1. Comply with recommendations for concrete finishing established by ACI 302.1R and ACI 304R.
2. Comply with dimensional tolerance limitations given by ACI 117 except as modified in the Construction Documents.
3. Insure removal of bituminous materials, form release agents, bond breakers, curing compounds if permitted and other materials employed in work of concreting which would otherwise prevent proper application of sealants, liquid waterproofing, and other delayed finishes and treatments.
4. Where cleaning is required, take care not to damage surrounding surfaces or leave residue from cleaning agents.
5. Where fiber reinforcement is used, remove exposed fibers from concrete surface to the satisfaction of the Architect.
6. For shored floor or slab on grade construction: Floor flatness/floor levelness tolerance compliance testing is to be performed prior to the removal of shores and forms but not later than 72 hours of concrete placement by Owner's Testing Agency.
7. See architectural drawings for locations of the various finishes listed below.
8. Comply with slab F_F and F_L values specified below:
 - a. If an individual test section measures less than either of the specified minimum local F_F / F_L numbers, that section may be rejected and remedial measures may be required as specified in CONCRETE SURFACE REPAIRS.
 - b. If the composite value of the test surface measures less than either of the specified overall F_F / F_L numbers, then the entire slab may be rejected and remedial measures may be required.
 - c. F_L numbers shall not apply to unshored slabs or shored slabs with camber.

B. Finish for monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile and other bonded applied cementitious finish flooring material, as indicated on architectural drawings:

1. Scratch Finish. Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and as otherwise indicated.
 - a. Finish surface to overall value of $F_F=20$ and $F_L=15$ and minimum local value of $F_F = 14$ and $F_L=10$ measured according to ASTM E 1155.
 - b. Slope surfaces uniformly to drains where required.
 - c. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.

- C. Finish for monolithic slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, sand-bed terrazzo as indicated on architectural drawings:
1. Float Finish.
 - a. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating.
 - b. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.
 - c. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units.
 - d. Finish surfaces to overall value of $F_F=20$ and $F_L=15$ and minimum local value of $F_F=14$ and $F_L=10$ measured according to ASTM E 1155.
 - e. Cut down high spots and fill low spots.
 - f. Uniformly slope surfaces to drains.
 - g. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- D. Finishes for Pedestrian Sidewalks and Ramps, Exterior Platforms, Steps, as indicated on architectural drawings:
1. Sidewalks and Curbs: Light-to-medium broom finish applied with fiber-bristle broom perpendicular to direction of main traffic route immediately after float finishing.
 2. Ramps: Scored finish as applied perpendicular to direction of main traffic route immediately after float finishing.
 3. Finish surface to overall value of $F_F=20$ and $F_L=15$ and minimum local value of $F_F=14$ and $F_L=10$ measured according to ASTM E 1155.
 4. Texture shall be approved by the Design Professionals from sample panels.
- E. Finish for interior floor slab and stair surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile on thick-set mortar, paint or another thin film-finish coating system, as indicated on architectural drawings:
1. Trowel Finish.
 - a. After floating, begin first trowel-finish operation using a power-driven trowel.
 - b. Begin final troweling when surface produces a ringing sound as trowel is moved over surface.
 - c. The final hand-troweling operation shall result in a smooth surface, free of trowel marks, uniform in texture and appearance.
 - d. Grind smooth any surface defects that would telegraph through applied floor covering system.
 2. Finish surface to overall value of $F_F=25$ and $F_L=20$ and minimum local value of $F_F=17$ and $F_L=14$ measured according to ASTM E 1155.
 3. Floor Slopes: Where drains occur, slope floor slabs uniformly to drains, maintaining scheduled slab thickness.
 4. Floor Edges at Expansion Joints: Tool edges minimum 3/8".
 5. Defects: Remove defects of sufficient magnitude to show through floor covering by grinding.
 6. Floor Hardener: Use only where scheduled and in accordance with manufacturer's published instructions.
 7. Dry Cement: Shall not be used during finishing.
- F. Finish for thin set ceramic tile or thin set epoxy terrazzo, as indicated on architectural drawings:
1. Trowel and Fine Broom Finish:

- a. Apply a trowel finish as specified.
 - b. Immediately follow by slightly scarifying the surface with a fine broom.
 2. Finish surface to overall value of $F_F=30$ and $F_L=20$ and minimum local value of $F_F = 20$ and $F_L=14$ measured according to ASTM E 1155.
- G. Finishes for Parking Garage Deck, Ramps, Loading Docks, Stairs:
1. Highway straight edge immediately after screeding concrete.
 2. Finish surface to overall values of $F_F=20$ and $F_L=15$ and minimum local value of $F_F = 14$ and $F_L=10$ measured according to ASTM E 1155.
 3. For Slabs Not Receiving Deck Coating: Medium broom finish with ridges not to exceed 1/8" in height. Texture shall be as approved by the Design Professionals from sample panels.
 4. For Slabs Scheduled to Receive Deck Coating: Smooth floated finish which must be verified with coating manufacturer before finishing the slab.
 - a. Coordinate with deck coating specified in Division 7.
 5. Auto Ramps: Rough texture applied perpendicular to direction of traffic. Texture shall be as approved by the Design Professionals from sample panels.
 6. Finish stairs to profiles shown with cove at base of risers and radius at top: tool grooves at edge of treads as detailed.
- H. Tolerances at Slab Discontinuities:
Within 2 ft of slab boundaries, construction joints, isolation joints, block-outs, penetrations or other similar discontinuities, where required for travel paths, installation of finishes and partitions, or any other requirements indicated in the contract documents, the following equivalent straightedge tolerances shall apply:
Specified local $F_F = 14$, use 1/4" over 4 ft, no offset greater than 1/16"
Specified local $F_F = 20$, use 1/8" over 4 ft, no offset greater than 1/32"
- I. Dry Shake Finish:
1. Non-slip aggregate where indicated on drawings.
 2. Non-oxidizing metallic hardener on loading docks at a rate of 1.5 lbs. per sq. ft. and in other locations so noted on the drawings.
 3. Mineral aggregate hardener at a rate of 1.2 lbs. per sq. ft. where noted on the drawings.
 4. Final finish type, method and tolerance as applicable by location and use.
 5. Dry shake finish will be applied only where scheduled and in accordance with the manufacturer's published instructions and the methods and procedures agreed upon at the pre-installation conference.
- J. Rough Formed Finish:
1. Acceptable for formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated.
 2. Concrete surface shall have texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4" in height rubber down or chipped off.
- K. Smooth Formed Finish:
1. Required for formed concrete surfaces exposed to view, or scheduled to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or other similar system, as indicated on architectural drawings:
 2. Surface is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

3. Repair and patch tie holes and defects. Remove fins and other projections completely.

L. Smooth Rubbed Finish:

1. "Smooth Rubbed" finish shall consist of a finish free of fins, joint marks smoothed off, blemishes removed and surfaces left smooth and unmarred.
2. Provide smooth rubbed finish to scheduled concrete surfaces, as indicated on architectural drawings, which have received smooth form finish treatment not later than one day after form removal.
3. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced.
 - a. Do not apply cement grout other than that created by the rubbing process.

M. Grout-Cleaned Finish:

1. Provide grout-cleaned finish on scheduled concrete surfaces, as indicated on architectural drawings, that have received smooth-formed finish treatment.
2. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint.
3. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
4. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes.
5. Remove excess grout by scraping and rubbing with clean burlap.
6. Keep surface damp by fog spray for at least 36 hours after rubbing.

N. Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.6 CURING AND PROTECTION

A. Normal Conditions:

1. Protect concrete from premature drying, excessive hot or cold temperature, and damage.
2. After concrete has taken its initial set, care shall be exercised to avoid jarring forms or placing any strain on ends of projecting reinforcement.
3. Concrete shall be kept continuously moist and above 50° for seven days. High early strength concrete usage shall be maintained over 50° for three days. The architect may recommend longer periods based on temperature, wind and humidity conditions.
4. Concrete and concrete patching materials shall be cured according to manufacturers published recommendations.
5. Begin curing as soon as free water has disappeared from concrete surface and finishing has been completed.
6. Comply with CBC Section 1905A.11.
7. Do not permit curing method to affect adversely finishes or treatments applied to finish concrete.
8. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
 - a. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:

- 1) Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Curing compound should be applied at upper end of manufacturer's range of application.
 - 2) Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions.
 - 3) Recoat areas subjected to heavy rainfall within 3 hours after initial application.
 - 4) Maintain continuity of coating and repair damage during curing period.
 - 5) Use curing and sealing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
 - 6) Floors to receive covering shall be cleaned thoroughly using a power scrubber and industrial strength detergent.
 - 7) Hand-brooming and sweeping is not sufficient.
 - 8) Strippable curing compound may be used in lieu of a moist curing method when approved by the Design Professionals.
- b. Provide moist curing by the following methods:
- 1) Keep concrete surface continuously wet by covering with water.
 - 2) Use continuous water-fog spray.
 - 3) Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4" lap over adjacent absorptive covers.
- c. Provide moisture-retaining cover curing as follows:
- 1) Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period using cover material and waterproof tape
9. Cure slabs on grade, concrete toppings, concrete pour strips, supported slabs, walls and columns, not subject to conditions of hot or cold weather concreting, in accordance with ACI 308.
10. Cure surfaces exposed to deicing salts, brackish water, etc, such as loading dock slabs, parking garage slabs and ramps in accordance with ACI 308 recommendations for moist curing.
11. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed.
- a. If forms are removed, continue curing by methods specified above, as applicable.
- B. Cold-Weather Protection:
1. When concrete is placed under conditions of cold weather concreting (defined as a period when the mean daily temperature drops below 40°F for more than 3 successive days), take additional precautions as specified in ACI 306R when placing, curing, monitoring and protecting the fresh concrete.
- C. Hot-Weather Protection:

1. When concrete is placed under conditions of hot weather concreting, provide extra protection of the concrete against excessive placement temperatures and excessive drying throughout the placing and curing operations with an evaporation retarder.
 - a. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
 2. Hot weather curing is required if hot weather conditions occur within a 24-hour period after completion of concrete placement.
- D. Floor surfaces, wherever indicated by weather conditions, shall be sprinkled during the interval between finishing operation and the start of curing to positively ensure against the possibility of surface drying.

3.7 MOCKUPS

1. Provide a mockup approximately 3-foot long by full height, as indicated on the Drawings, of a wall using the form liner specified in Section 03 10 00. Repeat mockup until the Design Consultant approves it. Keep and protect the approved mockup until the work represented by the mockup is completed and approved. Remove mockup when so instructed.

3.8 CONCRETE REPAIRS

- A. Where concrete is under strength, out of line, level or plumb, or shows objectionable cracks, honeycombing, rock pockets, voids, spalling, exposed reinforcement, signs of freezing or is otherwise defective, and, in the Architect's judgment, these defects impair proper strength or appearance of the work, the Architect will require its removal and replacement at the Contractor's expense.
- B. Perform patching and repairs in accordance with ACI 301.
- C. Contractor shall submit patching and repair methods and materials for review by Design Professionals.
- D. When complete, all patches and repairs shall match color and texture of adjoining surfaces.
- E. At surfaces that are exposed to view, prepare test areas at inconspicuous locations for review by design professionals to verify repair color and texture match before proceeding with repair.
- F. Apply all patching and repair materials in accordance with manufacturer's specifications.
- G. Repairing Formed Surfaces:
 1. Immediately after stripping forms, patch all honeycombing, defective joints, voids, etc. before the concrete is thoroughly dry. Compact patching mortar into place and neatly file defective surfaces to produce level, true planes.
 2. Remove all burrs, fins, ledges, bulges and ridges before the concrete is thoroughly dry.
 3. Remove stains from rust, grease and oils, form release agents, etc.
 4. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of the Design Professionals.
 - a. Surface defects, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - b. Chip away defective areas, honeycomb, rock pockets, voids over 1/4" in any dimension and holes left by tie rods and bolts, down to solid concrete but in no case to a depth less than 1" and saw-cut edges to prevent feather edging of fill material. Thoroughly wet surface before placing patching mortar.
 5. Repair concealed formed surfaces, where possible, containing defects that affect the durability of concrete. If defects cannot be repaired, remove and replace concrete.

6. Clean out form tie holes and fill with dry pack mortar or precast cone plugs secured in place with bonding agent.
7. If honeycombing exposes reinforcement, chip to provide clear space at least 3/4" wide all around steel to allow proper bond.

H. Repairing Unformed Surfaces:

1. Depressed and high areas in concrete surfaces which are in excess of specified tolerances shall be leveled or ground-smooth.
 - a. Correct high areas by grinding after concrete has cured at least 14 days. Surface defects include crazing and cracks in excess of 0.01" wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 - b. Correct low areas by applying leveling material. Finish leveling material as specified in this section.
 2. Repair surfaces containing defects that affect durability of concrete.
 - a. Surface defects include crazing and cracks in excess of 0.01" wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 3. Repair defective areas, except random cracks and single holes not exceeding 1" in diameter, by cutting out and replacing with fresh concrete.
 - a. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4" clearance all around.
 4. Contractor shall be responsible for repairing all cracks wider than 0.02" and all cracks wider than 0.01", that occur in a group of at least three cracks within twelve inches, in concrete slabs by epoxy injection or routing and sealing as required by Design Professionals. Use epoxy adhesive, Eucopoxy Injection Resin by The Euclid Chemical Company or Sikadur 35, LV, LPL by the Sika Corporation according to manufacturer's recommendations.
- I. Filling In: Fill in holes and openings left in concrete for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place.

3.9 EVALUATION AND ACCEPTANCE OF CONCRETE

- A. In accordance with ACI 301, except where otherwise specified.
- B. If, at any time during construction, the concrete resulting from the approved mix design deviates from Specification requirements for any reason, such as lack of workability, or insufficient strength, the contractor shall have his laboratory verify the deficiency and modify the mix design, until the specified concrete is obtained. Modified mix to be submitted for approval per Part 1 - SUBMITTALS.

3.10 COORDINATION & CORRECTIVE MEASURES

- A. Conflicts: The contractor shall be solely responsible for errors of detailing, fabrication, and placement of reinforcement steel; placement of inserts and other embedded items; and the structural adequacy of all formwork.
- B. Reimbursement for Additional Services: Should additional work and/or visits be required which are necessitated by failure of the Contractor to perform his work in accordance with the contract documents, or if additional design or drafting time is required for corrective

measures caused by failure to perform in accordance with the contract documents, the Contractor shall reimburse the Architect and Engineer at the rate of direct personnel expense plus 150% overhead plus out-of-pocket traveling expenses incurred.

3.11 CLEAN UP

- A. Perform Work under this Section to keep affected portions of building site neat, clean, and orderly. Remove, immediately upon completion of Work under this Section, surplus materials, rubbish, and equipment associated with or used in performance. Be aware that failure to perform clean-up operations within 24 hours of notice by Architect will be considered adequate grounds for having work done by others at no added expense to the Owner.

END OF SECTION

CONCRETE MIX DESIGN SUBMITTAL FORM

Project:	_____
City:	_____
General Contractor:	_____
Concrete Contractor:	_____
Concrete Strength:	_____
Use/Location on Job:	_____
Supplier's Mix Designation:	_____

Design Mix Information	(Please check one):	<i>Refer to ACI 301 for requirements of data used to substantiate strength calculations.</i>
Field Experience (Based on Standard Deviation Analysis):	_____	
Trial Mixture Test Data:	_____	

Design Characteristics:		
Density:	_____	Pcf
Strength:	_____	Psi (28 day)
Air:	_____	% (specified)

Materials:	Type/Source	Specific Gravity	Weight (lb)	Absolute Vol. (cu. ft.)
Cement:	_____	_____	_____	_____
Fly ash:	_____	_____	_____	_____
Slag (GGBFS)	_____	_____	_____	_____
Microsilica:	_____	_____	_____	_____
Coarse Aggregate:	_____	_____	_____	_____
Fine Aggregate:	_____	_____	_____	_____
Water:	_____	_____	_____	_____
Air:	_____	_____	_____	_____
Other:	_____	_____	_____	_____

TOTAL:
Water/Cementitious Material Ratio (lbs. water / lbs.
cementitious material) =

	27.0 cu. ft.
	%

Admixtures:	Manufacturer	ASTM	Dosage (oz/cwt)
Water Reducer:			
Air Entraining Agent:			
High Range Water Reducer			
Non-corrosive Accelerator:			
Other:			

Slump before HRWR: _____ Inches

Slump after HRWR: _____ Inches

Standard Deviation Analysis (from experience records):

No. of Test Cylinders	
Evaluated:	_____
Standard Deviation:	_____

Required Average Strength f'_{cr}

Average Strength by Tests

Equation Used (ACI Chapter 5)

(Refer to ACI 318 for increased deviation factor when less than 30 tests are available)

TRIAL MIXTURE TEST DATA

Compressive Strength:	Age (days)	Mix #1	Mix #2	Mix #3
	28 [56] [90]	psi	psi	Psi
	28 [56] [90]	psi	psi	Psi
	28 [56] [90]	psi	psi	Psi
	Average	psi	psi	psi
<i>Required Average Strength f'_{cr}</i>				
<i>Average Strength by Tests</i>				
<i>Equation Used (ACI Chapter 5)</i>				

REQUIRED ATTACHMENTS

**PLEASE
CHECK**

Coarse Aggregate Gradation Report	
Fine Aggregate Gradation Report	
Combined Aggregate Gradation Report: (8% - 18% for large top size aggregates (1½ in.) or 8% - 22% for smaller top size aggregates (1 in. or ¾ in.) retained on each sieve below the top size and above the No. 100) (See Section 2.3.B.)	
Fly Ash (or other Supplementary Cementitious Material) Certification	
Concrete Compressive Strength Data or Trial Mixture Test Data	
Admixture Compatibility certification letters	
Chloride Ion Content Certification	
Alkali Aggregate Reactivity Certification	
Shrinkage Test Reports	

SUBMITTED BY:

Name:	
Address:	
Phone no.:	
Main Plant Location:	
Miles from Project:	
Secondary Plant Location:	
Miles from Project:	
Date:	
Certification by Concrete Supplier:	
Signature:	

Structural Substitution Request Form – to be completed by Contractor

Project:		Substitution Request #
Date:		
Requesting Contractor:		Pages Attached (including this form)

1. Description of Requested Substitution:
2. Related Drawings and Specification Sections:
3. Rationale or Benefit Anticipated:
4. Effect on Construction Schedule¹ (check one): ☐ NONE ☐ See Attached
5. Effect on Owner's Cost² attach data (check one): ☐ CREDIT TO OWNER ☐ EXTRA
6. Effect on Construction Documents³ (design work anticipated): ☐ NONE ☐ See Attached
7. Requesting Contractor Agrees to Pay for Design Changes (check): ☐ YES ☐ NO ☐ NOT APPLICABLE
8. Effect on Other Trades⁴:
9. Effect of Substitution on Manufacturer's Warranty (check): ☐ NONE ☐ See Attachment

Signature⁵: _____ Date: _____

Company: _____

General Contractor Signature⁵: _____ Date: _____

Notes:

1. Contractor is responsible for means and methods and any problems that may arise from making the requested substitution.
2. This is **NOT A CHANGE ORDER FORM**. A separate form is required to adjust costs and/or schedules.
3. Contractor is responsible for any design impacts that may arise from this substitution, including redesign efforts.
4. Contractor is responsible for effects on other trades from this substitution;
General Contractor must review and agree effects on other trades are fairly represented in items 4-9.
5. Signature by a person having authority to legally bind his/her company to the above terms.
Otherwise this request is void
6. All items in form must be completed for substitution request to be considered.

Request Review Responses (completed by Architect and/or Engineer(s)):

ACCEPTED	ACCEPTED AS NOTED	REJECTED	INSUFFICIENT DATA TO SUPPORT REQUEST	ENGINEER / ARCH / MEP SIGNATURE	DATE

Engineer/Architects Comments:

SECTION 033300 - LANDSCAPE ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies cast-in-place Landscape Architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes.
- B. Related Sections include the following:
 - 1. Section 01 10 10 - Sustainable Design Requirements.
 - 2. Division 03 Section "Cast-In-Place Concrete" for formwork; material, fabrication, and installation requirements for steel reinforcement; and field quality control.
 - 3. Division 05 Section "Pipe and Tube Railings" for fabrication and installation requirements for pipe and tube railings.
 - 4. Division 31 Section "Site Clearing" for removal limits of trees, shrubs, and other plantings affected by new construction.
 - 5. Division 31 Section "Earth Moving" for building and utility trench excavation, backfilling, compacting and grading requirements, and soil materials.
 - 6. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants in contraction and other joints in cast-in-place Landscape Architectural concrete.
 - 7. Division 32 Section "Decorative Concrete Paving" for Landscape Architectural concrete pavement and flatwork finishes.
 - 8. Division 32 Section "Plants" and "Turf and Grasses" for coordination with adjacent planting areas.
 - 9. Division 32 Section "Planting Irrigation" for coordination with adjacent irrigation systems.
 - 10. Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS": LEED Requirements.

1.3 REFERENCES

- A. US Green Building Council (USGBC), www.usgbc.org

1.4 DEFINITIONS

- A. Cast-in-Place Landscape Architectural Concrete: Exterior formed concrete shown on the Landscape Plans except for walkways requiring special concrete materials, formwork, placement, or finishes to obtain specified Landscape Architectural appearance.
- B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- C. Design Reference Sample: Sample designated by Design Consultant in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place Landscape Architectural concrete.
- D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

1.5 SUBMITTALS

- A. Comply with Section 01330 Submittal Procedures and Section 01 10 10 - Sustainable Design Requirements.
- B. Product Data: Furnish manufacturer's product specifications and installation instructions for the following and for each type of product indicated.
 - 1. Clear sealer
 - 2. Curing agents
 - 3. Dowels
 - 4. Expansion joint filler material
 - 5. Fiber reinforcement
 - 6. Finish retardant
 - 7. Form materials
 - 8. Form release agent
 - 9. Integral color/ color admixture
 - 10. Joint sealant
- C. Product Samples: Submit one pound samples, clearly identified, for each component used to prepare each paving type, including but not limited to:
 - 1. Coarse Aggregate
- D. Design Mixtures: Furnish certified reports of proposed mix design for each type of concrete installation. For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Provide documentation for each paving type specified on Drawings that will enable Owner's Authorized Representative's to better match replaced concrete:
 2. Laboratory and Cement Test Reports: Submit six copies of laboratory test reports for concrete materials and a certificate with each concrete mixer truck, stating mix design, PSI, rating, slump, water and cement quantity, cement/water ration, fine and coarse aggregate and color additives.
 - a. Cement:
 - 1) Manufacturer and plant location.
 - 2) Cement type, i.e. Type I, II, III, or V.
 - b. Admixtures:
 - 1) Manufacturer and plant location.
 - c. Sand:
 - 1) Source and Type.
 - d. Aggregates:
 - 1) Source and Type.
 3. Signed certification from a licensed structural engineer.
- E. Formwork Shop Drawings: Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place Landscape Architectural concrete.
- F. Placement Schedule: Submit concrete placement schedule before start of placement operations. Include locations of each joints including construction joints.
- G. Samples for Verification: Landscape Architectural concrete Samples, cast vertically, approximately 18 by 36 by 2 inches, of finishes, colors, and textures to match design reference sample (if provided). Include Sample sets showing the full range of variations expected in these characteristics.
- H. Qualification Data: For installer.
1. Installer: Provide evidence to indicate successful experience in providing decorative concrete work similar to that specified herein and can demonstrate successful experience through past Project documentation and references.
 2. Experience: Minimum 5 years experience in the installation of patterned concrete paving.
 3. Demonstration of Experience: 10 Projects which have been completed within the past 36 months utilizing similar products, scope and complexity.
 4. Supervision: Perform placement and finishing of concrete work under supervision of a person having a minimum of 5 years of experience in placement and finishing of products specified herein.
 5. Submit qualifications to Owner's Authorized Representative for information purposes. Submit a resume of Project Manager and Superintendent who will be overseeing the Work.

- I. Certification that Design Consultant's Reference panels have been reviewed (if reference panels provided) and that materials and processes provided will achieve intended effects indicated on Design Consultant's Reference panel.
- J. Submittals for above items shall be made in one package. If submittals are judged incomplete or non-responsive to the directions of the Design Consultant after three submissions the Contractor shall be back charged for the Design Consultant's costs to process additional Submittals.
- K. Field quality-control test reports.
- L. Minutes of preinstallation conference.
- M. Delivery slips.
- N. LEED certification product data as specified in Division 1, Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content
 - 2. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally

1.6 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, as documented according to ASTM E 548.
- C. Source Limitations for Cast-in-Place Landscape Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from one manufacturer with resources to provide cast-in-place Landscape Architectural concrete of consistent quality in appearance and physical properties.
- D. The total estimated requirement of architectural aggregate plus anticipated losses and waste shall be procured from one source of supply. The Contractor will assure that the source of supply is adequate to provide, throughout the duration of the project, an aggregate which is uniform in size, color and shape. Should an aggregate be elected in which there is doubt about the quantity of a uniform supply, the Contractor shall require the supplier to remove the entire amount from the pit, mine or river and thoroughly mix and stockpile said aggregate for exclusive use of this project.
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Mockups: Before casting Landscape Architectural concrete, build mockups to verify selections made under sample submittals and to demonstrate typical joints, surface

finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups at the job site, 18" wide x 18" high x 36" min length for each wall type and 36" min length (48" min. length if curved) sample for curbs and headers at the location as directed by Design Consultant.
 2. Build mockups of each cast-in-place Landscape Architectural concrete Type as indicated on Drawings.
 3. Build mockups using identical materials, design mix and methods to be used in the work.
 4. Mix Design: The concrete mix design used to prepare the sample panels shall be identical to that used for the project's landscape architectural concrete
 5. Demonstrate curing, cleaning, and protecting of cast-in-place Landscape Architectural concrete, finishes, and contraction joints, as applicable.
 6. Mockups shall be cured a minimum of 10 days prior to review by the Design Consultant.
 7. In presence of Design Consultant, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
 8. Obtain Design Consultant's approval of mockups before casting Landscape Architectural concrete.
 9. The contractor shall be back charged for the costs of the Design Consultant to review more than two mock up attempts.
 10. Remove mock ups from the job site when directed and dispose legally.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management And Coordination."
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place Landscape Architectural concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Cast-in-place Landscape Architectural concrete subcontractor.
 2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction joints, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place Landscape Architectural concrete.

1.7 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.8 DELIVERY AND HANDLING

- A. Conform to Section 01600 Product Requirements.
- B. Deliver, store, and handle reinforcement to prevent damage.

1.9 REGULATORY REQUIREMENTS

- A. Testing: Slump tests shall be taken to certify compliance with mix design. Slump shall be in accordance
- B. Mix design shall be in accordance with ACI 211-6.with ASTM C 143.
- C. Conform to applicable laws, codes, and regulations required by authorities having jurisdiction over the work.

1.10 SITE CONDITIONS

- A. Do not place concrete when subbase surface temperature is less than 40 degrees F, nor when surface is wet.

1.11 COORDINATION

- A. In accordance with Section 01315.
- B. Ensure that irrigation sleeves, electrical conduit, food cart outlets, and other utility elements are accommodated and as-built located prior to pouring concrete.

1.12 INSPECTION OF SITE

- A. Verify conditions at site affect Work of this Section, and take field measurements as required. Report major discrepancies between Drawings and field dimensions to Owner's Authorized Representative prior to commencing work.

PART 2 - PRODUCTS

2.1 FORMING MATERIALS

- A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for formwork and other form-facing material requirements.
- B. Forms shall be new; no reused or reconditioned forms will be permitted. Forms for landscape architectural concrete shall be built so that they are completely rigid, strong enough to withstand without deflection, movement or leakage, the high hydraulic pressures which result from rapid filling and heavy frequency vibration. Materials shall be new at start of work.
- C. Fasteners shall be formed galvanized steel or other approved non-corrosive steel materials.

- D. Form-Facing Materials for Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlaid plyform, Class I or II. Use for surfaces to have a Plyformed finish.
- E. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will provide surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- F. Rustication Strips: Metal, rigid plastic, or dressed wood with sides beveled and back kerfed; nonstaining; in longest practicable lengths.
- G. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch (6 mm) thick.
- H. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or S, Grade NS, that adheres to form joint substrates.
- I. Form Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.
1. Acceptable Manufacturers:
 - a. W.R. Grace Company "Formfilm"
 - b. Nox-Crete Chemicals, Inc. "Pre-Form"
 - c. Hunt Process Co. "Seal Form-L"
- J. Form-Release Agent: Commercially formulated colorless form-release agent that will not bond with, stain, or adversely affect Landscape Architectural concrete surfaces, that is compatible with the sealer and will not impair subsequent treatments of those surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 2. Final acceptance of form release agent depends on proven performance on mock up panels.
 3. Acceptable Manufacturers:
 - a. Atlas Release (858) 277-2100
- K. Surface Retarder: Chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed concrete surface to depth of reveal specified.
1. Acceptable Manufacturers:
 - a. Top Cast/ Top Face by Grace Products
 - b. Rugasol
- L. Form Ties: Factory-fabricated, As indicated on the Drawings or 1/4" snap ties or for types requiring extra support 3/8" dia she bolts compatible with 1" dia cones. Ties shall be designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

- M. Stripping Gaskets: Resilient rectangular material non-absorbent and non-staining at junctions of formwork and at junctions for forms with columns and beams as required to permit removal and reuse of formwork without damage.
- N. Form Gaskets: 1/8" x 1/2" adhesive backed foam tape.
 - 1. Acceptable Manufacturers:
 - a. Burke Company
 - b. Norton Sealants
 - c. Arlon Co.
- O. Chairs and spacers: Solid plastic of color matching landscape architectural concrete

2.2 STEEL REINFORCEMENT AND ACCESSORIES

- A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."
 - 1. Where legs of wire bar supports contact forms, use gray, all-plastic, CRSI Class 1, gray, plastic-protected or CRSI Class 2, stainless-steel bar supports.

2.3 ABRASIVE STAIR NOSINGS

- A. Repair stair with in contrasting colors, install at all treads and top landing of exterior stairs in compliance with California Building Code requirements to match existing stair nosing.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II gray or white as needed to achieve desired color effect.
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - c. Silica Fume: ASTM C 1240, amorphous silica.
- B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse Aggregate Size: As indicated on the Drawings. Cleanliness value shall not be less than 75 when tested in accordance with California Test 227.

2. Gradation: Uniformly graded.

- C. Normal-Weight Fine Aggregate: ASTM C 33 or ASTM C 144, manufactured or natural sand, from same source for entire Project. Free of materials with deleterious reactivity to alkali in cement. Sand Equivalent shall not be less than 75 when tested in accordance with California Test 217.
- D. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

2.5 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.

2.6 COLOR MATERIALS

- A. Integral Color: Integrally color concrete in colors, blending mixtures and application rates necessary to create colors, gradations, and variations to match Design Consultant's mock-up.
 - 1. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
 - 2. Acceptable Manufacturers:
 - a. As indicated on the Drawings or as selected by the Design Consultant.
 - 3. Color:
 - a. As indicated on the Drawings or as selected by Design Consultant from manufacturer's full range.

2.7 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

1. For integrally colored concrete, curing compound shall be pigmented type approved by color pigment manufacturer.
2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

2.8 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.
 1. Types I and II, non-load bearing]; IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of cast-in-place Landscape Architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 1. Mix design shall be the responsibility of the Contractor.
 2. Contractor shall employ a Testing Laboratory approved by the Design Consultant under the active direction of the Design Consultant, who shall determine mix designs to fulfill the specified requirements for strength, aggregate size and workability of concrete, and such designs shall be used in proportioning structural concrete.
 3. Mix designs shall be submitted to the Design Consultant for review at least 10 days prior to scheduled concrete pour.
 4. Review by the Design Consultant shall not be considered unqualified approval, and shall not relieve the Contractor of his responsibility to furnish concrete of proper consistency and specified strengths.
 5. Provide concrete of the strengths indicated in the structural general notes
- B. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- C. Proportion concrete mixtures as follows:
 1. Compressive Strength (28 Days): As indicated on the Drawings or 3000 psi (20.7 MPa).
 2. Maximum Water-Cementitious Materials Ratio: 0.46.
 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
- D. Cementitious Materials: For cast-in-place Landscape Architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement

according to ACI 301 requirements. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.

- E. Limit water-soluble, chloride-ion content in hardened concrete to [0.06] [0.15] [0.30] [1.00] percent by weight of cement.
- F. Admixtures: Use admixtures according to manufacturer's written instructions.
- G. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.10 CONCRETE MIXING

- A. Ready-Mixed Landscape Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - 1. Clean equipment used to mix and deliver cast-in-place Landscape Architectural concrete to prevent contamination from other concrete.
 - 2. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

- A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for formwork, embedded items, and shoring and reshoring.
- B. The design, engineering and construction of forms shall be the Contractor's responsibility.
- C. Construct forms to shape, lines and dimensions of architectural concrete members. Spacing of studs, ties and other supporting members shall be such to support maximum pressures imposed by the wet concrete (mix). Final concrete surfaces shall conform to tolerances as specified.
- D. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- E. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place Landscape Architectural concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch (3.2 mm)
- F. Fabricate forms to result in cast-in-place Landscape Architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Tolerances: In addition to ACI 117, comply with the following tolerances:
 - 1. Tolerances shall not be cumulative.

2. Variation from plumb for lines and surface of columns, walls, beams and arises:
 - a. In 10' length: 1/8".
 - b. Maximum for entire length: 1/2".
 3. Variation from the level or from the indicated elevations of tops of slabs, beams, and arises:
 - a. Across Top: 1/8".
 - b. In 10' length: 3/16".
 - c. In bay or in 20' length: 1/4".
 - d. Maximum for entire length: 1/2".
 4. Deviation from Round:
 - a. Out of round, 1/4".
- H. Failure to comply with these limits will result in the Contractor, at his expense, filling and/or grinding the sub-standard surfaces, or if this is deemed impossible by the Owner's Representative, then the concrete section shall be removed and reconstructed at no expense to the owner.
- I. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
 2. Do not use rust-stained steel form-facing material.
- J. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- K. Do not chamfer exterior corners and edges of cast-in-place Landscape Architectural concrete.
- L. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.
- M. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Forms shall be tight to prevent concrete loss. Corner chamfer strips are not allowed, making mandatory especially tight well designed corners of the forms. Continuous girts and blocking shall be provided behind plywood butt joints not backed.

- Q. All forms shall be cleaned of extraneous loose material with compressed air, and thoroughly inspected before use. Forms with clips, dents, damaged corners or edges, scratches, gouges or other defects that will transfer to the concrete surface will be discarded. Forms shall be thoroughly wetted just before concrete placement. Have sufficient equipment available to allow for these procedures.
- R. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- S. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.
- T. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

3.2 REINFORCEMENT AND INSERTS

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

3.3 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Schedule form removal to maintain surface appearance that matches approved mockups.
- B. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place Landscape Architectural concrete surfaces.

3.4 JOINTS

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

2. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 3. Space vertical joints in walls as indicated on the Drawings or 16'-0" max. on center as approved by the Design Consultant. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- B. Contraction Joints: Form weakened-plane contraction joints true to line with faces perpendicular to surface plane of cast-in-place Landscape Architectural concrete so strength and appearance of concrete are not impaired, at locations indicated on the Drawings or 8'-0" on center as approved by Design Consultant.
1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- D. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Design Consultant.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.

2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
 4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.
- F. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.6 FINISHES, GENERAL

- A. Landscape Architectural Concrete Finish: Match Design Consultant's design reference sample (if provided), identified and described as indicated, to satisfaction of Design Consultant.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.
- D. Finishes shall match approved sample panel. Provide three varying degrees of etch on the sample panels for review.

3.7 AS-CAST FORMED FINISHES

- A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair and patch tie holes and defects.
- B. Rubbed Finish: Apply the following to smooth-form-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 surrounding concrete. 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.
- C. Buff-Wash Finish: Tamp, float, and trowel surfaces to the required planes. Evenly apply surface retarder to achieve an etch of 1/16" or at the rate approved from the submittal samples. Cover concrete and allow concrete to cure for a time period recommended by the surface retarder manufacturer's instructions - followed by washing the surface with clear water and bristle brush to expose the fines.

3.8 EXPOSED-AGGREGATE FINISHES

- A. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi), apply scrubbed finish. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed. Rinse scrubbed surfaces with clean water. Maintain continuity of finish on each surface or area of Work. Remove only enough concrete mortar from surfaces to match design reference sample or mockup.
- B. High-Pressure Water-Jet Finish: Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of 4500 psi). Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
 - 1. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in reveal projection to match design reference sample or mockup.
- C. Sand-Blast Finish: Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.
 - 1. Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of

Work. Maintain required patterns or variances in depths of blast to match design reference sample or mockup.

2. Abrasive Blasting: Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
3. Use same nozzle, nozzle pressure and blasting technique as used to prepare initial mock-ups. Exercise care to provide even and consistent strokes with air nozzle to minimize pockmarking of paving surface.
4. Cleanup and remove expended sand particles, concrete dust, loose aggregate, and other work-related debris at end of each day's blasting operations.
5. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample or mockup, as follows:
 - a. Brush: Remove cement matrix to dull surface sheen and expose face of fine aggregate; with no significant reveal.
 - b. Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color; with maximum reveal of 1/16 inch.
 - c. Medium: Generally expose coarse aggregate; with slight reveal, a maximum of 1/4 inch.
 - d. Heavy: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter; with reveal range of 1/4 to 1/2 inch.
6. Cleanup and remove expended sand particles, concrete dust, loose aggregate, and other work-related debris at end of each day's blasting operations.

3.9 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to exterior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Site Furnishing Concrete Foundations and Post Foundations: Provide foundations as shown on Drawings.

3.10 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Begin curing cast-in-place Landscape Architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:

1. Moisture Curing: Keep exposed surfaces of cast-in-place Landscape Architectural concrete continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair holes or tears during curing period; use cover material and waterproof tape.
3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.11 FIELD QUALITY CONTROL

- A. General: Comply with Division 03 Section "Cast-In-Place Concrete" for field quality-control requirements.

3.12 REPAIRS, PROTECTION, AND CLEANING

- A. Repair and cure damaged finished surfaces of cast-in-place Landscape Architectural concrete when approved by Design Consultant. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 1. Remove and replace cast-in-place Landscape Architectural concrete that cannot be repaired and cured to Design Consultant's approval.
- B. Protect corners, edges, and surfaces of cast-in-place Landscape Architectural concrete from damage; use guards and barricades.
- C. Protect cast-in-place Landscape Architectural concrete from staining, laitance, and contamination during remainder of construction period.
- D. Clean cast-in-place Landscape Architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
- E. Wash and rinse surfaces according to concrete finish applicator's written recommendations. Protect other Work from staining or damage due to cleaning operations.
 1. Do not use cleaning materials or processes that could change the appearance of cast-in-place Landscape Architectural concrete finishes.

END OF SECTION

SECTION 03 35 00 - CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Finishing formed concrete surfaces and interior concrete flatwork.
 - 2. This Section supplements Section 03 30 00.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. As specified in Section 03 30 00.
- B. Water: Fresh, clean, and free of oil and other materials injurious to concrete.

2.2 CONCRETE FINISHES

- A. TBD.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Joints in flatwork:
 - 1. Set premolded expansion joint strip below finished surface with a slightly tapered, dressed, wood strip, temporarily secured to top of expansion strip to provide space for sealant, or use an extruded plastic strip, approved by the Design Consultant.
 - 2. Install expansion joints in straight or curved lines as indicated within a tolerance not exceeding 1/4 inch in 10 feet.
 - 3. After concrete finishing operations are completed, and concrete is cured, fill void formed by the strip with sealant as specified in Section 07 92 00. Provide joints where indicated and in all cases where concrete flatwork abuts vertical elements such as walls, columns and curbs.

3.2 GENERAL REQUIREMENTS

- A. Finish concrete surfaces to produce a uniform appearance throughout area involved and throughout adjacent areas with the same treatment.
- B. Where concrete finishing occurs adjacent to finished metal and similar surfaces, particularly where serrated or indented surfaces occur, remove all traces of cement film before allowing concrete to harden.
- C. Use no troweling machines within 12-inch of electrical junction and outlet boxes set to finish flush with concrete floors.
 - 1. Float and trowel such areas by hand with wood floats and steel trowels, using caution so that concrete is finished flush with box cover and matches adjacent surfaces.

D. Concrete stairs:

1. As soon as concrete is set up sufficiently to permit working, remove riser forms and finish treads and risers in a continuous operation, working from top to bottom.
2. Slope treads 1/8-inch from base of riser to nosing, run nosings straight and level to template.
3. Finish nosings and coves at junction of treads and vertical surfaces to a uniform profile throughout. Where abrasive nosings are indicated, embed them in the fresh concrete, level and centered on the tread.

E. Concrete finish will be considered defective and shall be repaired, when the repairs are acceptable to the Design Consultant, or removed and replaced with proper work conforming to Contract Documents, at no additional cost to City, when:

1. It does not match approved sample panels.
2. It is not true to lines and planes.
3. It is not properly troweled and surfaced as required, and varies in excess of tolerances specified.
4. Is scuffed or has a rough surface, except where required.
5. Does not connect properly to adjoining work.
6. Does not slope consistently to drains (has bird baths).
7. Is not properly cured.

3.3 MARKINGS

- A. At control joints and elsewhere as indicated, provide markings with a rounded edging or marking tool, to a 1/4 inch radius. In textured work, edge and mark with a combination edging and smoothing tool approximately 1-1/2 inch wide.
- B. Make markings within a tolerance not exceeding 1/4 inch in 10 feet.
- C. Where indicated, provide cut markings sawn into surface of cured concrete. Coordinate this work with the work of other Sections to avoid damage to adjacent surfaces.
- D. Complete sawcutting within 16 hours after casting.
- E. Use sawcutting equipment specifically designed to cut 1/8-inch wide joints crisp, sharp, unchipped edges in newly cast concrete. Use cutting machine with a high speed (10,000 rpm minimum), self propelling without forcing the speed, with a 4-inch blade specially made for green concrete. Equipment and blades made by Soff-Cut Corp., Corona, CA, or equal that will provide similar results.
- F. Make marking lines straight, or curved where required by the Drawings, equally spaced and parallel to adjacent lines and walls, edges and other construction, and of uniform depth and cross section, with intersections accurately formed. Continue markings to vertical surfaces interrupting the flatwork.

3.4 BUILT-IN ITEMS

- A. Set items furnished under this or other Sections and finish to floor fixtures and other floor features as indicated. Adjust finish to properly connect and fit to other work. Slope floor to drain where indicated.
- B. Floor drains and other items furnished and installed under other Sections: Finish concrete surface flush with rims unless detailed otherwise.
- C. Exercise particular care with respect to drains to ascertain that they are installed at proper elevations to permit drainage. Do not proceed until corrective work is performed and accepted.

3.5 FINISHING FORMED SURFACES

A. TBD.

3.6 FLATWORK FINISHES

A. TBD.

END OF SECTION

SECTION 03 45 00 - PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access panels not provided by other trades, but required for access to concealed equipment and assemblies.
 - 1. Design/build exterior precast concrete planks at amphitheater seating.
 - 2. Precast concrete countertops.
 - 3. Miscellaneous support, fasteners, and anchors.
 - 4. Sealing joints between precast concrete units.
- B. Work furnished but installed in other Sections: Division 03 for embeds to be cast in cast-in-place concrete.
- C. Related Requirements:
 - 1. Division 01 for LEED requirements
 - 2. Divisions 03 and 32 for all other concrete work.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Design requirements:
 - 1. Structural performance: Provide precast architectural concrete planks and connections capable of withstanding the following design loads within limits and under conditions indicated and specified without permanent damage to the precast units and the supporting structure.
 - a. Dead loads: [****].
 - b. Live loads: [****].
 - c. Seismic loads: applicable earthquake design data including seismic coefficient and importance factor.

1.4 SUBMITTALS

- A. Data:
 - 1. Manufacturer product data listing all materials used in the precast concrete units together with evidence of compliance with accepted industry standards such as ANSI and ASTM.
 - 2. Data stating that form release agent will not stain the concrete surfaces and will not adversely affect the bond of subsequently applied finishes.
 - 3. Data for admixtures.

- B. Shop drawings:
 - 1. Show plan, elevation and section of each unit, fabrication details, unit identification marks, reinforcement, connection details, dimensions and relationship to adjacent material in sufficient detail to cover manufacture, handling and erection.
 - 2. Show location and details of anchorage devices to be embedded in other construction. Furnish templates, if required, for accurate placement.
 - a. Include erection procedure for precast units, sequence of erection, and erection tolerances.
 - b. Show sealant joints, including expansion joints. Identify sealants by make and number and/or name.
- C. Preliminary samples: Prior to fabrication of the full size sample units, submit 2-foot square plank and countertop samples for Architect's preliminary approval of texture, color and finish.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.5 QUALITY ASSURANCE:

- A. Quality control testing and inspection reports:
 - 1. Reports for the specified Source Quality Control and Field Quality Control inspections and tests.
 - 2. Include water absorption test reports for units.
- B. Design data: Provide complete structural engineering design calculations, including loads imposed on structure, prepared, signed and sealed by a California-licensed structural engineer.
 - 1. Submit calculations for design modifications required to meet field conditions. Only the loading of the structure at the connections will be reviewed.
 - 2. Certificate from design engineer that he has visited the site and that to the best of his information, knowledge and belief, the precast units have been installed in accordance with his design.
- C. Admixtures: Certified test results and manufacturer's statements verifying that each admixture to be used in the work complies with specified requirements and is non-corrosive based on acceptable long-term testing.
- D. Calculations:
 - 1. Signed by the design engineer to demonstrate compliance of the assemblies with these Specifications and governing Building Code.
 - 2. Submit calculations for design modifications required to meet field conditions. Only the loading of the structure at the connections will be reviewed.
- E. Mixes:

1. Proposed concrete mixes, and materials and cylinder test results to verify the fabricator's quality control procedures.
 2. Written report for each type of mix design, with test reports and testing agency evaluation. Include product data for all admixtures.
 3. Do not begin precast concrete production until the Architect has reviewed mixes and evaluations.
- F. Record drawings: Revise the original approved shop and erection drawings to correspond with changes made in the field.
- G. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content
 2. Credit MR 5.1, Regional Materials, Manufactured Locally
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally
 4. Credit MR 6, Rapidly Renewable Materials
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants
- 1.6 QUALITY ASSURANCE
- A. Manufacturer's qualifications:
1. Certified by the Precast/Prestressed Concrete Institute Plant Certification Program at time of bidding. Certification shall be in Group A1. Firm shall have 10 years demonstrated capability to produce precast concrete products of the quality and complexity specified and indicated.
 2. Manufacturer must be able to show that it has experienced personnel, physical facilities, established quality control procedures, and a management capability sufficient to execute the work shown on the Drawings and specified herein.
 3. When requested by the Architect, obtain from the manufacturer written evidence of the above requirements and submit same to the Architect.
- B. Design engineer qualifications: Professional structural engineer licensed to practice in California, and experienced in providing engineering services that have resulted in successful installation of architectural precast concrete units similar in material, design, and extent as indicated.
- C. Plank sample unit:
1. The first unit of the plank production run will be used as a sample unit and must be approved by the Architect at the precast plant before similar unit fabrication proceeds.
 2. Repeat sample unit when the first one is not satisfactory.
 3. The approved unit can be used in the Work and will be used as a standard of quality. Clearly identify approved units on backside.
- D. Engineering:
1. Contractor is responsible for the engineering of the units and their attachment to the building structure, and for obtaining approval of authorities having jurisdiction, and paying costs and fees therefore.
 2. Engineer units to comply, as a minimum, with the performance criteria specified.
 3. Engineering shall be performed by a California-licensed professional engineer.

1.7 HANDLING

A. Transport:

1. With equipment which will protect units from staining and damage.
2. Do not place precast units on ground.

B. Storage:

1. Store precast units to protect them from contact with soil and from other damage, in same position as transported, with non-staining, resilient supports located in same positions as when transported.
2. Store precast units on firm, level, and smooth surfaces so that identification marks are visible.

C. Handling: Lift and support units at designated lift points only.

1.8 COORDINATION

A. Design and fabrication:

1. Prepare precast units as required attachment of anchoring devices.
2. Install precast-embedded items as required and supplied by other trades, and incorporate openings in units as required for penetrations and other work.
3. Coordinate this work with the work of other trades for attachments and other requirements.

B. Pre-erection:

1. Provide precast-embedded unit connection hardware, and furnish unit connection hardware to be welded to primary structure and embedded in cast-in-place concrete.
2. Supply drawings, templates, and/or instructions to jobsite as necessary for proper setting of items embedded in cast-in-place concrete.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. One of the following, or equal:

1. Clark Pacific.
2. Willis Construction Co., Inc.
3. Walters & Wolf.
4. Coreslab Structures.
5. Stepstone, Inc.
6. Syndesis, Inc.
7. Or equal.

2.2 REINFORCEMENT

- A. Reinforcing bars: ASTM A 615, grade selected by the manufacturer.
- B. Steel wire: ASTM A 82, plain, cold-drawn, steel.
- C. Welded wire fabric: ASTM A 185.
- D. Supports for reinforcement:
 - 1. Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing, complying with CRSI recommendations.
 - 2. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with plastic-coated legs of the same color as the precast units.

2.3 CONCRETE MATERIALS

- A. Portland cement:
 - 1. General: Where surfaces are exposed in final construction, each exposed surface shall be finished to match the Architect's control sample, regardless of location.
 - 2. Face mix: White Portland cement complying with ASTM A 150, Type I or III. Use only one brand and type of cement throughout the Project, same as in approved sample panel.
 - 3. Back-up mix: Same as above, except may be gray.
- B. Aggregates:
 - 1. ASTM C 33, non-reactive with other concrete materials. For face mix, match color of aggregates of approved sample panel.
 - 2. Provide aggregates from a single source for all concrete.
 - 3. Do not use aggregate larger than 1/5 of the narrowest dimension between sides of forms, nor 3/4 of the minimum clear spacing between individual reinforcing bars or bundles of bars.
- C. Water: Potable, fresh.
- D. Coloring pigments: Mineral oxide or carbon black harmless to concrete set and strength, stable at high temperature and in sunlight, and alkali-fast.
- E. Admixtures: Selected by the manufacturer but subject to the Architect's approval.
- F. For precast concrete countertops: Syndecrete, or equal.

2.4 CONNECTION MATERIALS

- A. Steel plates: Structural quality, hot-rolled carbon steel, ASTM A 283, Grade C.
- B. Steel shapes: ASTM A 36.
- C. Anchor bolts: ASTM A 307, regular hexagon nuts and carbon steel washers.
- D. Finish of steel units: Galvanized in compliance with ASTM A 153, or cleaned to bright metal and shop coated with zinc-rich coating specified applied to a minimum dry film thickness of 8 mils.

2.5 FORM MATERIALS

- A. Forms, and where required form facing materials, of metal, plastic, wood or other acceptable materials that are non-reactive with concrete and will produce the required finish surfaces.

2.6 ACCESSORIES

- A. Bearing pads: As selected by the manufacturer, or installer, subject to the Architect's approval.
- B. Grout:
 - 1. Cement grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 440.
 - 2. Premixed, non-shrink grout: ASTM C 1107.
- C. Shim stock:
 - 1. Forward of back face of units: Non-ferrous metal or stainless steel.
 - 2. All others: Non-ferrous metal or galvanized steel.
- D. Clips, hangers, and other accessories: As required for installation of precast units and for support of construction or finishes attached to, or supported by precast units.
- E. Zinc-rich metal primer: 2-component, solvent based, inorganic ethyl silicate zinc coating with minimum 75 percent zinc content in dry film.
- F. Zinc-rich primer to touchup damaged galvanized surfaces: One-component, solvent based, zinc rich coating. Minimum 73 percent content in dry film.
- G. Epoxy adhesive: 2-part waterproof, UV stable, non-shrink, polyester, epoxy or urethane adhesive compound which will not induce or support mildew and fungus growth, by Akemi North America, Bonstone Materials Corp., Laticrete International, or equal.
- H. Sealants: As specified in Section 07 92 00.

2.7 PROPORTIONING AND DESIGN OF MIXES

- A. Design mixes for each type of concrete specified shall be prepared by an independent testing agency or by an architectural precast manufacturing plant at precast fabricator's option.
- B. Proportion mixes by either testing agency trial batch or field test data methods in accordance with ACI 211.1, using materials to be used on the Project, to provide normal weight concrete with properties as follows:
 - 1. Compressive strength: 5,000 psi when tested in accordance with ASTM C 39.
 - 2. Maximum water cement ratio 0.40 at point of placement.
 - 3. Air-entrainment admixture to result in air content at point of placement complying with ACI requirements.
 - 4. Water absorption maximum 6 percent by weight when tested in accordance with ASTM C 642.
- C. Facing and back-up mixes shall be designed and placed so as to result in a single, monolithic construction of units.
- D. After production is started, do not change mix design without Architect's authorization.

2.8 FABRICATION

A. General:

1. Manufacture precast concrete units indoors, in compliance with approved shop drawings and to match approved mockups.
2. Fabricate precast concrete units complying with the manufacturing and testing procedures, quality control recommendations, and dimensional tolerances of PCI MNL-117, and as specified for the type of units required.
3. Place welded wire fabric and reinforcing bars of sizes and spacings to resist shrinkage, temperature, and handling stresses and to achieve design requirements.

B. Cast-in anchors, inserts, plates, angles, and other anchorage hardware:

1. Fabricate anchorage hardware with sufficient embedment to comply with design requirements.
2. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
3. Furnish loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast concrete units to supporting and adjacent construction.
4. Locate handling/lifting inserts to be invisible in the Work, after indicated finishes are installed, and inboard of all primary and secondary sealant joints. Patching of inserts on exposed plank faces is not permitted.
5. Cast-in reglets, slots, holes, and other accessories in precast architectural concrete units to receive work by others as indicated.
6. Do not relocate bearing plates in units unless acceptable to Architect.

C. Cast-in holes for openings in compliance with final shop drawings; coordinate this work with other trades when necessary.

D. Mix concrete as specified in Section 03 30 00.

E. Forms:

1. Accurately construct forms, mortar-tight, and of sufficient strength to withstand the pressures due to concrete placement, consolidation, finishing temperature changes, and de-forming, without objectionable deflection and failures.
2. Maintain forms to provide completed precast units of the shapes, lines, and dimensions indicated, within the specified fabrication tolerances. Coat surfaces of forms with a bond-breaking compound before reinforcement is placed.
3. Coat forms with compound that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces requiring bond or adhesion. Apply coating in compliance with its manufacturer's instructions.

F. Reinforcement: Comply with recommendations in CRSI's "Manual of Standard Practice" and PCI MNL 117 for fabricating, placing, and supporting reinforcement.

1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
3. Place reinforcement to maintain at least 3/4-inch minimum coverage. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.

4. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

G. Placing concrete:

1. Place concrete in a continuous operation to prevent the formation of seams or planes of weakness in precast units. Comply with ACI 304. Do not add water after concrete batching.
2. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with PCI MNL 117.

H. Identification:

1. Identify units with permanent mark to identify pick-up points and orientation in the structure.
2. Comply with the markings indicated on the final shop drawings.
3. Imprint the date of casting on each precast unit where it will not show in the finished structure.

I. Curing: Cure units by low-pressure steam, by steam vapor, by radiant heat and moisture, or other similar process to accelerate concrete hardening and to reduce the curing time.

J. Finish:

1. Surfaces to be concealed in the Work: Normal plant-run-finish produced in forms that impart a smooth finish to the concrete. Small surface holes caused by air bubbles, normal form joint marks, and minor chips and spalls will be tolerated, but no major or unsightly imperfections, honeycomb, or structural defects will be permitted.
2. Exposed surfaces: Match Architect's control samples and approved mockup.

K. Fabrication tolerances: Fabricate precast architectural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished precast unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

2.9 FABRICATOR'S TESTING LABORATORY

A. General: In addition to requirements of the Contractor's quality control program, conduct the following inspection tests and submit reports of the results.

B. Compression tests: In accordance with ASTM C 31 and C 39.

1. Sample at point of deposit. Every 50 cubic yard or fraction thereof.
2. Make one set of 3 cylinders from a single concrete in same manner as precast element, and test at transfer strength age.
3. Cure 2 cylinders in laboratory, and test at the age of 28 days.

C. Air content test, ASTM C 173, air-entrained concrete: First batch and every 10th batch thereafter.

D. Slump test, ASTM C 143: First batch each day, each sample for cylinders, and as often as necessary thereafter. Provide a slump cone and rod available at all times.

E. Compression test reports: In addition to reporting as outlined in ASTM C 39, present the following data in tabular form and distribute immediately after recording the test results.

1. Project name, Contractor, supplier.

2. Identity of mixes and required strength.
3. Identity of elements cast with sampled, air temperature, concrete temperature, and consistency.
4. Slump, air content, time and date samples, air temperature, concrete temperature, consistency.
5. Curing history.
6. Date cast, date tested, and age.
7. Compressive strength.
8. Type of fracture.
9. Compliance with Specifications (yes or no).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine bearing surfaces, inserts and adjacent construction for conditions that would adversely affect this work.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Lift, place, and secure units in compliance with their manufacturer's instructions and final shop drawings, keeping units tight and perpendicular to bearing supports.
- B. Set units straight, level, plumb, and square within the tolerances specified. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
- C. Do not install damaged units.
- D. Do not install units until supporting members are in place and secured.
- E. Shore members during erection where necessary to minimize camber between adjacent units.
- F. Lift units so as not to cause damage, distortion or undue stresses in the assemblies. Comply with manufacturer's directions.
- G. Set units dry, without mortar, attaining specified joint width with lead, plastic, or hot-dip galvanized steel spacers.
- H. Remove projecting hoisting devices and use sand-cement grout to fill voids within recessed hoisting devices flush with surface of concrete.
- I. Fastening:
 1. Fasten units in place in accordance with the approved shop drawings.
 2. Tighten bolted connections with equal torque.
 3. Secure bolts with lockwashers or tack-weld nut to bolt.
 4. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts.
 5. Provide temporary erection anchorage for welded connections.
- J. Install flexible bearing pads where necessary, as precast units are being erected. Set pads on level, uniform bearing surfaces and maintain in correct position until precast units are placed.
- K. Weld in compliance with AWS D1.1 and D1.4, including qualification of welders. Protect units from damage by field welding. Provide non-combustible shields where required.
- L. Repair damaged primer and galvanizing of steel surfaces by cleaning to bright metal and applying a coat of zinc-rich paint.

- M. Remove shims and spacers from joints after units are permanently anchored but before installing sealant. Seal joints between units watertight in compliance with the requirements of Section 07 92 00.

3.3 INSTALLING COUNTERTOP

- A. Anchor countertop securely to supports by embedding in structural epoxy adhesive on pre-set stainless steel dowels, or by drilling and setting dowels in structural epoxy adhesive. When shimming, use plastic shims completely embedded in epoxy adhesive.
- B. Seal interface of countertop with contiguous surfaces as specified in Section 07 92 00.

3.4 INSTALLATION TOLERANCES

- A. Comply with the tolerances listed in PCI MNL 117, Appendix I or ACI 533R.

3.5 PATCHING

- A. When a precast unit is damaged after installation, patching will be permitted only with the Architect's approval. When patching is authorized, mix and place patching mixture to match texture and color of surrounding concrete and to minimize shrinkage.
- B. Adhere patch to hardened concrete with a non-staining, compatible, permanent bonding agent.
- C. Replace defective precast units if patching is not acceptable to Architect. Units may be rejected for non-conformance with these Specifications and the following:
 - 1. Ragged or irregular edges.
 - 2. Excessive air voids evident in the exposed surface.
 - 3. Adjacent flat and return surfaces with a noticeable difference in exposure.
 - 4. Casting lines.
 - 5. Visible form joints or irregular surfaces.
 - 6. Rust stains on exposed surfaces.
 - 7. Units not matching approved sample or non-uniformity of color and texture within a plank or in adjacent units due to areas of variable aggregate concentration and variations in depth of exposure.
 - 8. Blocking stains or acid stains evident on exposed plank or countertop surface.
 - 9. Foreign material embedded in the face.
 - 10. Visible repair.
 - 11. Reinforcement shadow lines.
 - 12. Cracks visible after wetting.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform the following field tests and inspections for field welds and connections using high-strength bolts.
 - 1. Testing agency will report test results promptly and in writing to Contractor and Architect.
 - 2. Contractor shall remove and replace work that does not comply with specified requirements.

3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.
 - B. Certificate: Submit a certificate from Contractor design engineer that he/she has visited the site and that to the best of his/her information, knowledge and belief, the precast units have been installed in accordance with his/her design.
- 3.7 CLEANING/TOUCHING-UP/PROTECTING
- A. Before and after installation, clean soiled exposed concrete surfaces using fiber brush and sponge, and rinse thoroughly with clean water.
 - B. Use extreme care to prevent damage to concrete surfaces and to adjacent materials when cleaning.
 - C. Protect edges of precast units in high traffic areas by boarding securely attached in place without damaging the units.

END OF SECTION

DIVISION 04

MASONRY

SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section Includes: Provision of concrete masonry work, including but not limited to, masonry units, mortar, grout, reinforcing steel, control joints, testing and inspection.
- B. Related Sections:
 - 1. Section 03 20 00 – Concrete Reinforcing.
 - 2. Section 03 30 00 – Cast-in-Place Concrete.
 - 3. Section 05 12 00 – Structural Steel Framing.
 - 4. Section 07180 – Water Repellant Coatings.
 - 5. Section 01 81 13 - "SUSTAINABLE DESIGN REQUIREMENTS": LEED Requirements

1.2 REFERENCES

- A. Requirements of the GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specifications, standards, tests or recommended methods of trade, industry or governmental organizations apply to Work in this Section where cited by abbreviations noted below (latest editions apply).
 - 1. California Building Code (CBC), 2010 Edition.
 - 2. American Concrete Institute (ACI):
 - a. "Building Code Requirements for Masonry Structures," ACI 530-05 / ASCE 6-05 / TMS 602-05 (ACI 530).
 - b. "Specifications for Masonry Structures," ACI 530.1-05 / ASCE 5-05 / TMS 402-05 (ACI 530.1).
 - c. "Manual of Standard Practice for Detailing Reinforced Concrete Structures" (ACI 315).
 - 3. American Society for Testing and Materials (ASTM).
 - a. "Specification for Quicklime for Structural Purposes" (ASTM C5).
 - b. "Specification for Load Bearing Masonry Units" (ASTM C90).
 - c. "Test Method Sampling and Testing Concrete Masonry and Related Units" (ASTM C140).
 - d. "Specification for Portland Cement" (ASTM C150).
 - e. "Standard Specification for Aggregate for Masonry Mortar" (ASTM C144).
 - f. "Specification for Hydrated Lime for Masonry Purposes" (ASTM C207).
 - g. "Specification for Mortar for Unit Masonry" (ASTM C270).
 - h. "Standard Specification for Aggregate for Masonry Grout" (ASTM C404).
 - i. "Specification for Grout for Masonry" (ASTM C476).
 - 4. US Green Building Council (USGBC), www.usgbc.org

1.3 QUALITY ASSURANCE

- A. All masonry work shall comply with the standards and requirements of the above references. Where discrepancies exist between the references and the Contract Documents, the requirements of the Contract Documents shall govern.
- B. Allowable Tolerances:

1. Unit masonry shall be fabricated within 1/8-inch of dimensions noted.
2. The maximum variation from plumb of walls shall be 1/8" in 20 feet.
3. Joints shall have a uniform thickness of 3/8" unless otherwise noted. Joints shall not vary more than 1/16" in adjacent courses within two feet and shall not be less than 5/16" thick and not greater than 7/16" thick.
4. Constructed masonry shall comply with the tolerances specified in ACI 530.1, article 3.3.

C. Reinforcing Steel:

1. Reinforcing steel shall not be permitted to rust where there is danger of staining exposed surfaces of adjacent concrete.
2. The Contractor shall replace rust-stained concrete and/or masonry at his expense.

D. Examination Criteria: All examinations, selections and approval shall be for the purpose of achieving a final installation of the unit masonry with the greatest possible uniformity of appearance and structural integrity based on the following criteria:

1. Testing and quality assurance measures outlined in this specification.
2. Color and texture shall match the approved mock-up for range, random variation and finish. The quality of construction shall match the approved mock-up.
3. Conformance to the contract documents and approved shop drawings within specified dimensions and tolerances.
4. Only one source for concrete masonry units shall be used throughout the work.
5. Other criteria as specified in this Section.
6. Non-conformance with any or all of the above criteria shall be grounds for removal and replacement of the work without expense to the Owner. The Architect shall determine if the work complies with the above criteria.

1.4 QUALITY ASSURANCE

A. The Owner's Testing Agency will:

1. Collect plant certificates from the Contractor for concrete masonry units, stating that all units have been properly cured before shipment and that they conform to all the requirements of these specifications. All masonry units shipped without certification will be rejected.
2. Field test masonry unit moisture content prior to block installation. See Section 3.07, Field Quality Assurance.
3. Submit material test reports indicating and interpreting test results relative to compliance with the tests described in this Section and Section 3.07 Field Quality Assurance.

1.5 SUBMITTALS

A. Manufacturer's literature: Submit manufacturer's literature describing products, including mix designs, history of compression tests, and mixing requirements as they apply to each different masonry unit, accessory and other manufactured product to be used in the unit masonry construction. Literature shall include, but not be limited to, preformed rubber control joints and all additives.

B. Certificates:

1. Submit material certificates for the following signed by the manufacturer and the Contractor certifying that each material complies with requirements designated.
 - a. Each material and grade of reinforcing bars. See Section 03 20 00, Concrete Reinforcing.
 - b. Each type and size of anchors, inserts, ties and accessories.

2. The Contractor shall submit a certificate of compliance with the standards designated.
 3. Submit plant certificates for all concrete masonry units to the Owner's Testing Agency and Architect, stating that all units have been properly cured before shipment and that they conform to all requirements of these specifications, including but not limited to, requirements for moisture content per ASTM C90.
- C. Mix Designs: Submit mix designs for mortar and grout where the proportions do not comply with CBC Table 2103.8(1) for mortar and Table 2103.12 for grout. Mix designs shall include a history of compression tests that substantiate the compressive strength of the mix in accordance with CBC section 1905.2. Submit the manufacturer's literature for grout admixtures.
- D. Unit Samples: Submit sample concrete masonry units in each color and texture combination specified
- E. Samples: Submit samples of all accessories embedded in masonry.
- F. Mill Test: Submit mill test reports for all reinforcing steel.
- G. Extreme Weather Procedures: Submit cold and hot-weather construction procedures evidencing compliance with requirements specified in ACI 530.1, CBC, and these specifications.
- H. Shop Drawings: Coordination and shop drawings for all concrete masonry unit walls. Drawings shall consist of elevations and sections indicating materials and assembly, color surface finish, courses and reinforcing.
1. The shop drawings shall illustrate detailing, fabrication, bending and placement of unit masonry reinforcing bars. Comply with ACI 315 showing bar schedules, stirrup spacing, diagrams of bent bars and arrangements of masonry reinforcement. The shop drawings shall also indicate the location of all conduit, plumbing and other items embedded in unit masonry walls and coordinate this work with the placement of the unity masonry reinforcement.
 2. All shop drawings shall be drawn to scale.
- I. Mock-Up: Prior to installing concrete masonry units, construct the following out-of-sequence mock-up for each form of construction and finish required to demonstrate aesthetic effects and qualities of materials and installation. Build mock-up to comply with the following requirements:
1. Submit shop drawings of the mock-up showing plan and elevation, mock up wall footing and lateral bracing.
 2. Locate on site in the location and size as directed by the Architect.
 3. Notify the Architect 7 days in advance of the dates and times when mock-up will be constructed.
 4. CMU exterior wall corner with installed window and precast sill: The mock-up shall be 8 feet long on one wall and 4 feet long on the other wall. The walls shall meet at an exterior outside corner. Both walls shall be 6'-0" high. The mock-up shall also demonstrate a vertical joint with the glazed curtain wall system, a vertical expansion joint with sealant and a continuous parapet cap over the CMU walls. The window shall be located in the center of the 8' wall of the mock-up. Include required application of masonry sealer or water repellent coating.
 5. Demonstrate the proposed maximum range of color and texture variation and the quality of workmanship.
 6. Obtain the Architect's approval of mock-ups before beginning installation.
 7. Retain and maintain mock-up during construction in an undisturbed condition as a standard for judging the completed work. Remove from the site and properly dispose of mock-ups, with the Architect's approval, at the end of Substantial Completion.
 8. LEED certification product data as specified in Division 1, Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

- a. Credit MR 4.1 & 4.2, Recycled Content
- b. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested /
Extracted Locally

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver and store packaged material in original containers with seals unbroken and labels intact until time of use.
- B. At the time of delivery to the site, masonry units shall conform to the linear shrinkage requirements of ASTM C90.
- C. Unload and inspect each masonry unit carefully and store on raised platform protected from weather so as to meet ASTM C90 requirements at the time of laying and grouting. Reject and remove from the site all material not conforming to specification requirements. In addition to lack of conformance to manufacturers' specifications, masonry units shall be rejected if:
 - 1. The color or texture of the concrete masonry units deviates from the range of colors and textures displayed on approved mock-up, as determined by the Architect.
 - 2. Concrete masonry units that are chipped, cracked, or otherwise damaged.
- D. Protect cementitious materials against exposure to moisture. Use of cementitious or other materials that have become caked and hardened from absorption of moisture will not be permitted.
- E. Prior to installation, unload concrete masonry units onto working pallets as described in Section 3.02.D.

1.7 JOB CONDITIONS

- A. Environmental Conditions:
 - 1. Do not place unit masonry when temperature is below 40 degrees Fahrenheit, unless the Architect approves and the Contractor provides means for preventing damage from freezing before and after placement.
 - 2. Do not place unit masonry when temperature is above 100 degrees Fahrenheit or above 90 degrees Fahrenheit with a wind velocity greater than 8 miles per hour, unless the Architect approves and the Contractor provides means for preventing damage from freezing before and after placement.
- B. Protection:
 - 1. Protect surrounding work as required against damage from masonry work.
 - 2. Clean satisfactorily and correct damage to surrounding work resulting from masonry work.
 - 3. The contractor shall take all means and precautions necessary to protect masonry units from moisture absorption during shipping, storage on site, placement prior to grouting of wall, during wall construction until the masonry wall is completed and water repellant coating is applied.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hollow Load-Bearing Concrete Masonry Units: As manufactured by Basalite, Calstone, or approved equal. Medium weight (115 pcf) open end type concrete block size 8 x 8 x 16-inches or 12 x 8 x 16-inches, conforming to ASTM C90, (0.065 maximum allowable linear shrinkage). Provide compressive strength as required by CBC Table 2105.2.2.1.2 for the

specified compressive strength of masonry indicated on drawings. The colors listed are Basalite. Submitted colors must match Basalite colors.

1. Precision Face; Color – standard grey.
- B. Portland Cement: ASTM C150, Type II.
- C. Aggregates:
 1. For Mortar: ASTM C144.
 2. For Grout: ASTM C404.
- D. Hydrated Lime; ASTM C207, Type S.
- E. Quick Lime: ASTM C5.
- F. Reinforcing Bars: Comply with the requirements of Section 03 20 00, Concrete Reinforcing.
- G. Water: Clean and potable, free from impurities detrimental to mortar and grout.
- H. Expansion Joints: Preformed rubber in profiles required or shown. Same as Sonneborn-Contech's "Masonry Control Joints"; Dur-O-Wal National Inc.'s "Rapid Control Joint"; or equal product substituted per Section 01630.
- I. Mortar Coloring: Mineral oxide type.
- J. Additives and Admixtures: Required in all grout to reduce early water loss to the masonry units and produce expansive action in the plastic grout to offset the initial shrinkage and promote bonding of grout to the interior masonry unit surfaces. Use Grout Aid by Sika Corporation or approved equal. Obtain approval of admixture by Architect, Structural Engineer and Owner's Testing Agency.
- K. Water Repellant Coating: As specified in Section 07180, Water Repellant Coating.

2.2 FABRICATION

- A. Concrete Masonry Units: Blocks shall have been air cured for not less than 28 days.
- B. Reinforcement:
 1. Shop-fabricate to comply with Drawings.
 2. Conform to requirements of ACI 315 where specific details are not shown or where Drawings and Specifications are not more demanding.

2.3 MIXES AND MIXING

- A. Mortar:
 1. Conform to ASTM C270, Type S.
 - a. Compressive Strength: Minimum 1,800 psi after 28 days.
 - b. Proportions by Volume: Shall be as shown in CBC Table 2103.8(1).
 2. Mix in batch mechanical mixer permitting accurate control of water amounts. Site mixing of mortar shall not be permitted without review and acceptance of Contractor's procedure by the Owner's Testing Agency and the Structural Engineer.
 - a. Place approximately half of the required water and sand into the mixer while turning.
 - b. Add cement and remainder of the sand and water into mixer in that order and mix materials for at least three minutes with minimum of water to produce workable consistency.
 - c. Add lime and continue mixing as long as required to secure a uniform mass.
 - d. Total mixing time may not be less than 3 minutes or more than 10 minutes.
 - e. Use and place mortar in final position within 2½ hours after mixing. Mortar that have stiffened as a result of evaporation of water may be re-tempered with

water as frequently as required to restore required consistency during this time period.

B. Grout:

1. Compressive Strength: Minimum 2,000 psi after 28 days.
2. Slump: 9- to 10-inches. Use sufficient water to make a workable mix that will flow into all joints of the masonry units with typical rates of absorption for ASTM C90. The slump of the grout should be approximately 9 to 10 inches depending on temperature and humidity conditions.
3. Proportions by Volume: Shall be per CBC Table 2103.12. Alternately, the contractor shall submit a grout mix design with a history of compression tests that substantiate the compressive strength of the mix in accordance with CBC section 1905.2.
4. Use grout aid in all grout to reduce early water loss to the masonry units and produce an expansive action in the grout sufficient to offset initial shrinkage. Mix grout admixture in accordance with the manufacturer's recommendations and requirements.
5. Grout to comply with ASTM C476 and CBC sections 2103.12.1, 2103.12.2, and 2103.12.3 for materials and mix requirements.
6. Site mixing of grout shall not be permitted without review and acceptance by the Structural Engineer.

C. General Mixing Requirements:

1. Measure materials accurately.
2. Shovel measurements will not be permitted.
3. Use mechanical mixer of at least one-sack capacity.
4. Completely empty drum before charging succeeding batch of materials.
5. Exercise extreme care in measuring ingredients for partial batches.

2.4 SOURCE QUALITY CONTROL

A. The Owner's Testing Agency will:

1. Collect mill test reports for reinforcements under Section 1.04.
2. Take samples of reinforcement and test per Specification 03 20 00, Section 1.03.D.
3. Sample and test concrete masonry units as required by the Unit Strength Method in conformance to CBC 2105.2.2.1. Test for compressive strength, unit weight, absorption and moisture content in accordance with ASTM C140.
4. Test for moisture content and drying shrinkage in accordance with ASTM C426.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine areas to receive masonry and verify the following:

1. Foundation surface is level to permit bed joint within range of 1/4- to 3/4-inch.
2. Edge is true to line to permit projection of masonry to less than 1/4-inch.
3. Projecting dowels are free from loose scale, dirt, concrete, or other bond-inhibiting substances and properly located.

B. Do not begin before unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean concrete surfaces to receive masonry.
- B. Remove laitance or other foreign material lodged in surface by sandblasting or other means as required.
- C. Ensure masonry units are clean and free from dust, dirt, or other foreign materials before laying.
- D. Roughen concrete below walls to expose aggregate; remove loose particles and in hot weather, dampen concrete surfaces before laying blocks. Contact surfaces of all foundations and floors that are to receive masonry work are to be mechanically roughened to 1/4" amplitude.
- E. Ensure random color variations in the installation of CMU. Unload from three delivered pallets onto a "working" pallet to be used for construction. Alternate among pallets when unloading to ensure a mix of CMU on the working pallet.

3.3 REINFORCEMENT

- A. Place bars where noted in accordance with ACI 315, ACI 530 section 1.13, and ACI 530.1 section 3.4. Do not disturb after start of masonry placement.
- B. All horizontal reinforcement shall be laid in bond beam units.
- C. Minimum clearance between bar and CMU is ½-inch or one bar diameter, whichever is greater. Minimum clearance between parallel bars is 1-inch or one bar diameter, whichever is greater. Minimum clearance between vertical bars in a column or pilaster is 1½ -inch or one and one half bar diameters, whichever is greater.
- D. Horizontal and vertical reinforcing shall be held in position by wire positioners or spacing devices near ends and at intervals not to exceed 200 bar diameters, and as required to prevent displacement by construction loads or placement of grout beyond the tolerances allowed by ACI 530.1 section 3.4B, item 7.

3.4 PLACEMENT

- A. General Requirements:
 - 1. Ensure masonry units are sound, clean and free of cracking, chipping and broken edges at time of placement.
 - 2. Accurately cut and fit units as required to accommodate other work using masonry saws.
 - 3. Lay masonry units plumb, true to line, with level courses accurately placed.
 - 4. Adjust unit to final position while mortar is soft and plastic.
 - 5. Align vertical cells accurately.
 - 6. Remove units disturbed after stiffening of mortar, clean joints, and relay unit with fresh mortar.
 - 7. In hot weather, moisten contact surfaces of the masonry units to receive mortar immediately before laying to prevent excessive drying of mortar.
 - 8. Do not lay up one tier of wall more than 16-inches ahead of other tier.
 - 9. Where necessary to stop longitudinal run, rack back one-half block length in each course.
 - 10. Do not attach construction supports to walls, except where permitted by the Architect.
 - 11. Install anchors, bolts, and other embedded items accurately as work progresses and prior to grouting.
 - 12. Masonry installer and reinforcing steel installer shall meet and coordinate placement of reinforcing steel prior to placement of concrete or grout.
- B. Joints:
 - 1. Fill joints to thickness noted: Ensure full coverage of face shells in both horizontal and vertical joints and on webs.

2. Tool joints as specified on the drawings and achieve solid, smooth, watertight, compacted joints.
3. Joints Exposed to Weather: Point with pointing tools making solid, smooth, watertight joint well bonded to masonry at edges.
4. Immediately fill holes made by line pin with mortar when pin is withdrawn.
5. Remove surplus mortar from joints.

C. Cold Weather Requirements:

1. When daily temperature is below 40 degrees F., ensure reinforcing, masonry units, etc., contacting mortar, and grout are free of frost. Comply with CBC section 2104.3 and ACI 530.1 article 1.8C for cold weather requirements.
2. Protect all mortar and grout from freezing for at least 48 hours after installation whenever temperature falls below 40 degrees F.
3. Maintain mortar and grout at temperature no lower than 50 degrees F., while being used and until installed.
4. In freezing or near freezing weather, provide equipment of adequate size for heating of mortar and grout.
5. Do not add water to mix at temperature greater than 140 degrees F.

D. Hot Weather Requirements:

1. Implement the requirements of approved Hot Weather construction procedures when ambient air temperature exceeds 100 degrees F or 90 degrees F with a wind velocity greater than 8 mph. Comply with CBC section 2104.4 and ACI 530.1 article 1.8D for hot weather requirements

E. Protection:

1. Protect face materials against staining.
2. Remove misplaced grout or mortar immediately.
3. Protect sills, ledges, offsets, and similar items from mortar drippings or other damage during construction.

F. Requirements for Walls to be Grouted by High-Lift Method:

1. Lay up walls full story prior to grouting. Brace walls adequately to resist wind lateral and other forces.
2. Build vertical grout barriers or dam of solid masonry across grout space at no more than 25-feet on centers to control horizontal flow of grout.
3. Provide cleanouts by leaving out every other unit in bottom course; seal after inspection and before grouting. Face shell plugs shall have a 24 hour cure time and be adequately braced to resist grout pressure.
4. During laying up, remove mortar fins and other foreign matter from grout space with stick and compressed air.
5. Grout shall be a high slump workable mix placed by pumping.
6. Use mechanical vibrators for consolidation.
7. Grout is to be reconsolidated after it has taken on a plastic consistency but prior to taking on initial set.
8. A "pour" is considered as the entire height of grout fill placed in one day and is composed of a number of successive placed grout lifts. A "lift" is the layer of grout placed in a single continuous operation.
9. Maximum height of pour will be twelve feet for eight inch walls, sixteen feet for twelve inch walls.

G. Concrete Masonry Units:

1. Bond: Running bond, unless specifically noted otherwise.

2. Joint Thickness: 3/8-inch, both vertically and horizontally.
3. Joint Treatment:
 - a. Where exposed, all mortar joints shall be tooled joints.
 - b. Where concealed, cut off mortar flush with face of work using trowel.
4. Use double open ended beam units to the extent practical. At no time should blocks with closed ends be placed back to back. Use proper units to provide for windows, doors, bond beams, lintels, pilaster, etc., in order to minimize cutting.
5. Do not wet units.
6. Align vertical cells to provide continuous, unobstructed opening for grouting.
7. Corners: Provide standard masonry bond by overlapping units.

3.5 GROUTING

A. Requirements:

1. Use high-lift or low-lift grouting, at the Contractor's option. Do not pour grout until mortar has set and cured, 36 hours minimum. Grout walls as soon as possible after mortar has cured.
2. Grout all cells of concrete block.
3. Ensure grout flows into voids and completely surrounds reinforcing steel.
4. Stop grout approximately 1-1/2 inches below top of last course (1/2" at bond beams with horizontal steel), except at top course, bring grout flush with top of block.
5. Grout from inside face of masonry wherever possible.
6. Where necessary to stop longitudinal run, provide suitable dam to retain grout in place.
7. Do not wet down grout spaces prior to grouting.

B. Low-Lift Grouting:

1. Pour grout to a maximum height of 4-feet, stopping 1-1/2-inches below top of unit except at bond beam units with horizontal steel the grout shall be stopped 1/2-inch below top of unit.
2. Delay 3 to 5 minutes allowing the excess of water to be absorbed by the masonry unit, then consolidate by vibrating.
3. Layup and grout next 4-feet of wall height.

C. High Lift Grouting:

1. Ensure cleanout has been sealed before grouting.
2. Pour first lift to a depth not in excess of 4 feet, with a waiting period between subsequent lifts of thirty to sixty minutes, sufficient to permit grout to become plastic but not set.
3. Place the first lift of grout to a uniform height, wait 3 to 5 minutes, and mechanically vibrate thoroughly to fill all voids. Subsequent lifts should be poured and alternate cells vibrated twelve inches to eighteen inches into the preceding lift.
4. Complete pour in sequence with other lifts not in excess of 4 feet.
5. If grout pour is 6-feet or less, it may be placed in one lift. If total pour exceeds 6-feet, the grout shall be placed in 4-foot lifts.
6. Grouting operations shall be conducted such that pours are limited to successive lifts which can be placed within one hour of the preceding lift.
7. Reconsolidate the top lift after the required waiting period to fill any space left by settlement and shrinkage.
8. Repeat the waiting, pouring, and reconsolidation steps until the top of the day's pour is reached.
9. Construction Joints: In the high lift grouting method, intermediate horizontal construction joints are not permitted. Plan the work for one continuous pour of grout

to the top of the wall in four foot layers or lifts in the same working day. Should a blow-out, equipment breakdown, or any other emergency occur, cease the grouting operation. An alternate procedure may be used with the approval of the Architect or Structural Engineer.

10. The section of wall to be grouted in any one pour is limited to a length in which successive lifts can be placed within one hour of the preceding lifts. Vertical control barriers shall be placed between pour sections in locations approved by the Architect or Structural Engineer.

3.6 POINTING AND CLEANING

- A. Point holes or defective mortar joints upon completion of work; where necessary, cut out and re-point defective joints.
- B. At end of work day, fiber-brush new surfaces to remove mortar splashes, clean with mild detergent or enzymes, and rinse with clean water.
- C. Do not use acid solution to remove green stain or efflorescence resulting from salts; follow recommendations of manufacturer for removal of such stains.
- D. Upon completion of work, remove from site surplus materials, rubbish, and debris resulting from this work.

3.7 FIELD QUALITY ASSURANCE

- A. Special Inspection: The Owner shall employ an approved, qualified masonry inspector to perform masonry inspection per CBC 1701 and 1704. Acceptance by a State or Municipality having a program of examining and certifying masonry inspectors will be considered adequate qualifications. The masonry inspector shall provide inspection of masonry construction in accordance with CBC 1704.5 and perform the following duties:
 1. Review plans and specifications and meet with the Contractor to discuss requirements before work commences.
 2. Before masonry work commences, meet with the Contractor and the Architect in a joint meeting to review the requirements for surveillance and quality control of the masonry work.
 3. Check brand and type of cement, lime (if used) and source of sand.
 4. Inspect the foundation or slab to ascertain that it is clean and ready to receive units.
 5. Check reinforcing steel dowels for straightness, proper alignment, spacing, size and length.
 6. Observe manner in which units are laid up to ensure that joints are full of mortar and kept tight during work. Inspect cells to assure that fins will not interfere with grouting or foaming. Instruct masons to keep cells clean of mortar droppings and inspect to determine compliance.
 7. Observe placing of grout continuously.
 8. Perform or supervise performance of required sampling and field testing as specified.
 9. Keep complete record of inspection of work. Report daily to the Owner's Representative the progress of the masonry inspection.
- B. Mortar and Grout Testing: The Owner's Testing Agency shall take and test mortar and grout samples as follows:
 1. Take test samples of mortar and grout on each of three consecutive working days at the start of the project.
 2. Take test samples at intervals not exceeding one week for the remainder of the project.
 3. Take additional test samples whenever a change in materials or job conditions occurs.
 4. Tests shall verify that the mortar and grout comply with their respective specified compressive strengths.

- C. Prism Test: At the contractor's option, masonry prism testing may be performed in lieu of mortar and grout testing as follows:
1. The Owner's Testing Agency will perform prism testing in accordance with CBC section 2105.2.2.2. Prior to construction, a set of 5 masonry prisms shall be built and tested using materials taken from those specified for this project. During construction test 3 prisms for each 5,000 sq. ft. of wall area and as additionally required by the Architect.

END OF SECTION

DIVISION 05

METALS

SECTION 05 12 00 - STRUCTURAL STEEL

PART 1 - GENERAL

1.1 GENERAL

- A. Work of this Section shall conform to requirements of Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections.

1.2 SCOPE

- A. The work covered by this Section shall include all labor, material, equipment, permits, engineering and other services necessary for the fabrication and installation of structural steel and related work, complete, in accordance with the drawings and as specified herein.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

- | | | |
|----|----------------------|------------------|
| A. | Submittals | Division 1 |
| B. | Quality Control | Division 1 |
| C. | Concrete | Section 03 30 00 |
| D. | Miscellaneous Metals | Division 5 |
| E. | Fireproofing | Division 7 |
| F. | Painting | Division 9 |

1.4 CODES AND STANDARDS

- A. Building Code: Structural steel work shall conform to the requirements of the Building Code identified on the Structural General Notes, and OSHA requirements, except where more stringent conditions or criteria occur in the standards referenced below and on the drawings.
- B. Standards:
 - 1. American Institute of Steel Construction (ANSI/AISC 360) "Specification for Structural Steel Buildings" per Structural General Notes.
 - 2. American Institute of Steel Construction (AISC 303-05), "Code of Standard Practice", March 18, 2005, shall apply except:
 - a. The last sentence of the last paragraph of item 3.1.2 shall be revised from "...for approval." to read "...for review; the Contractor's Engineer shall be professionally responsible for connections they design."
 - b. Item 3.6 shall be deleted.
 - c. Item 4.4 shall be deleted, and replaced with the requirements of the project specification.
 - d. The second paragraph of 7.10.3 shall be revised from "... Owner's Designated Representative for Design and Construction" to "Owner's Designated Representative for Construction or as indicated in the Contract Documents"
 - e. The last sentence of items 8.5.2 and 8.5.4 shall be deleted.
 - f. Item 8.5.3 shall be deleted. Where a conflict exists between the Code of Standard Practice and the Contract Documents, the Contract Documents shall govern.
 - 3. American Welding Society, AWS D1.1-08, "Structural Welding Code".
 - 4. Research Council on Structural Connections (RCSC) - "Specification for Structural Joints Using ASTM A325 or A490 Bolts", (June 30, 2004).

5. American Society for Testing and Materials "ASTM Standards in Building Codes", various standards as referenced herein, latest edition.
6. The Society for Protective Coatings (formerly Steel Structures Painting Council, "SSPC") "Steel Structures Painting Manual", (2005).

C. Definitions:

1. The term "Contract Documents" in this specification is defined as the design drawings and the specifications.
2. The term "SER" in this specification is defined as the Structural Engineer of Record for the structure in its final condition.
3. The term "Design Professionals" in this specification is defined as the Owner's Architect and SER.
4. The term "Contractor" in this specification is defined to include any of the following: General Contractor and their sub-contractors, Construction Manager, Structural Steel Fabricator or Structural Steel Erector.
5. The term "Heavy Shapes" in this specification is defined to include hot rolled steel shapes with flanges exceeding 2 inches (50mm) in thickness and built up cross sections with plates exceeding 2 inches (50mm) in total thickness.
6. The term "High Restraint Weld" describes welds in which there is almost no freedom of movement for members joined due to geometry or material thickness.
7. The term "Testing Agency" in this specification is defined as an independent testing and inspection service engaged by the Owner for quality assurance observation and testing of steel construction in accordance with applicable building code provisions and any additional activities listed in the Contract Documents.
8. The terms "for record" and "submit for record" in this specification are defined as Contractor submittals that do not require a response from the Design Professionals.
9. Working Days: Monday through Friday, except for federal or state holidays.

1.5 STRUCTURAL STEEL CONTRACTOR QUALIFICATIONS

- A. The term Structural Steel Contractor refers to any or all of the following parties, regardless of their contractual relationships: Structural Steel Fabricator, Structural Steel Detailer, Structural Steel Erector and Contractor's Engineer.
- B. Qualification Data: Submit qualification data (personnel and firm resumes, and project lists with references) for the Structural Steel Fabricator ("Fabricator"), Structural Steel Detailer ("Detailer"), Contractor's Engineer(s) and Structural Steel Erector ("Erector").
- C. The Fabricator shall have 10 years of comparable experience in installations of this type and shall employ labor and supervisory personnel familiar with the type of installation, experienced in fabrication and erection of structural steel for projects of similar size and complexity. At the time of bid the Fabricator shall be AISC certified to the Standard for Steel Building Structures (STD) and must submit proof of these qualifications. The Fabricator's qualifications shall be subject to review by the Design Professionals and Owner.
- D. The Detailer shall have 10 years experience preparing detailed steel shop drawings and CNC downloads for structures of this type and complexity. The detailer's qualifications shall be subject to review by the Design Professionals and Owner. All detailing shall be performed with 3D modeling software, such as TEKLA STRUCTURES, SDS-II or equivalent. Model shall be maintained to be current throughout the construction and in a form useable by the Design Professionals.
- E. The Contractor's Engineer(s) shall be qualified to perform the type of work required by the project. The Engineer(s) shall be a Licensed Professional Engineer(s) in the State of California. The Contractor's Engineer(s) shall have 10 years of experience being in responsible charge of work of this nature. The proposed Engineer(s) shall be subject to approval of Design Professionals and Owner.

- F. The Erector shall have 10 years of successful experience erecting structural steel for structures of this type and complexity in the region of the project. At the time of bid the Erector shall be an AISC Certified Steel Erector (CSE) and must submit documentation of this qualification. The Erector shall be an AISC Advanced Certified Steel Erector (ACSE) and must submit documentation of this qualification.
- G. Welding: Qualify the welding procedures, shop welders, field welders, welding operators and tackers in accordance with AWS D1.1 and for the following periods of effectiveness of certification:
 - 1. Certification and qualification, including period of effectiveness of welding personnel shall be as specified by AWS D1.1. Certification shall remain in effect for duration of work provided welders are continuously engaged in performing the type of welding for which they are certified, unless welders fail to perform acceptable welding, as determined by the Owner's Testing Agency. Certification and re-certification of welding personnel is subject to verification by the Testing Agency. Re-testing for re-certification will be the Contractor's responsibility.

1.6 SUBMITTALS

- A. Required Submittals - Where the SUBMITTALS section of this specification is in conflict with Division 1 Submittals, the more stringent requirements for the Contractor apply. Required submittal items are listed here; see below for detailed requirements. Do not submit items not requested.
 - 1) Submittal Schedule
 - 2) Calculations, Shop Drawings and Erection Drawings
 - 3) Submittal Letters
 - 4) Pre-construction Survey
 - 5) Quality Control Program
 - 6) Product Data
 - 7) Samples
 - 8) Welding Procedures Specification (WPS)
 - 9) Welder Certifications
 - 10) Mill Reports
 - 11) As-built surveys.
- 2. Calculations, Shop Drawings and Erection Drawings (including Field Work drawings): Submit required connection calculations, shop drawings and erection drawings for all structural steel indicated on the Contract Documents.
 - a. Material shall not be fabricated or delivered before the shop and erection drawings have been approved or approved as noted by the Design Professionals and returned to the Contractor.
 - b. Connection design calculations: Calculations are required for all details that are not indicated on the drawings as "Completely Designed." Each calculation package shall be signed and sealed by the Contractor's Engineer.
 - c. Structural Steel Shop Drawings: Submitted shop drawings shall include layouts and details for each member showing the steel type and grade, size, connections, cuts, copes, holes, bolts, welds, surface treatments (cleaning, shop paint, etc.) and provisions for the connection of other work. Steel type, grade and size for all attached elements shall also be shown.
 - d. Shop and erection drawings shall contain complete dimensional and geometric information, based on established dimensions shown on contract documents, and shall not be scaled from contract documents. The shop drawings shall clearly distinguish between shop and field welds and bolts, identify pre-tensioned high strength bolts and identify surface preparation requirements at slip critical connections.

- e. Welds: All welds shall be indicated by standard welding symbols in the "Standard Code for Arc and Gas Welding in Building Construction" or as accepted by the SER. Shop and erection drawings shall show the size, length, and type of each weld, including the electrode type to be used.
 - f. Bolts: Details for bolt assemblies shall indicate bolt size, length, type and the presence, type and location of washers where required as part of the assembly; distinguish between N and X bolts, distinguish between slip-critical and bearing bolts; and distinguish between shop and field bolts. Also, indicate bolt orientation where required by the Contract Documents.
 - g. Erection Drawings: The erection drawings shall include plans showing exact locations of base and bearing plates, and/or anchor rods and other embedded items. All field connections not specifically shown on shop drawings shall be shown on erection drawings, including field bolt size, type, number, location and any special installation requirements, and field weld size, type, length and location.
- 3. Preconstruction Survey: Submit for record. Where interface with existing construction occurs, before related shop drawings are prepared survey the existing construction and submit the survey prepared by a professional surveyor employed by the Contractor to the Design Professionals. For all steel construction, before steel erection commences, perform and submit to the Design Professionals a complete survey for position and alignment at all points where construction by other trades will support steel elements, including but not limited to pockets, embedded plates, anchor rods and base plates. Include plan location positions relative to the building gridlines, and elevations of bearing surfaces and tops of bolts relative to building Datum elevation.
 - 4. Quality Control Program: Submit for record complete details of the Contractor's quality control program including the names of the personnel responsible for this work.
 - 5. Product Data: Submit manufacturers' specifications, test reports and applicable standards for all products listed under Part 2: Products. Standard literature shall be edited to suit job conditions.
 - 6. Samples: Submit (2) samples each, (2) of shop painted products and (2) of field touch-up painted products.
 - 7. Welding Procedures: Submit for record written welding procedures for all AWS D1.1 prequalified joints, and qualification procedures for all joints not prequalified by Section 3 of AWS D1.1. Submit written welding procedures developed by Contractor's welding consultant for heavy shapes and High Restraint Welds described in this specification. Use the forms in AWS D1.1, Annex E. Submit all welding and qualification procedures to the Owner's Testing Agency for approval before submitting to the Design Professionals.
 - 8. Welder Certification: Submit for record certification that the welders have passed qualification tests [acceptable to the governing authority] using AWS procedures.
 - a. A certification shall be submitted in standard AWS format.
 - b. Each certification shall state that the welder has been doing satisfactory welding of the required type within the six-month period prior to the subject work.
 - 9. For any welder whose period of certification effectiveness has lapsed or whose workmanship is subject to question in the opinion of the Design Professionals or Testing Agency, immediate testing for recertification will be required. Tests, when required, shall be conducted at the sole expense of the Contractor.
 - 10. Mill Reports: Submit for record certified copies of all mill reports, two (2) to the Design Professionals and one (1) to the Testing Agency, covering the chemical and physical properties of all structural steel and accessories (as defined in this specification) for

the project. Where required on the Contract Documents or by the AISC Code, reports shall include results of Charpy V-notch tests.

- a. Such certificates shall be obtained from the mills producing the steel and shall certify in a cover letter submitted with the certificates, that the steel meets the minimum requirements as to physical properties, inspection, marking and tests for structural steel as defined by the current edition of the relevant ASTM Standard Specifications. Any steel that does not meet the ASTM requirements must be clearly identified in a cover letter submitted with the certificates.
 - b. Prior to commencing steel erection, the contractor shall deliver certificates to the Owner in number and form as may be required by the local Building Department or other local and State agencies having jurisdiction.
11. As-Built Surveys: Execute and submit for record a comprehensive survey of steel structure at each level adequate to assess if the structure has been built within the tolerances specified in the Contract Documents. Each certified survey, performed by a professional surveyor employed by the Contractor, shall be submitted to the Contractor's Engineer for their approval before proceeding to the next stage of erection. If deviations from the tolerances are discovered, the Contractor shall present corrective measures to the Design Professionals within 48 hours of completion of that stage of erection. Upon completion of steel erection, submit the complete package of steel surveys for record to the Design Professionals and the Owner.

B. Submittal Process

1. Submittal of shop and erection drawings and other submittals by the Contractor shall constitute Contractor's representation that the Contractor has verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each drawing with other drawings and other trades. The Contractor shall place their shop drawing stamp on all submittals confirming the above.
2. Connection design calculations: Calculations are required for all details that are not indicated on the drawings as "Completely Designed." The Contractor shall submit connection design calculations prior to submitting shop drawings related to those calculations. The shop drawings shall incorporate all comments provided on the calculations.
3. Shop and erection drawings: Submit in complete packages so that individual parts and the assembled unit may be reviewed together. This Specification Section and the applicable drawings used in the development of the shop and erection drawings shall be referenced on each shop and erection drawing to facilitate checking. Unless the piece marks are self indexing, furnish index sheets with the shop drawings, relating piece marks for all beam, girder and column details to the sheet numbers on which they are located.
4. If the Contractor and Design Team agree to process shop drawings electronically, Contractor shall submit one hardcopy and one electronic copy to the SER. The naming convention of each drawing must follow the submittal numbering system and include the submittal #, specification #, revision # and drawing # in the prefix of the drawing name.
5. All modifications or revisions to submittals, shop drawings, and erection drawings must be clouded, with an appropriate revision number clearly indicated. The following shall automatically be considered cause for rejection of the modification or revision whether or not the drawing has been approved by the Design Professionals:
 - a. Failure to specifically cloud modifications
 - b. Failure to submit calculations for the modifications
 - c. Unapproved revisions to previous submittals

- d. Unapproved departure from Contract Documents
 - 6. The Contractor shall deliver to the Design Professionals at the completion of the job 2 electronic versions of the final as-built shop drawings on a CD-ROM or other media acceptable to the Design Professionals.
 - 7. Resubmittals: Completely address previous comments prior to resubmitting a drawing. Resubmit only those drawings that require resubmittal.
 - 8. Resubmittals Compensation: The Contractor shall compensate the Design Professionals for submittals that must be reviewed more than twice due to contractors' errors. The Contractor shall compensate the Design Professionals at the standard billing rates plus out-of-pocket expenses incurred at cost + 10%.
- C. SER Submittal Review
- 1. The review of connection design and the review and approval of shop and erection drawings and other submittals by the Design Professionals shall be for general conformance with the design intent of the work and with the information given in the Contract Documents only and will not in any way relieve the Contractor or the Contractor's Engineer from:
 - a. Responsibility for the adequacy of the design of the connections designed by the Contractor's Engineer.
 - b. Responsibility for all required detailing.
 - c. Responsibility for the proper fitting of construction work in strict conformance with the contract requirements.
 - d. The necessity of furnishing material and workmanship required by contract drawings and specifications which may not be indicated on the shop and erection drawings.
 - e. Conforming to the Contract Documents.
 - f. Coordination with other trades.
 - g. Control or charge of construction means, methods, techniques, sequences or procedures, for safety precautions and programs in connection with the work.
 - 2. TYPE 1 Stamp - For shop drawings for building elements designed by the SER, the responses on the shop drawing review stamp used by the SER require the following actions:
 - a. APPROVED indicates that the SER has found that the information presented on the shop or erection drawing appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
 - b. APPROVED AS NOTED indicates that the SER requires the shop or erection drawing to be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected shop or erection drawing for record.
 - c. REVISE and RESUBMIT indicates that the SER requires resubmission of the shop or erection drawing after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.
 - d. NOT APPROVED indicates that the shop or erection drawing does not conform to the Contract Documents and must be extensively revised before resubmittal. None of the elements of work shown on the shop drawing shall be

fabricated, manufactured or constructed until the Contractor has received a returned shop drawing marked Approved or Approved as Noted.

3. TYPE 2 Stamp - For submittals for building elements which are not designed by the SER but are performance specified, for items that do not form part of the completed structural system but impose loads on the structure, and for construction items or activities which have an effect on the final structure, a second stamp will be used. The responses on the stamp used by the SER require the following actions:
 - a. NO EXCEPTIONS indicates that the SER has found that the information presented on the submittal appears to conform to the requirements of the Contract Documents. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the Contract Documents.
 - b. EXCEPTIONS NOTED indicates that the SER requires the submittal be corrected to reflect the notes and comments shown. Fabrication, manufacture or construction of the elements of work shown in the shop drawing may proceed, provided that work is in compliance with the notations shown on the shop drawings and the Contract Documents. Promptly resubmit the corrected document for record.
 - c. REJECTED indicates that the SER requires resubmission of the submittal after correction per notes and comments. None of the elements of work shown on the shop drawing shall be fabricated, manufactured or constructed. Contractor to revise and resubmit until SER response of No Exceptions or Exceptions Noted is received.

D. Substitution Request

1. Requests for any departure from Contract Documents must be submitted in writing by the Contractor and accepted in writing by the Design Professionals, prior to receipt of submittals.
2. All substitutions must be requested using the structural substitution request form included at the end of this section. Acceptance using the structural substitution request form indicates acceptability of the structural concept only. Contractor must submit shop drawings reflecting accepted substitutions for review in accordance with this Specification. The structural substitution request form, even if accepted, does not constitute a change order.
3. Such substitutions or modifications, if acceptable to the Design Professionals shall be coordinated and incorporated in the work at the sole expense of the Contractor.
4. The acceptance by the Design Professionals of a specific and isolated request by the contractor to deviate from these requirements does not constitute a waiving of that requirement for other elements of, or locations in the project, unless specifically addressed as such and permitted by the Design Professionals in writing.
5. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated for the review and/or incorporation of the Contractor-requested substitution, including indirect effects on other portions of the work, the Contractor is responsible for paying for additional work performed by the Design Professionals at the standard billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Owner shall also be compensated by the Contractor.
6. Contractor is responsible for means and methods and any impacts on other portions of the work that may arise from this substitution.

E. Request for Information (RFI)

1. RFI shall originate with the Contractor. RFI submitted by entities other than that Contractor will be returned with no response.
2. Limit RFI to one subject.
3. Submit RFI immediately upon discovery of the need for interpretation or clarification of the Contract Documents. Submit RFI within timeframe so as not to delay the Construction Schedule while allowing the full response time described below.
4. The response time for answering an RFI depends on the category in which it is assigned.
 - a. Upon receipt by the SER, each RFI will be assigned to one of the following categories:
 - 1) No cost clarification
 - 2) Shown in Contract Documents
 - 3) Change to be issued in future bulletin
 - 4) Previously answered
 - 5) Information needs to be provided by others.
 - 6) Request for corrective field work
 - 7) Request for substitution
 - b. RFIs in categories 1, 2, 3, 4 and 5 will be turned around by the SER in the number of days referenced in Division 1.
 - c. RFIs in categories 6 and 7 will be rejected and must be submitted as submittals or requests for substitution.

1.7 TEMPORARY SUPPORT OF STRUCTURAL STEEL FRAME

- A. The structure as shown on the Contract Documents is designed to withstand the design loads only when all structural elements are installed and fully connected. The contractor shall be responsible for the analysis of all components and assemblies for stresses and displacements that may be imposed by fabrication, shipping, handling, erection, temporary conditions, construction loads, etc. The analysis of such shall be performed by the Contractor's Engineer.

1.8 STORAGE AND DELIVERY

- A. Delivery: Unload all structural steel promptly upon arrival and store in an area designated and approved by the Owner at the site of the work. The Contractor shall be responsible for any charges from failure to unload material promptly.
- B. Storage: Store structural steel to drain properly. Provide weep holes and clean out as required to keep steel free from water. Provide adequate protection and shoring to prevent distortion and other damage. Store structural steel on timber; do not lay on mud, directly on ground or cinders, or otherwise handle in a manner that damages finishes. Stored sections shall be readily accessible for inspection.
- C. Store fasteners in a protected place.
- D. Welding materials to be in moisture resistant, undamaged package. Maintain packages effectively sealed until electrode is required for use. Storage and handling shall be per AWS D1.1.

1.9 DESIGN OF CONNECTIONS

- A. The contractor is responsible to design all connections not completely designed on the Contract Documents. A Completely Designed connection is only one that is specifically designated as such by the statement "COMPLETELY DESIGNED" on the Contract Documents. All connections not indicated as "COMPLETELY DESIGNED" shall be

designed for the forces and/or connection design criteria called for in the Contract Documents.

- B. Connection concepts shown on the drawings that are not "COMPLETELY DESIGNED" show only the minimum requirements to convey design intent.
- C. All connections and details shown on shop and erection drawings shall be prepared under the supervision of the Contractor's Engineer, in accordance with AISC "Load and Resistance Factor Design Specification for Structural Steel Buildings."
- D. The contractor shall design and provide any stiffener plates, doubler plates, reinforcing plates, etc. and their connections that may be required to develop and/or transfer the forces and/or connection design criteria called for in the Contract Documents.
- E. Design connections to withstand the combined effects of shears, axial forces, moments and torques and as required by applicable code(s) and the contract documents.
- F. All forces shown on the drawings are to be assumed reversible unless noted otherwise and must be checked for both directions. If no transfer/pass-through forces are shown on the Contract Documents, the most critical combinations of member forces and directions shall be assumed for the connection design.
- G. Use types of shop and field connections shown on Contract Documents or, in absence of such indication, propose appropriate type for Design Professionals review.
- H. Welding of High Restraint Welds: Use double bevels in lieu of single bevels where practical. Detail joints to allow for weld shrinkage. In cases of plates in more than one plane, show welding operation sequence on the drawings. In general, start welding at the most restrained part of the weldment and proceed to the least restrained.
- I. All welded connection must utilize pre-qualified joints or joints that have been qualified by AWS D1.1, section 2.
- J. Comply with all connection notes on drawings in conjunction with these specifications.
- K. The connection design calculation submittals shall meet the following criteria:
 - 1. Number each calculation in a logical and orderly system. Once submitted for review, calculations shall not be renumbered. Resubmitted calculations shall be indicated by using the same number with an "R" suffix. All changes must be clouded.
 - 2. Provide sketches for results of each calculation, with all pertinent dimensions relating to the calculations (including pitch, gage, edge distance, unbraced lengths, Whitmore lengths, etc.) clearly shown. Geometry must be shown accurately and to scale. Provide enough sketches to clearly document the full range of geometric conditions applicable to each connection design calculation proposed.
 - 3. For repetitive connections provide a spreadsheet or computer program summary table for each specific location, and a standard calculation which shows how the spreadsheet or program calculation applies.
 - 4. Provide drawings showing the overall locations of the connections that are keyed/referenced to each connection calculation.
 - 5. Calculations shall be typed, or performed by spreadsheet, or by computer program, or by other method approved by the SER. All spreadsheet calculations shall show the input and results for every calculation step and include appropriate text and sketches explaining all calculation assumptions.
 - 6. Provide calculation checks for all forces shown on the drawings. All AISC code requirements apply. Provide calculations for each check. "OK by inspection" is not permitted.

1.10 STRUCTURAL STEEL PRE-ERECTION CONFERENCE:

- A. At least twenty (20) working days prior to the commencing of steel erection the Contractor shall hold a meeting to review the detailed requirements of the steel erection.
- B. The Contractor shall prepare an agenda and require responsible representatives of every party who is concerned with the steel erection to attend the conference, including but not limited to the following:
 - 1. General Contractor/Construction Manager

2. Steel Erector / Steel Fabricator
 3. Erector's Surveyor
 4. Roof Deck Contractor
 5. All Testing and Inspection Agencies
 6. Design Professionals
 7. Owner
 8. Precast or Cladding Contractor as appropriate.
- C. Minutes of the meeting shall be recorded, typed and distributed by the Contractor to all parties listed above within 5 working days of the meeting.
- D. The minutes shall include a detailed outline of the erection procedure including a schedule of milestone dates for surveys and sign-offs on erection stages which represents an agreement reached by all parties involved. It shall also include the surveying program and submission schedule for approval.
- E. Notwithstanding any provision of the Specification, the SER shall not be responsible for and not have charge over any safety programs or precautions at the site of the Project.

1.11 QUALITY ASSURANCE BY OWNER'S TESTING AGENCY

- A. Quality assurance is testing and inspection to assist the Owner in evaluating the Contractor's performance in the fabrication shop and field. It is not a substitute for the testing and inspection which is required as part of the Contractor's quality control program (see the following section on quality control).
- B. Cost: Except as specifically noted otherwise, the testing agencies for quality assurance shall be engaged and paid by the Owner.
- C. The Owner has negotiated inspection services based upon the assumption that all fabrication work shall be performed at one single fabrication shop. Costs associated with work being performed in additional shops will require reimbursement to the Owner.
- D. Coordination with Owner's Testing Agency: The Contractor shall have sole responsibility for coordinating their work with the testing agency to assure that all test and inspection procedures required by the Contract Documents and Public Agencies are provided. The Contractor shall cooperate fully with the Owners testing agencies in the performance of their work and shall provide the following:
1. Information as to time and place of starting shop fabrication and a field construction and erection schedule, one week prior to the beginning of the work
 2. Site File: At least one copy of each approved shop drawing shall be kept available in the contractor's field office and the drawings not bearing evidence of approval and release for construction by the Design Professionals shall not be kept on the job. Provide drawings for the work to be performed in the shop or field one week prior to the start of work.
 3. Representative sample pieces requested by the inspection agency for testing, if necessary
 4. Full and ample means of assistance for testing and inspection of material
 5. Proper facilities, including scaffolding, temporary work platforms, safety equipment etc., for inspection of the work in shop and field
- E. Duties of the Owner's Testing Agencies:
1. Reports: The Testing Agency shall prepare daily reports of the structural steel work including progress and description/area of work, tests made and results. Reports of inspection of welding shall include deficiencies noted and corrections made, and other items pertinent to acceptance or rejection of the work. The reports shall state whether specimens comply with or deviate from contract requirements. The daily reports shall be collected and delivered to the Design Professionals and Owner weekly.

2. Rejection: The Owner's Testing Agency has the right to reject any material, at any time, when it is determined that the material or workmanship does not conform to the Contract Documents. The Testing Agency shall report deficiencies to Owner, Design Professionals, and Contractor immediately.
3. Structural steel work and general testing requirements: The Testing Agency shall perform the following shop and field inspections in addition to any other inspections enumerated above or specified on the Contract Documents:
 - a. Shop inspection of steel shall include alignment and straightness of members, camber, preparation for connections, dimensional checks, testing of shop bolts, witnessing of welding procedures, testing of cuts, weld access holes and copes of heavy shapes as defined in this specification, examination and testing of completed welds, headed studs and deformed bar anchors, cutting of heavy shapes, finishing of column ends, cleaning, painting and storage of material. All shop fabrication shall be inspected in the shop. Camber shall be verified in a minimum of 10% of all members requiring camber. If, in the opinion of the SER and Testing Agency this testing discloses a large ratio (10% or more) of unacceptable cambers, the required percentage of tested cambers may be increased by the SER to 100% at no expense to the Owner.
 - b. Field inspection of steel shall include connections, proper tensioning of bolts, levelness, plumbness and alignment of the frame, conformance to AWS welding methods, examination of surface before welding, examination and testing of completed welds, headed studs and deformed bar anchors and field painting, including touch-up.
 - c. Check qualifications of the following:
 - 1) Shop welding procedures and personnel
 - 2) Shop stud welding setup and operators
 - 3) Shop bolting procedure and crew
 - d. Where testing is required for less than 100% of locations, select test locations at random and throughout the project.
 - e. Review mill certifications for compliance with the Contract Documents.
4. High Strength Bolting: The Testing Agency inspector shall inspect high strength bolted construction in accordance with RCSC "Specification for Structural Joints using ASTM A 325 or A 490 Bolts," including but not limited to:
 - a. Surface preparation and bolt type conforms to plans and specifications prior to start of bolting operations.
 - b. Proper bolt storage and handling procedures per codes and standards referenced by this specification are being followed.
 - c. Visually inspect all bolted connections.
 - d. For all bolted connections that are indicated as snug tight, connections are properly compacted and brought to the snug tight condition progressing outward from the most rigid part.
 - e. For all bolted connections that are indicated as pre-tensioned or slip critical, pre-installation verification testing is performed by the inspector in cooperation with the contractor in accordance with RCSC section 9.2 and section 7.
 - f. For all bolted connections that are indicated as pre-tensioned or slip critical, through routine observation, as defined in RCSC 9.2.1, 9.2.3 or 9.2.4, that the pre-tensioning methods of RCSC 8.2.1, 8.2.3, or 8.2.4, as appropriate, are performed.
 - 1) "Routine observation" is defined as observation of 10 bolts for every 100 bolts with a minimum of 2 bolts per connection.

- g. Retest bolted connections that fail initial inspection after correction by the Fabricator or Erector.
- 5. Welding:
 - a. Review of submittals: Welding procedures including prequalification, qualifications test and, for heavy shapes and high restraint welds, the welding procedure prepared by the Contractor's Engineer or Welding Consultant.
 - b. Full penetration welds: Test all full penetration welds for soundness by means of either radiographic or ultrasonic testing in accordance with AWS D1.1 and ASTM E164 procedures. All flaws in plate or flange material revealed during such tests shall be repaired by the Contractor at the Contractor's expense.
 - c. Partial penetration welds: Test all partial penetration welds for soundness by means of visual and magnetic particle inspection, unless other methods are specified in the Contract Documents. All flaws in plate or flange material revealed during such tests shall be repaired by the Contractor at the Contractor's expense.
 - d. Testing of welds at heavy shapes and high restraint welds shall be performed not less than 48 hours after the weld has been completed.
 - e. Fillet welds: Visually inspect all fillet welds. In addition test ten percent (10%) of all fillet welds per connection using a non-destructive method, such as dye penetrant or magnetic particle. Select test locations randomly throughout the structure. If, in the opinion of the SER and Testing Agency this testing discloses a large ratio (10% or more) of unacceptable welds, the required percentage of tested welds may be increased by the SER to 100%, all at the Contractor's expense.
 - f. Inspection and Testing by the Testing Agency of high restraint welds and where Heavy Shapes are to be joined by partial or full penetration welds in tension:
 - 1) Joint Preparation: Monitor fit up and joint preparation (bevel angle, etc.) for conformance to the submitted welding procedures including preheat and interpass temperature. Monitor base metal temperature during welding operations.
 - 2) Test Full Penetration Welds in accordance to the requirements of this specification section, ultrasonically in accordance with AWS D1.1 procedures. On T or corner joints, pay careful attention to the heat affected zone and base metal where the weld shrinkage stresses are in the through thickness direction.
 - 3)
 - 4) Test Partial Penetration Butt Joints in accordance with this specification section by the magnetic particle method. At T or corner joints, in addition to the magnetic particle testing, ultrasonically scan the heat affected zone and adjacent base metal from face "C" per AWS D1.1 Table 6.7 and Annex K-7 to detect lamellar tears and shall be done with a compression wave. The Testing Agency shall submit a testing procedure that includes evaluation (acceptance criterion) procedures to the Design Professionals for review.
 - g. At heavy shapes and high restraint welds: provide pre-production sample testing of heat treatment, observe fabrication, welding and heat treatment of the samples for conformance with submitted welding procedures. Establish locations of testing coupons following AWS procedures. Test coupons following AWS procedures to verify satisfactory results using the welding procedure and heat treatment.

6. Headed Studs and Deformed Bar Anchors: Visually inspect all headed studs and deformed bar anchors for complete fusion and full 360-degree weld flash (or fillet).
 - a. Check all studs with incomplete fusion, and at random five studs at each of six beams per floor, by bending to an angle of 15 degrees from its original axis (away from any missing flash). If more than twenty percent of studs fail on one member, check all studs on member. In addition for each member with any defective studs, test an additional member.
 - b. Contractor to replace any studs that crack or break. Contractor to only straighten studs that would foul other work or have less than 1 inch (25mm) cover in bent position.
7. Cleaning & Painting:
 - a. Prior to shop painting, examine all fabricated pieces to verify proper cleaning in accordance with this specification.
 - b. Examine all shop painting to verify conformance with this specification.
 - c. Examine loading and unloading of steel to visually observe that damage does not occur during shipping and handling.
8. Remedial Work: The Testing Agency shall indicate to the Contractor where remedial work must be performed and will maintain a current list of work not in compliance with the Contract Documents. This list shall be submitted to the Design Professionals and Owner on a weekly basis.
9. Certification: When all work has been approved by the Testing Agency, the Testing Agency shall certify in a letter to the Design Professionals and Owner that the installation is in accordance with the design and specification requirements (including applicable codes).

1.12 QUALITY CONTROL BY CONTRACTOR

- A. The Contractor shall provide a program of quality control to ensure that the minimum standards specified herein are attained.
- B. The Contractor shall immediately report to the Design Professionals any deficiencies in the work which are departures from the Contract Documents which may occur during construction. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Design Professionals. After proposed corrective action is accepted by the Design Professionals and Owner, the Contractor shall correct the deficiency at no cost to the Owner.
- C. The Owner's general review during construction and activities of the Owner's Testing Agency are undertaken to inform the Owner of performance by the Contractor but shall in no way replace or augment the Contractor's quality control program or relieve the Contractor of total responsibility for quality control.

1.13 OBSERVATIONS AND CORRECTIONS BY DESIGN PROFESSIONALS

- A. Review: The Design Professionals will observe the construction for general compliance with the provisions of the Contract Documents during various phases of construction.
- B. Compensation for Additional Services: Should additional work by Design Professionals such as design, drafting, meetings and/or visits be required which are necessitated by failure of the Contractor to perform the work in accordance with the Contract Documents, the Contractor is responsible for paying for additional work performed by the Design Professionals at their standard firm-wide billing rates plus out-of-pocket expenses incurred at cost + 10%. Additional costs for testing and inspection by the Owner shall also be compensated by the Contractor.

1.14 PERMITS AND WARRANTY:

1. Permits: The Contractor shall apply for, procure, renew, maintain, and pay for all permits required by City, State, or other governing authorities, necessary to execute work under this Contract. Contractor shall furnish copies of all permits to the Owner and Design Professionals.
2. Warranty: Upon completion of all work to be performed under this Contract, the Contractor shall execute and deliver in a satisfactory form a warranty that all workmanship and materials used in the performance of this Contract shall remain free from defects for a period of one (1) year from the date of execution of the Warranty.

1.15 LEED REQUIREMENTS

- A. See Division 1 Section "LEED Requirements" for additional LEED requirements.
- B. LEED Submittals
 1. Credit MR 4.1, 4.2 - Recycled Content:
 - a. Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 2. Credit MR 5.1, 5.2 - Local/Regional Materials:
 - a. Manufacturing (fabrication) location(s): Indicate location of manufacturing (fabrication) facility; indicate distance between manufacturing facility and the project site.
 - b. Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 - c. Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.
 3. Credit EQ 4.2: VOC
 - a. Submit Product Data and material safety data sheets stating compliance with VOC limits for field applied primers and paints. Refer to Section 01352/LEED Requirements for additional requirements.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL

- A. Structural steel shall conform to the requirements listed on the Structural General Notes.
- B. "Heavy Shapes" as defined in this specification require minimum Charpy impact values per the Structural General Notes, in addition to any other members stated in the Notes.

2.2 SHOP COATINGS

- A. Standard Primer: SSPC – Paint 25 or Paint 25 BCS, Type II zinc oxide raw linseed oil and alkyd primer. Color to be determined by Architect. Primer shall be compatible with, and from the same manufacturer as, top coats specified in Division 9 specification.
- B. Zinc Rich Primer: SSPC-Paint 20, Type I or Type II, Zinc rich primer utilizing either an organic or inorganic binder with a minimum zinc content of 80 percent by weight in the dry film. The primer shall provide a surface meeting AISC Slip Critical Class B (slip coefficient

- =0.50 min) requirements. Color to be determined by Architect. Primer shall be compatible with, and from the same manufacturer as, top coats specified in Division 9 specification.
- C. Hot Dip Galvanizing: ASTM A123, weight of coating shall average not less than 2.3 oz per square foot (0.70 kg/ m²), with no individual thickness less than 2.0 oz per square foot (0.61 kg/m²).
 - D. Galvanizing Repair Paint: ZRC Cold Galvanizing Compound, or other complying with SSPC-Paint 20.

2.3 ACCESSORIES

- A. High Strength Bolts: Conform to the provisions of the Research Council on Structural Connections (RCSC) "Specifications for Structural Joints using ASTM A325 or A490 Bolts" except that nuts shall be ASTM A563 Grades DH or DH3 (hardened) for both A325 and A490 bolts. Twist off type bolts (Tension Control bolts) shall additionally conform to ASTM F1852 or ASTM F2280.
- B. All bolts shall be new, and not re-used.
- C. Where A325 galvanized bolts nuts and washers are required, they shall be in accordance with ASTM A153, Class C. Where A588 steel is used, bolts, nuts and washers shall be Type 3.
- D. Direct Tension Indicators: Meet requirements of ASTM F959.
- E. Anchor Rods: Per structural General Notes.
- F. Washers:
 - 1. Round washers shall conform to American Standard B 27.2 type b
 - 2. Washers in contact with high-strength bolt heads and nuts shall be hardened in accordance with ASTM Standard F436.
 - 3. Beveled washers shall be square, smooth and sloped so that contact surfaces of the bolt head and nut are parallel.
 - 4. The diameter of the hole of square beveled washers shall be 1/16 inch (1.5mm) greater than the bolt size for bolts smaller than one inch (25mm), and shall be 1/8 inch (3.0mm) greater than the bolt size for bolts larger than one inch (25mm).
 - 5. Comply with requirements of RCSC for all washers including thickness, size and hardness, depending on connection details.
- G. Welding Electrodes: Electrodes shall be low hydrogen and shall be selected from Table 4.1.1 of AWS D1.1. Comply with CVN requirements of the Structural General Notes.
 - 1. Shielded Metal-Arc Welding: Welding electrodes for manual shielded metal-arc welding shall conform to the specification for Mild Steel Covered Arc-Welding Electrodes, AWS A5.1 E70 or 80, or the specification for Low-Alloy Steel Covered Arc-Welding Electrode, AWS A5.5.
 - 2. Submerged-Arc Welding: Bare electrodes and granular flux used in submerged-arc welding shall conform to F70 or F80 AWS flux classifications of the specification for Mild Steel Electrodes and Fluxes for submerged-arc Welding, AWS A5.17.
 - 3. Where Charpy V-Notch values are required on the base metal, an electrode meeting the Charpy V-Notch requirements listed in the Structural General Notes shall be provided.
- H. Headed Studs (shear connectors) shall be per Structural General Notes.
- I. Deformed Bar Anchors shall be as specified in Structural General Notes.
- J. Steel Castings shall conform to ASTM A27, Grade 65-35, medium strength carbon steel.
- K. Grout: Refer to General Notes.
- L. Post-installed Anchors shall be per Structural General Notes.

2.4 LEED REQUIREMENTS

- A. Structural Steel: LEED Credit MR 5.1, 5.2: Fabrication facility should be within 500 miles (800km) of project site.
- B. Structural Steel: LEED Credit MR 4.1, 4.2: Recycled content: Minimum 50 percent post-consumer recycled content
- C. Bolts: LEED Credit MR 4.1, 4.2: Recycled content: Minimum 50 percent post-consumer recycled content.
- D. Anchor Rods: LEED Credit MR 4.1, 4.2: Recycled content: Minimum 25 percent post-consumer recycled content.
- E. Headed Studs (shear connectors): LEED Credit MR 4.1, 4.2: Recycled content: Minimum 50 percent post-consumer recycled content.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Work by Others: Examine all work prepared by others to receive work of this Section and report any defects affecting installation to Design Professionals. Commencement of work will be construed as complete acceptance of preparatory work by others. The Contractor alone shall be responsible for checking the dimensions and coordination of the structural steel work with other trades.
- B. Anchor Rods: At least 20 working days prior to the start of the structural steel erection, the Contractor shall ascertain by accurate survey the existing location, alignment, and elevation of the anchor rods embedded in the concrete by others. The Contractor shall immediately bring to the attention of the Design Professionals any discrepancies observed between the Contract Documents and the as-built conditions. Steel erection shall not start until corrective measures, if required, have been performed.

3.2 FABRICATION

- A. Fabricate and assemble structural steel in the shop to the greatest extent possible.
- B. Tolerances:
 - 1. Conform to the tolerances of the AISC "Code of Standard Practice," compensate for the difference between the temperature at time of fabrication and the mean temperature in service.
 - 2. Elevator shafts used for temporary hoists shall conform to the detailed requirements of the hoist manufacturer.
 - 3. Conform to the tolerances of the AISC "Code of Standard Practice", Section 10 (AECS) for architecturally exposed structural steel as indicated as "AECS" on the drawings.
- C. Holes: Holes shall be provided in members to permit connections to the work of other trades or contracts, and for passage through the member of work of other trades. All holes shall be accurately drilled or punched at right angles to the surface of the metal in accordance with AISC Specifications. Holes shall not be made or enlarged by burning. Burning or drifting unfair holes will not be permitted. Holes that must be enlarged shall be reamed. Drift pins will be allowed only to bring together the several parts for connection. Holes in base plates shall be drilled. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling operations shall be removed with a suitable tool.
- D. Camber: Provide camber as indicated on the Contract Documents. Where no camber is indicated, provide natural camber up.
- E. Cutting: Manual gas-cutting in the shop may be used only if automatic or semi-automatic methods are not possible. If manual shop cutting is required, it shall be done only with a mechanically guided torch, except that an unguided torch may be used where the cut is

more than 1/2 inch (12mm) from the finished dimension and final removal is completed by means such as chipping or grinding to produce a gouge-free surface of quality equal to that of the base metal. At restrained joints and as indicated elsewhere, weld access holes shall be ground smooth.

- F. Cutting of Heavy Shapes: Where "Heavy Shapes" as defined in this specification are to be joined by partial or full penetration welds in tension, preheating shall be required for all thermal cutting operations. Preheat shall be sufficient to prevent cracking but in no case less than 150 degrees F (65°C). Weld access holes and copes shall be ground to a smooth radius after cutting and tested for cracks by the magnetic particle method. All cut edges shall be free of sharp notches and gouges.
- G. Anchor Rods: Rigid steel templates and anchor rods shall be furnished, labeled and shipped in sets indicating sizes and locations of columns, together with instructions for setting of anchor rods. Plate washers per Typical Details shall be provided.
- H. Bolting: Bolts shall be driven accurately into the holes without damaging the threads. Bolt heads shall be protected from damage during driving. Bolt heads and nuts shall rest squarely against the metal. Where bolts are to be used on beveled surfaces having slopes greater than 1 in 20 with a plane normal to the bolt axis, beveled washers shall be provided to give full bearing under the head or nut.
- I. Bolts indicated as "finger tight" on the Contract Documents shall be prevented from backing off by using lock nuts, thread compound or deformed threads.
- J. Installation of High Strength Bolts:
 - 1. Except where "snug tight" installation is specifically permitted on design drawings, all high strength bolts shall be installed with full pretension using Turn-of-Nut Pretensioning, Twist-Off Type Tension Control Bolt Pretensioning or Direct-Tension-Indicator (DTI) Pretensioning in accordance with the "Specification for Structural Joints Using ASTM A325 or A490 Bolts". Calibrated Wrench Pretensioning shall only be used where specifically approved by the SER.
 - 2. Comply with special washer requirements of the RCSC, such as those related to slotted and oversize holes, and tapered flanges. DTI "washers" shall not be substituted for such required washers.
 - 3. All high strength bolt assemblies (including Tension Control bolts and DTI's) used in pretensioned connections shall be verified in accordance with the Pre-Installation Verification section of the RCSC.
 - 4. Clean and re-lubricate bolts and nuts that become dry or rusty before use, except Tension Control bolts must be re-lubricated by manufacturer.
- K. Welding of Structural Steel:
 - 1. Pre-Weld Inspection: The surface to be welded and the filler material to be used shall be subject to inspection before welding is performed.
 - 2. Welds indicated on the Contract Documents or the approved shop or erection drawings shall be created by electric arc welding processes that comply in all respects with the codes and specifications herein noted covering the design, fabrication, and inspection of welded structures and the qualifications of welders and supervisors. Control the heat input, weld length, weld sequence and cooling process to prevent distortion of the completed assembly.
 - 3. Each welder's work shall be traceable.
 - 4. Special Requirements: For high restraint welds and welds at heavy shapes, follow approved welding procedures for weld process, sequence, pre-heating and cooling. Use stress relieving techniques where shown in the approved procedure developed by the Contractor's Welding Consultant.
 - a. Special Procedures: Prior to the start of production welding, the contractor shall demonstrate to the Testing Agency that preheat can be maintained without relying on heat from the arc. For field welding, the contractor shall

- provide a shelter to protect each joint from inclement weather (rain, snow, etc.), from start until completion of the joint.
 - b. Preheat and Postheat: Preheat shall be sufficient to prevent cracking, but in no case less than required by AWS D1.1. For high-restraint welds, minimum preheat shall be 225 degrees F (105°C). The preheat shall be maintained throughout the thickness of the material for a distance equal to twice the material thickness on both sides of the joint at a minimum. Where different thicknesses of steel are being joined, the greater thickness shall govern. Preheat shall be measured on the face opposite the side of the heat application. Preheat shall be applied uniformly in a manner that does not harm the surface of the material nor cause surface temperatures to exceed 1100 degrees F (600°C). Should stress relief heat treatment be required, the contractor shall submit a written procedure.
 - c. Prior to heat treatment on a production weld, prepare and treat a test sample per the contractor's written procedure for tensile and Charpy V-notch tests in accordance with ASTM requirements.
 - 5. Deficient Welds: Welds found deficient in dimensions but not in quality may be enlarged by additional welding. Any weld found deficient in quality shall be removed by grinding or melting and the weld shall be remade.
- L. Bearing:
 - 1. Bearing ends of columns shall be milled or sawn square perpendicular to axis of the column.
 - 2. Finish bearing areas of base plates per AISC M2.8.
- M. Stiffeners: Fitted stiffeners shall be ground to fit closely against flanges.
- N. Cleaning and Preparation of Steel Surfaces:
 - 1. Clean all steel work in accordance with the Steel Structures Painting Council (SSPC). Method specified herein that corresponds to its location and exposure. Steel work to be painted shall be painted within the same day that it is cleaned.
 - a. Interior, Not Exposed to View (above suspended ceilings, under sprayed-on fireproofing, steel to be encased in concrete): SSPC-SP-2, Hand Tool Cleaning.
 - b. Interior, Exposed in the Finished Building: SSPC-SP-6, Commercial Blast Cleaning, unless noted otherwise on the drawings.
 - c. Exterior (exposed to weather or in unconditioned space): SSPC-SP-6, Commercial Blast Cleaning, unless noted otherwise on the drawings.
 - d. Architecturally Exposed Structural Steel where indicated on the Contract Documents as "AESS": SSPC-SP-10, Near White Blast. All mill marks and other marks such as pitting, rust and scale, seam marks, roller marks, and rolled trade names shall be removed by grinding, or welding and grinding, prior to blast cleaning.
 - e. Members to be Hot Dipped Galvanized: SSPC-SP3, Power Tool Cleaning, before galvanizing.
- O. Shop Coating:
 - 1. Where painting is specified, paint all steel work in accordance with the Steel Structures Painting Council (SSPC) Method specified herein that corresponds to its location and exposure and in accordance with manufacturer's written instructions. Paint steel work the same day that it is cleaned.
 - a. Interior, Not Exposed to View (above suspended ceilings, under sprayed-on fireproofing, steel to be encased in concrete): No Paint.

- b. Interior, Exposed in the Finished Building: SSPC – Paint 25
 - c. Exterior (exposed to weather or in unconditioned space): SSPC – Paint 20
 - d. Architecturally Exposed Structural Steel (AESS) to receive a 2 or 3 coat paint system.
2. Protect finished bearing surfaces with a rust-inhibiting coating which is to be removed immediately prior to erection.
3. Do not paint:
- a. Surfaces within six (6) inches (150mm) of field welds
 - b. Surfaces to be encased in concrete or to receive cementitious fireproofing
 - c. Contact surfaces of high-strength bolted Slip Critical connections (unless surface prep and paint has been specifically prequalified by the contractor or approved for use in this location by the SER)
 - d. Surfaces required for testing and preheat, until all testing and preheat has been performed
 - e. Finished bearing surfaces (use removable rust-inhibiting coating)
 - f. Top flange of the beam where steel deck or headed studs are to be attached
4. Paint shall be applied thoroughly and evenly to dry surfaces only when surface temperatures are above dew-point, in strict accordance with manufacturer's instructions.
5. Surfaces of exterior members which are inaccessible after assembly or erection shall receive their second coat of the approved paint, in a different shade, in the shop.
6. Hot-dip galvanize the following steel members:
- a. All angles, steel plates and shims supporting exterior masonry or exposed to the weather, including shelf, arch and relieving angles
 - b. All connections between the above angles and steel plates and the supporting structural member, including clip angles and hardware
 - c. Any other steel members indicated as "Galvanized" on the Contract Documents.
 - d. All miscellaneous metal, angles, clips, etc. on exterior masonry walls.

3.3 ERECTION

- A. Tolerances: Erect all work plumb, square and true to lines and levels in strict accordance with the structural requirements of the building within tolerances of the AISC Code of Standard Practice, unless otherwise indicated on the Contract Documents. Compensate for the difference between the temperature at time of erection and the mean temperature in service.
- B. Bracing: Brace the frame during erection in accordance with the Contractor's erection procedure.
- C. Errors: Immediately report to the Design Professionals any errors in shop fabrication, deformations resulting from handling and transportation, and improper erection that affects the assembly and fitting of parts. Prepare details for corrective work and obtain approval of the method of correction. Approved corrections shall be made expeditiously at the sole expense of the Contractor.
- D. Column Base Plates: Support and align on steel shims or setting bolts. After the supported members have been plumbed and properly positioned, tighten anchor rod nuts in preparation for grouting. Cut off wedges and shims flush with edges of plates and leave in place. The use of leveling plates will not be permitted.
- E. Grouting: Refer to General Notes. Grout base plates immediately after the first tier of columns are plumbed. Do not proceed with steel erection above the first tier until base plates are grouted.
- F. Bolting and Welding of Structural Steel: See Section on "Fabrication".

- G. Bearing Surface: Clean bearing surfaces and surfaces that will be in permanent contact before the members are assembled.
- H. Splices: Splices will be permitted only where indicated on the contract drawings or the reviewed shop drawings. Fasten splices of compression members only after surfaces are cleaned and abutting surfaces have been brought completely into contact. Fill any remaining gaps with steel shims driven into place and cut flush. Tack weld shims to each other and to members. Use runoff tabs at bevel weld splices. Cut off runoff tabs and ground smooth after weld completion.
- I. Driftpins: Driftpins may be used only to bring together the several parts, and shall not be used in such a manner as to distort or damage the metal. Correct poor matching of holes by drilling to the next larger size and using a larger size bolt. Plug welding and redrilling will not be permitted, unless a specific instance arises and is approved by the SER.
- J. Erection bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces. On non-exposed welded construction, remove erection bolts.
- K. Hammering: Hammering which may damage or distort the members will not be permitted.
- L. Do not use cutting torches in the field without the specific approval of the SER for each application. Where cutting torch use is permitted, all the requirements of the Section on "Fabrication" shall apply.
- M. Additional Material and Labor: If the Contractor furnishes additional material and labor for the purpose of erection or if the erection method requires that material be added to certain members, the required modifications shall be at the sole expense of the Contractor.
- N. Alignment: Following erection, accurately align, level, and adjust all members prior to final fastening. Conform to AISC standard tolerances unless otherwise noted in the Contract Documents.
- O. Touch-Up and Field Applied Paint: After erection, clean all damaged areas in the shop coat, exposed surfaces of bolts, bolt heads, nuts and washers and all field welds and unpainted areas adjacent to field welds according to manufacturers recommendations and paint with the same paint used for the shop coat. Match the touch up and field applied paint color to the as-built paint color. After touch up, at exterior (exposed to the weather or in unconditioned space) steel members apply a full coat of the specified paint in a different shade than the shop applied coat.
- P. After erection, clean all damaged galvanized areas, welds and areas adjacent to welds and paint with the specified galvanizing repair paint.
- Q. Clean all steel members of mud and debris and construction residue prior to erection.
- R. Headed Studs and Deformed Bar Anchors
 - 1. End weld headed studs and deformed bar anchors with an automatic process in accordance with section 7 of AWS D1.1.
 - 2. Areas to which studs are to be attached must be free of foreign material, such as rust, oil, grease, paint etc. When mill scale is sufficiently thick to cause difficulty in obtaining proper welds, remove by grinding or sand blasting.
 - 3. Remove ceramic ferrules from studs and work after welding.

3.4 [LEED REQUIREMENTS]

- A. Fabrication facility should be within 500 miles (800km) of project site.
- B. Shop Coating Product: must meet VOC requirements of LEED Credit EQ 4.2. See Section 01352/LEED Requirements for additional requirements.

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Structural Substitution Request Form – to be completed by Contractor

Project:		Substitution Request #
Date:		
Requesting Contractor:		Pages Attached (including this form)

1. Description of Requested Substitution:

2. Related Drawings and Specification Sections:

3. Rationale or Benefit Anticipated:

4. Effect on Construction Schedule¹ (check one): ☐ NONE ☐ See Attached

5. Effect on Owner's Cost² attach data (check one): ☐ CREDIT TO OWNER ☐ EXTRA

6. Effect on Construction Documents³ (design work anticipated): ☐ NONE ☐ See Attached

7. Requesting Contractor Agrees to Pay for Design Changes (check): ☐ YES ☐ NO ☐ NOT APPLICABLE

8. Effect on Other Trades⁴:

9. Effect of Substitution on Manufacturer's Warranty (check): ☐ NONE ☐ See Attachment

Signature⁵:

Date:

Company:

General Contractor Signature⁵:

Date:

Notes:

- Contractor is responsible for means and methods and any problems that may arise from making the requested substitution.
- This is **NOT A CHANGE ORDER FORM**. A separate form is required to adjust costs and/or schedules.
- Contractor is responsible for any design impacts that may arise from this substitution, including redesign efforts.
- Contractor is responsible for effects on other trades from this substitution;
General Contractor must review and agree effects on other trades are fairly represented in items 4-9.
- Signature by a person having authority to legally bind his/her company to the above terms. Otherwise this request is void
- All items in form must be completed for substitution request to be considered.

Request Review Responses (completed by Architect and/or Engineer(s)):

ACCEPTED	ACCEPTED AS NOTED	REJECTED	INSUFFICIENT DATA TO SUPPORT REQUEST	ENGINEER / ARCH / MEP SIGNATURE	DATE

Engineer/Architects Comments:

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END OF SECTION

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section Includes: Provision of light gauge steel stud and joist framing. Work includes, but is not necessarily limited to the following:

1. Load-bearing steel stud framing at exterior walls.
2. Non-load bearing steel stud framing at exterior walls.
3. Interior stud wall and ceiling framing with studs.
4. Framing accessories.

- B. Related Sections:

- | | |
|------------------------------|-------------------|
| 1. Structural Steel Framing: | Section 05 12 00. |
| 2. Metal Fabrications: | Section 05 50 00. |
| 3. Metal Framing Systems: | Section 09 10 00. |
| 4. Lath and Plaster: | Section 09 22 00. |
| 5. Gypsum Board Systems: | Section 09 26 00. |

1.2 REFERENCES

- A. Requirements of the GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specifications, standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work of this Section where cited by abbreviations noted below (latest editions apply).
1. California Code of Regulations, Title 24, Part 2, also known as the California Building Code (CBC), 2010 Edition.
 2. American Society for Testing and Materials (ASTM).
 3. Federal Specifications (FS).
 4. American Welding Society (AWS) D1.3: "Structural Welding Code - Sheet Steel."
 5. American Iron and Steel Institute (AISI): "Specifications for the Design of Cold-Formed Steel Structural Members."
 6. Steel Stud Manufacturer's Association (SSMA).
 7. Metal Lath Association (MLA): "Specifications for Metal Lath and Furring."
 8. Society of Protective Coatings (SSPC).

C. QUALITY ASSURANCE

1. Regulatory Requirements:
 - a. Comply with fire-resistance ratings as indicated and as required by governing authorities and codes.
 - b. Provide materials, accessories, and application procedures which have been listed by an approved testing agency or tested according to ASTM E119 for the type of construction shown.
 - c. Comply with CBC Section 2203.3 and AISI requirements for design and identification of cold-formed steel.
 - d. Framing shall conform to the ICC Report for stud gauge and spacing for all wall conditions.
2. Steel stud system shall conform to referenced AISI documents.

3. Installer: Company specializing in performing the work of this Section with minimum 3 years' documented experience.
4. Welders: Qualified in accordance with AWS D1.3 for welding process, position, type of weld and type of steel.

1.3 SUBMITTALS

- A. Submit in accordance with provisions of Section 01 30 00, "Submittals."
- B. Product Data: Manufacturer's ICC report, specifications and installation instructions for steel studs, fasteners, and accessories.
- C. Experience of installer if requested by Architect.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Procedures: In accordance with Section 01 60 00, "Materials & Equipment."
- B. Protect framing from rusting and damage.
- C. Deliver in manufacturer's unopened containers or bundles fully identified with name, brand, type and grade.
- D. Store inside a dry, ventilated space, and protect framing from rust and damage.

1.5 JOB CONDITIONS

- A. Coordinate stud sizes and layouts with the work of the various trades. Where ductwork, conduit, piping, casework, and other such items exceed indicated available space, increase stud sizes or make other minor modifications as necessary to accommodate the work at no change in cost of the Work.

PART 2 - PRODUCTS

A. MANUFACTURERS

1. Acceptable Manufacturers: Any member of Steel Stud Manufacturer's Association (ICC ER-4943P).

B. MATERIALS

1. Sheet Steel: ASTM A653, A1008 or A1011.
2. Studs and tracks:
 - a. See drawings for size and gauge.
 - b. Galvanization per ASTM A653 with G60 minimum.
3. Cold-Rolled Furring Channels: As specified in Section 09 10 00, "Metal Support Systems."
4. Vertical Deflection Clips (non-load-bearing framing): Manufacturer's standard bypass and head clips as required, capable of isolating wall stud from upward and downward vertical displacement of primary structure using mechanical fasteners. Acceptable Manufacturer: The Steel Network, Inc. Connections must be tested in accordance with ICC AC261 criteria and hold a valid ICC ERS evaluation service report to be accepted, such as ICC ESR-1903, or equivalent. Provide clips with attached bushing and screw of the series, size and configuration as required by the structural design calculations.
 - a. VertiClip® or VertiTrack® series or equal to. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement.

5. Drift Clips® (non-load-bearing framing): Manufacturer's standard bypass and head of wall clips (as required), capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure using mechanical fasteners. Acceptable Manufacturer: The Steel Network, Inc. Connections must be tested in accordance with ICC AC261 criteria and hold a valid ICC ERS evaluation service report to be accepted, such as ICC ESR-1903, or equivalent.
 - a. DriftClip® series or equal to. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical and lateral movement.
6. Sliptrack: as indicated on approved drawings. Acceptable Manufacturers: Sliptrack Systems (ICC ESR-2049) or engineer approved equal.
7. Partition Stiffeners or Bridging: Unpunched channel shape, formed of 16-gauge steel to required dimensions.
8. Welding Electrodes: AWS low hydrogen, rod number and diameter as approved by the Owner's Testing Agency.
9. Touch-up Primer for Galvanized Surfaces: SSPC Paint 20 zinc rich.
10. Metal Screws: Self-drilling and self-tapping. Screws shall penetrate substrate by a minimum of three full threads exposed. Use low profile heads as required by architectural finish.
 - a. Sheet Metal Screw (SMS): No. 8 and larger as noted on Drawings.
 - b. Heavy Gauge Screws: Size as noted on Drawings. Use "TEKS" screws by ITW Buildex (ICC ESR-1976) or equal product substituted per Section 01 63 00.
 - c. Hex Head Screws: Size as noted on Drawings. Use "Kwik-Flex" screws by Hilti or equal product substituted per Section 01 63 00.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate details and requirements of other Work which adjoins or fastens to studs and requires backing or special support framing included in this Section.
 1. Items requiring backing or support include, but are not necessarily limited to casework, wall-specialties, and similar items.
 2. Obtain Architect's approval of backing method proposed to satisfy requirements of this Section which differs from methods noted or shown.

3.2 EXAMINATION

- A. Examine all parts of the supporting structure and the conditions under which studs will be installed.
- B. Notify the Architect, in writing, of any conditions detrimental to the proper and timely completion of the Work.
- C. Do not proceed with the installation of steel studs until unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Tracks shall be securely anchored to supporting structure, with fasteners specified at not more than 24-inches on center.

- B. Complete, uniform, and level bearing support shall be provided for the bottom track at each bearing-stud location. Install full metal shims below bottom track at stud locations as needed, or set bottom track in high-strength grout.
- C. Abutting or intersecting pieces of track shall be securely anchored to a common structural element or spliced together.
 - 1. Splices or butt welds shall be used at all butt joints in the runner track.
 - 2. Do not splice studs.
- D. Wall studs shall sit in top and bottom track with 1/16" maximum gap between wall stud and track web.
 - 1. Studs shall be aligned or plumbed and securely fastened to the flanges of both top and bottom track.
 - 2. Space studs 16-inches on center maximum unless otherwise noted on Drawings.
- E. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Connect vertical (and/or drift) deflection clips to studs and anchor to primary building structure in accordance with manufacturer's recommendations.
- F. Framed wall openings shall include a header and multiple studs at each edge of opening as indicated on Drawings. Contractors option to built-up jambs, headers, and sills: JamStud[®] by The Steel Network, Inc. ASTM A653/A653M, Grade 50 (340) 50ksi (340MPa), minimum yield strength 65ksi (450MPa), minimum tensile strength, G-60 (Z180) hot-dipped galvanized coating.
- G. Diagonal bracing shall be installed at locations indicated for frame stability.
- H. Install bridging as indicated on Drawings.
- I. Form corners and intersections of partitions with three studs as shown on Drawings. Provide additional studs as indicated or required.
- J. Joining of members shall be made with welding; wire tying of framing members shall not be permitted.
- K. Welded connections shall be made by resistance spot fusion welding, fillet welding, or plug welding and shall be done in accordance with the latest recommended procedures and practices of the American Welding Society.
- L. Do not cut or notch stud flanges.
- M. Where exposed to weather, field abrasions and welds shall be touched up with zinc rich primer.
- N. Erection Tolerances: Install cold formed metal framing to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8-inch in 10 feet as follows:
 - 1. Space individual framing members no more than plus or minus 1/8-inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- O. Provide all angles, clips and other miscellaneous pieces necessary to attach light gauge framing to building structure or to attach other materials to light gauge framing.
- P. Do not bridge building expansion and control joints with cold formed metal framing. Independently frame both sides of joints.

3.4 INSTALLATION OF FIRE-RATED ASSEMBLIES

- A. Install studs which are components of fire-rated wall assemblies as indicated.

3.5 BACKING IN STUD PARTITIONS

- A. Securely weld or screw cut sections of unpunched stud to at least three stud or furring supports, leaving flat surface of backing stud web to receive attachment of object to be secured.
- B. Verify that any pre-drilling of backing and attachment of spacers to prevent crushing of collateral material is done prior to application of collateral material.
- C. If it is determined by the Architect that backing was not provided for any items as required, the Contractor shall remove the finish material and install backing. The Contractor shall patch and refinish surface to match adjacent area and finish.

3.6 FIELD QUALITY CONTROL

- A. The Owner's Testing Agency will:
 - 1. Provide continuous inspection of welding, including prior fit-up, welding equipment, weld quality, and welder certification in accordance with AWS and CBC Section 1704.3.
 - 2. Provide continuous inspection during installation as required to establish conformity of Work requirements.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS (ARCHITECTURAL)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes metal fabrications not classified as "structural steel", and not specified in other Sections.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 03 for grouting and dry-packing other than required for the work of this Section, and concrete fill in guard posts.
 - 3. Division 05 for stainless steel railings.
 - 4. Division 07 for expansion and seismic joint covers.
 - 5. Division 08 for guides and clips for rolling door.
 - 6. Division 09 for finish painting metal fabrications.
- C. Work furnished but installed in Division 03: Cast metal nosings and skate stoppers.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data:
 - 1. Specifications and installation instructions for manufactured items.
 - 2. Manufacturer's literature, including engineering data for anchors.
- B. Shop Drawings:
 - 1. Large scale, dimensioned shop drawings of metal fabrications indicating in detail methods of fabrication and assembly, weight, materials, holes, lugs, inserts, finishes and other pertinent data.
 - 2. For components to be embedded in concrete and masonry work, furnish templates supplemented by dimensioned Shop Drawings to trades placing those components in their work. Assist in location of these components where so requested by those trades.
- C. Samples: The following samples at least 6 inches long.
 - 1. Welded connection between the following components showing proposed weld quality and finish.
 - a. Pipe to pipe (railing).
 - b. Pipe to bar.
 - c. Tube to tube.
 - d. Tube and bar.
 - 2. Stair nosing.
 - 3. Ladder rung.
 - 4. Grating.

D. Engineering calculations:

1. Calculations signed and sealed by a California-licensed professional engineer, to demonstrate Code compliance for Contractor engineered assemblies, including railings and other load-bearing assemblies.
2. Calculations shall be legible and shall incorporate sufficient cross references to shop drawings to make calculations readily understandable and reviewable. Test reports are an acceptable substitute for calculations for the anchors only. Calculations shall include the following:
 - a. Analysis of framing members.
 - b. Analysis of anchors, including anchors embedded in concrete.
 - c. Section property computations for framing members.
3. Seal and signature of design engineer.

E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.4 QUALITY ASSURANCE

A. Qualifications for welding work:

1. Qualify welding procedures and welding operators in compliance with AWS "Qualification" requirements of AWS D1.1.
2. Examine that welders to be employed in this work have satisfactorily passed AWS qualification tests.
3. If recertification of welders is required, retesting shall be Contractor's responsibility.
4. Submit certificates of compliance to demonstrate compliance with the above requirement.
5. Costs for fabricator tests, inspections and quality control shall be borne by the Contractor.

B. Special inspections:

1. Except where otherwise specified, special inspections by City's testing laboratory, prescribed by Code, will not be required where work is performed on the premises of a licensed fabricator, registered and approved by authorities having jurisdiction to perform such work without special inspection.
2. Submit certificates of compliance to demonstrate compliance with the above requirement.
3. Costs for fabricator tests, inspections and quality control shall be borne by the Contractor.

1.5 HANDLING

A. Store metal fabrications above ground, under cover. Protect from moisture and rust.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General:
 - 1. Provide railings and other load-bearing assemblies capable of withstanding the loads prescribed by Code without exceeding the allowable design working stress of the materials involved, including anchors and connections, except use 100 psf minimum for gratings.
 - 2. Apply each load to produce the maximum stress in each component.
- B. Deflection: Limit deflection under uniform load to L/360; L/120 under concentrated load; or 1/4-inch maximum, whichever is more restrictive.

2.2 MATERIALS

- A. Metal surfaces - general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness, and absence of surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
- B. Steel plates, shapes, and bars: ASTM A 36.
- C. Steel tubing:
 - 1. Cold-formed steel tubing: ASTM A 500, Grade A or B, as required for design loading, unless otherwise indicated.
 - 2. Hot-formed steel tubing: ASTM A 501. For exterior installations and where otherwise specified, provide tubing with hot-dip galvanized coating in compliance with ASTM A 53.
 - 3. Handrails: One of the following.
 - a. Welded and Drawn Over Mandrel (DOM), ASTM A 513, Type S.
 - b. Cold Drawn Seamless (CDS), ASTM A 519.
 - c. Hot Finished Seamless (HFS), ASTM A 519, machined to match the finish of the DOM steel above.
 - d. Painted finish at common room, color to match metal panels.
 - 4. Elsewhere: ASTM A 53; finish, type, and weight class as follows.
 - a. Galvanized finish for exterior installations.
 - b. Type S, Grade A, standard weight (schedule 40), unless another grade or weight or both required by design loading.
 - c. Painted finish at community room, color to match metal panels.
- D. Uncoated structural steel sheet: Product type (manufacturing method), quality, and grade, as follows.
 - 1. Cold-rolled structural steel sheet: ASTM A 1008, Grade A, unless otherwise required by design loading.
 - 2. Hot-rolled structural steel sheet: ASTM A 1011, Grade 30, unless otherwise required by design loading.

- E. Uncoated steel sheet: Commercial quality, product type (method of manufacture) as follows.
1. Cold-rolled steel sheet: ASTM A 1008.
 2. Rolled steel floor plate (Checkered): ASTM A 786, Pattern No. 1, 4 or 5. Use same pattern throughout the Project.
 3. Hot-rolled steel sheet: ASTM A 1011.
- F. Galvanized steel sheet:
1. Structural quality: ASTM A 653 SQ, Grade 33, G90 designation, unless another grade required for design loading.
 2. Commercial quality: ASTM A 653 CQ, G90 coating designation.
- G. Flanges and anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
- H. Concrete inserts:
1. Threaded or wedge type galvanized ferrous castings, either malleable iron complying with ASTM A 47, or cast steel complying with ASTM A 27.
 2. Provide bolts, washers, and shims as required, hot-dip galvanized in compliance with ASTM A 153.
- I. Welding rods and bare electrodes: Select in accordance with AWS specifications for the metal alloy to be welded.
- J. Fasteners: Provide zinc-coated fasteners for exterior use or where built into exterior walls, elsewhere fasteners may be uncoated. Select fasteners for the type, grade, and class required.
1. Bolts and nuts: Regular hexagon-head bolts, ASTM A 307, Grade A, Property Class 4.6; with hex nuts, ASTM A 563; and flat washers, unless otherwise indicated.
 2. Anchor bolts: ASTM F 1554, Grade 36.
 3. Machine screws: ASME B18.6.3ASME B18.6.7M.
 4. Lag bolts: ASME B18.2.1.
 5. Wood screws: Flat head, carbon steel, ASME B18.6.1.
 6. Plain washers: Round, carbon steel, ASME B18.22.1.
 7. Lock washers: Helical, spring type, carbon steel, ASME B18.21.1.
 8. Drilled-in expansion anchors:
 - a. Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [non-drilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade S, by Hilti, Inc., or ITW Ramset/Red Head.
 - b. Select anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in masonry and equal to 4 times the load imposed when installed in concrete, as determined by testing per ASTM E 488.
 9. Chemical anchors:
 - a. Set by Simpson Strong-Tie Co., Inc. or HY-150 by Hilti, both used with machine bolts complying with FS FF-B-575, Grade S.
 - b. Select drilled-in and chemical anchors to resist loads imposed thereon with a safety factor of 4 minimum for static loads, and 10 minimum for dynamic and overhead loads.
 10. Lock washers: Helical spring type carbon steel, FS FF-W-84.

- K. Grout: Pre-packaged, non-shrink, non-metallic grout, non-staining, nongaseous grout complying with ASTM C 1107.
- L. Cement (expansive): Factory-prepared with accelerators quick-setting hydraulic cement complying with ASTM C 595.
- M. Shop primer for ferrous metal:
 - 1. For non-galvanized surfaces to be painted with high performance coatings: Organic, zinc-rich primer Tnemec "90-97 Tneme-Zinc," or equal, applied at a 2.5 to 3.5 mils DFT, and meeting class B surface requirements for slip-critical connections.
 - 2. For all other ferrous metal surfaces: Tnemec "10-99," or "Unibond" (basis of design), or equal fast-curing, lead-free, universal modified alkyd primer selected for compatibility with finish paint systems specified in Section 09 90 00, and complying with performance requirements equal to or better than the basis of design.
- N. Galvanizing repair (zinc-rich) paint: "94-H20 Hydro-Zinc" by Tnemec Co., or equal.
- O. Bituminous paint: Cold-applied asphalt mastic complying with SSPC Paint 12 but containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.3 MANUFACTURED UNITS

- A. Abrasive stair nosings:
 - 1. Alumogrit Type 101SP aluminum nosing with integral anchoring lugs or studs by Wooster Products, Inc., or equal, consisting of a cast aluminum, abrasive nosing.
 - a. Abrasive nosings are required on every tread of exterior stairs, and top and bottom tread of every flight of interior stairs. Installation in concrete is specified in Section 03 30 00.
 - b. Furnish tread inserts 6-inch shorter than length of treads for cast-in-place concrete stairs, and full length for concrete-filled pan stairs.
- B. Aluminum ladder: O'Keeffe's "Standard Duty Channel Rails Fixed Ladder" with "Safety Post" when terminating at a roof hatch, or equal by Precision Ladders, Inc.
- C. Wall railing brackets:
 - 1. Cast malleable iron bracket, sized for the pipe railing indicated, model 1701-2 by JG Braun Co., No. 253 by Builders Brass Works Corp., Style B by McNichols, or equal.
 - 2. Provide cast steel spacer, to prevent crushing finish material, equivalent to Builders Brass Works Corp. Model No. 249.
- D. Skate stoppers: "Skate Stoppers Diamond 90-12" by Intelliccept, or equal.
- E. Safety post: Where ladder terminates at roof hatch, provide Bilco "LadderUp" safety post or "Hatch Access Safety Rail" by Precision Stair Corp., "Extend-A-Rail" by Precision Ladders, Ltd., or equal, complete with hardware and fasteners required for installation.
- F. Metal bar grating at amphitheater seating: McNichols GCM-1-100, smooth, press-lock constructions with one-inch by 3/16-inch bearing bars, 7/16-inch o.c., and rectangular cross bars 4 inches o.c.
- G. Mesh infill panels in exterior railings: X-Tend NEO Flexible stainless steel mesh, with 1.5 mm rope diameter.
- H. Painted interior protective steel wall panels: TBD.
- I. Painted metal wall base: "Final Form series 953-830" by Gordon, Inc., with manufacturer's standard baked-on high performance powder coating.
- J. Bollards: Types TBD.

2.4 FABRICATION - GENERAL

- A. Comply with the reference standards and the following.
- B. Engineer, fabricate and install exterior components to allow for expansion and contraction for a temperature range of 150-degree F, with a metal surface of 180-degree F without causing buckling, excessive opening of joints, and over-stressing of welds and fasteners.
- C. Drill holes for bolts and screws. For screws exposed to view in finished surfaces use FHCS type with screw slots filled and finished flush and smooth with adjacent surfaces.
- D. Form exposed work true to line and level with accurate angles and surfaces, and straight, sharp edges, so assembling can be done without filler pieces.
- E. Shear and punch metals cleanly and accurately. Remove burrs.
- F. Remove sharp or rough areas on exposed surfaces. Projecting edges are not permitted. Ease exposed edges to a radius of approximately 1/32-inch.
- G. Weld corners and seams continuously to comply with AWS recommendations and the following:
 - 1. Do not use stitch, spot or tack welds on exposed surfaces.
 - 2. For work exposed to view, provide weld quality and finish equal to NOMMA Finish #1. Elsewhere provide weld quality and finish equal to NOMMA Finish #4.
 - 3. Use materials, methods and welding sequence that minimize distortion and develop strength and corrosion resistance of base metals.
 - 4. Obtain fusion without undercut or overlap.
 - 5. Remove welding flux immediately.
 - 6. At exposed connections, undercut edges of components to be welded, weld and finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing and contour of welded surface matches those adjacent.
 - 7. Where welds will be exposed to the elements, weld connections between various pieces continuously to prevent water intrusion in the weld area, or seal welded parts, after weld is ground, with silicone sealant specified in Section 07 92 00.
- H. Form bent metal corners to the smallest radius possible without causing grain separation or otherwise impairing the strength of the material.
- I. Form exposed connections with flush, hairline joints, using concealed fasteners wherever possible. Cope intersections of rails and posts, weld joints, and grind smooth; butt weld end-to-end joints of railings or use welding connectors.
- J. Bend pipe without collapsing or deforming its walls, to produce a smooth, uniform curved section and to maintain uniform sectional shape.
- K. Fabricate joints that will be exposed to the weather with weep holes where water or condensation may accumulate.
- L. Fabricate items to be galvanized in accordance with ASTM A 385. Limit use of vent and drain holes and locate where concealed from view in the finish work.
- M. Cut, reinforce, drill, punch, thread and tap metal work as required to receive finish hardware and similar items of work.
- N. Fabricate items in the largest Sections practical to minimize field jointing.
- O. Provide supplementary parts necessary to complete each item of metal fabrication even though such parts may not be shown or specified. Provide all anchors, brackets, and sleeves for securing metal work to adjacent construction.
- P. Remove blemishes by grinding before cleaning, treating, and applying specified finishes.

2.5 PIPE RAILING FABRICATION

- A. General: Fabricate handrails and 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 handrails and 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.
- C. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Connect members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose when acceptable to the Design Consultant. Weld connections continuously to match approved samples.
- E. Brackets, flanges, fittings, and anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other work, unless otherwise indicated.
 - 1. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
 - 2. For railing posts set in concrete, unless otherwise indicated, provide preset sleeves of steel not less than 6-inch long with inside dimensions not less than 1/2-inch greater than outside dimensions of post, and steel plate forming bottom closure.
- F. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- G. Fabricate joints to be exposed to weather to be watertight.
- H. Close exposed ends of handrail and railing members.
- I. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4-inch or less.
- J. Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.6 CASTINGS FABRICATION

- A. Make castings of uniform quality, well cleaned, free from blowholes, swells, cracks, porosity, hard spots, shrinkage distortion and other defects. In addition, castings shall be free of fins, burrs and slag.
- B. Fabricate castings to the dimensions indicated with a tolerance of plus 1/8-inch, except that in the dimensions of covers and the openings to receive them, tolerance shall be limited to 1/16-inch.
- C. Machine horizontal bearing surfaces of covers subject to vehicular and pedestrian traffic with machined bearing on contact surfaces for other joints.

2.7 WELDING

- A. Weld shop and field connections continuously in compliance with AWS D1.1, Structural Welding Code - Steel, and AWS D1.3, Structural Welding Code - Sheet Steel, unless bolted connections are specifically shown.
- B. Grind welds that will remain exposed, smooth and flush to match and blend with parent metal surfaces. Match approved weld samples.

2.8 GALVANIZING

- A. Follow procedures outlined in ASTM A 1430 to safeguard against and test for possible embrittlement. Unless fabricated from galvanized materials, hot-dip galvanize exterior ferrous metal items and items installed in exterior walls, which are totally or partially exposed to the weather, after their fabrication in compliance with ASTM A 123 or A 153, as applicable
- B. Excessive dross, rough surfaces, blisters, lumpiness, runs, edge tears, spikes, and chromate quenching are unacceptable.
- C. Safeguard assemblies against steel embrittlement in compliance with ASTM A 143, and against distortion in compliance with ASTM A 384.
- D. Coating weight shall conform to Table 1 of ASTM A 123, or ASTM A 153, as applicable.
- E. Plug vent holes with lead or silicone sealant after galvanizing.
- F. If necessary to prevent humid storage staining, quench freshly galvanized steel in a passivating solution.
- G. Safety posts:
 - 1. Attach to the ladders side rails in accordance with the post manufacturer's instructions.
 - 2. Verify that posts lock securely in "up" position.
 - 3. Adjust and lubricate for smooth operation.

2.9 FABRICATION TOLERANCES

- A. Squareness: 1/8-inch maximum difference in diagonal measurements.
- B. Maximum offset between components at joints: 1/16-inch except that at welded joints no offset is allowed.
- C. Maximum misalignment of adjacent members: 1/16-inch.
- D. Maximum bow: 1/8-inch in 48 inches.
- E. Maximum deviation from plane: 1/16-inch in 48 inches.

2.10 SHOP PRIMING

- A. Apply a heavy coat of bituminous paint to metal surfaces that will be in contact with cementitious materials. Do not apply on exposed surfaces.
- B. Shop prime all other metal assemblies as follows:
 - 1. Prepare surfaces in accordance with the following:
 - a. SSPC SP3, Power Tool Cleaning for interior surfaces.
 - b. SSPC-SP6, Commercial Blast Cleaning for surfaces to be primed with zinc-rich primer.
 - 2. Remove loose mill scale, rust, cutting and punching burrs, oil, grease and other deleterious materials before priming.
 - 3. Immediately after surface preparation, apply primer in compliance with the paint manufacturer's instructions to provide a uniform dry film thickness of not less than 1-1/2 mils per coat. Use painting methods that will result in full coverage of joints, corners, edges and all exposed surfaces.
 - 4. Apply primer to completely cover all exposed surfaces as well as surfaces concealed after assembly. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - 5. Allow paint to dry thoroughly before handling.
 - 6. Apply one coat of primer to surfaces exposed in the finished work, and 2 coats to surfaces that will be inaccessible after their assembly or erection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Fastening:
 - 1. Provide anchorage devices and fasteners required for attaching metal fabrications to in-place construction, including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors required.
 - 2. Dry-pack metal fabrications supported on concrete and masonry as specified in Section 03 30 00 to provide firm, level bearing surfaces.
- B. Cutting, fitting and placing:
 - 1. Perform cutting, drilling and fitting required for installation of metal fabrications.
 - 2. Set items accurately in their proper location, alignment and elevation, plumb, level, true and free of rack as measured from established lines and levels.
 - 3. Provide temporary bracing or anchors for items to be built into concrete, masonry or similar construction.
 - 4. Fit exposed connections accurately to form flush, hairline joints.
 - 5. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and flush with parent metal.
- C. Field welding: Comply with AWS Code for procedures of manual shielded arc welding, appearance and quality of welds made, and methods used to correct faulty welds.
- D. Prefabricated units: Install as specified, and in compliance with their manufacturer's instructions.
- E. Safety posts:
 - 1. Attach to the ladders side rails in accordance with the post manufacturer's instructions.
 - 2. Verify that posts lock securely in "up" position.
 - 3. Adjust and lubricate for smooth operation.
- F. Installation tolerances: Adjust metal fabrications for squareness, alignment, twist, levelness and plumbness to the following tolerances.
 - 1. Squareness where applicable: Plus or minus 1/16 inch, measured on the diagonal.
 - 2. Alignment: Plus or minus 1/16 inch where fabrications are separated by one inch or more; where components join or are separated by less than one inch, components shall be aligned; no deviations permitted.
 - 3. Twist: Plus or minus 1/16 inch, except that deviation shall be such that joined panelized components are flush at joints; no deviations permitted.
 - 4. Plumbness: Plus or minus 1/16 inch, except that deviation shall be such that joined panelized components are flush at joints; no deviations permitted.
 - 5. Levelness: 1/8 inch from level, except where tighter tolerances are required for joining or alignment with adjacent work.
 - 6. Deviation from theoretical location in plan: 1/4 inch, except where tighter tolerances are required for joining or alignment with adjacent work.

3.3 TOUCHUP

- A. General: Immediately after erection, clean field welds, bolted connections and abraded areas, and proceed as follows.
- B. Damaged primer: Clean the damaged area, sand smooth, re-clean and spot-prime with the same paint as that used for shop priming applied to a minimum thickness of 2 dry mils.
- C. Damaged zinc coating:
 - 1. Clean abraded area in accordance with SSPC-SP11, "Power Tool Cleaning" to bare metal all welds and damaged zinc coating. Extend cleaning 2 inches past damaged area.
 - 2. Spot prime damaged area with Tnemec "94-H20 Hydro-Zinc" applied at 2.5 to 3.5 Mils DFT.
- D. Where galvanized surface will remain exposed in the Work, repair damaged areas with zinc-based solder in accordance with ASTM A 780, regardless of the width of the abrasion (not limited to 3/16 inch).

END OF SECTION

SECTION 05 52 00 - STAINLESS STEEL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes exterior stainless steel handrails and railings.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 05 for all other railings.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC) www.usgbc.org.

1.3 SUBMITTALS

- A. Shop Drawings: Large scale, dimensioned, indicating in detail methods of fabrication and assembly, welds, weight, materials, holes, lugs, inserts, fasteners, finishes and other pertinent data.
- B. Data: Manufacturer product data consisting of the following.
 - 1. Specifications and installation instructions for railings.
 - 2. Manufacturer's literature, including engineering data, for drilled-in anchors and shot pins.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
- D. Closeout: With closeout submittals furnish to the City the fabricator's recommendations for maintenance of the ornamental metals surfaces.

1.4 QUALITY ASSURANCE

- A. Fabricator qualifications:
 - 1. Successfully engaged in the manufacture of ornamental metal work, similar to the work described in this Section and indicated on the Drawings, for a minimum of 5 years.
 - 2. Fabricator qualifications are subject to Design Consultant's review and approval before subcontract is awarded.
- B. Welding work qualifications:
 - 1. Qualify welding procedures and welding operators in compliance with AWS "Qualification" requirements for AWS D1.1.
 - 2. Verify that welders to be employed in this work have satisfactorily passed AWS qualification tests.

3. If recertification of welders is required, retesting will be Contractor's responsibility.

C. Mockup:

1. Erect at the Project site, unless otherwise acceptable to the Design Consultant, a mockup of one assembly for the Design Consultant's review and approval.
2. Make mockup complete with all accessories, features required for the final assemblies.
3. Mockup size and features: TBD.
4. Make modifications necessary to achieve mockup satisfactory to the Design Consultant, or remove and construct additional mockups.
5. Approved mockup shall serve as the standard for the same work on the building.
6. Remove mockups only after completion and acceptance of final work unless its incorporation in the Work is authorized by the Design Consultant.
7. Protect mockups until its removal.

1.5 HANDLING

- A. Protect fabrications with strippable coating or other forms of protection standard with the fabricator for exposed metal surfaces.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General:

1. Select materials for their surface flatness, smoothness and freedom from blemishes wherever exposed to view in the finished work.
2. Materials shall have been cold-rolled, cold-finished, cold-drawn, extruded, stretcher-leveled and machine cut to the highest commercial standards for flatness, with edges and corners sharp and true to angle or curvature as required.
3. Exposed-to-view surfaces which exhibit pitting, seam marks, roller marks, oil-canning, stains, discolorations or other imperfections will not be acceptable and shall be removed from the job site.

B. Stainless steel:

1. Type: ASTM A 666, Type 302/304.
2. Sheet, strip, plate, and flat bar: ASTM A 666, Type 304.
3. Bar stock: ASTM A 276.
4. Tubing: ASTM A 269.

- C. Welding electrodes and filler metal: Type and alloy recommended by producer of the metal to be welded, as required for color match, strength and compatibility in the fabricated items.

- D. Fasteners: NAAMM Type 305 stainless steel.

- E. Bituminous paint: Cold-applied asphalt mastic complying with SSPC Paint 12, except containing no asbestos fibers.

2.2 FABRICATION

- A. Design components to allow for expansion and contraction for a temperature range of 120-degree F, ambient, 180-degree F, material surfaces, without causing buckling, excessive opening of joints, and overstressing of welds and fasteners.
- B. Design assemblies to minimize site welding.
- C. Form metal work to the required shapes.
- D. Welding: Comply with AWS and the metal producer's recommendations.
 - 1. Use welding for joining pieces together, unless otherwise accepted by the Design Consultant on shop drawings.
 - 2. Welds shall be continuous, except where stitch and spot welding are specifically permitted.
 - 3. Make welded joints light-proof and tight. Close welded joint to air and water infiltration by welding interface completely.
 - 4. Use only technicians qualified to weld stainless steel using TIG equipment.
 - 5. Maintain proper welding temperature to avoid discoloring adjacent metal components.
 - 6. Clamp parts in jigs during welding to avoid distortion.
 - 7. Undercut metal edges where welds will be ground flush and dressed smooth.
 - 8. Grind welds exposed to view flush, and fill and dress to match adjacent parent metal surfaces so that joint will be invisible in the Work.
 - 9. Welds on or behind surfaces that will be exposed to view shall be done so that finished surface will be free of imperfections such as pits, runs, splatter, cracks, warping, dimpling, depressions or other forms of distortion or discoloration.
 - 10. Remove weld spatter and welding oxides from welded surfaces.
- E. Cut components square. Remove burrs from cut edges. Mill joints to a tight, hairline, flush fit. Cope or miter corner joints.
- F. Unless otherwise shown or accepted on the shop drawings, conceal fasteners in the finish work. Back-up joints with either sleeves or back-up plates.
- G. Built-in work: Furnish anchor bolts, inserts, plates and other anchorage devices, and all other items for metalwork to be built into concrete, masonry, or work of other trades, with necessary templates and instructions to facilitate proper placing and installation.

2.3 FINISHING EXPOSED METAL SURFACES

- A. Finish exposed stainless steel surfaces with a NAAMM No. 4 finish (180 grit) with the grain belting running parallel with the long dimension of the component being fabricated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 PREPARATION

- A. Furnish shop drawings, templates and inserts for work to be embedded in work of other trades.

3.3 INSTALLATION

A. General:

1. Do not install components damaged or defective in any way. Remove and replace members damaged during installation or thereafter, before Final Acceptance.
2. Do not cut, trim or weld parts during erection, where it would damage the finish, decrease the strength, or result in a visual imperfection or a failure in performance of the work.
3. Return components which require alteration to the shop for refabrication, if possible, or for replacement by new parts.
4. Install work with tight joints accurately fitted and aligned.
5. Where cutting is required for proper fitting and jointing, restore finish to eliminate evidence of corrective work.
6. Joints at changes in direction in stainless steel railings shall be shop welded; field joints shall be a minimum of 2 feet from a change in direction, and assembled with concealed sleeves or back-up plates and set screws.
7. Install this work with concealed fasteners.
8. Apply a bituminous coating of approximately 30 mils DFT, or other suitable permanent separator, on surfaces of dissimilar metals (except where exposed to view) and metal surfaces in contact with cementitious materials. Where the metals are exposed to view, provide a plastic or neoprene separators between dissimilar metals.
9. Comply with AWS Code for manual shielded metal-arc welding procedures, the appearance and quality of welds made, and the methods used in correcting welding work which must be approved by the Design Consultant in each case.

B. Fastening to in-place construction:

1. Set this work accurately in location, alignment and elevation, plumb, level or sloped to follow ramped conditions, and true to line, measured from established lines and levels.
2. Provide required anchorage devices and fasteners for securing ornamental metals to in-place construction; coordinate the embedment of anchors with the work of Section 03 30 00.

3.4 TOUCHING-UP/CLEANING/PROTECTING

- A. Field repair damaged components and finishes when the results are satisfactory to the Design Consultant, otherwise replace with undamaged new components.
- B. Restore protective coverings damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at the same location.
- C. Clean and protect exposed surfaces at completion of this work and protect assemblies from damage and stains until final acceptance.

END OF SECTION

DIVISION 06

WOOD AND COMPOSITES

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Wood framing and furring.
2. Wood grounds, nailers and blocking.
3. Plywood sheathing, subflooring and underlayment.
4. Rough hardware and fasteners.

B. Work furnished but installed in other Sections: Division 03 for anchor bolts.

C. Related requirements:

1. Division 01 for LEED requirements.
2. Other Section of Division 06 for architectural woodwork and for finish carpentry and millwork.
3. Division 26 for plywood backboards for electrical and telephone equipment.

1.2 DEFINITION

- A. Exposed framing refers to dimension lumber not concealed by other construction and indicated to receive a stained or natural finish.

1.3 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.4 SUBMITTALS

- A. Wood treatment data: Treatment manufacturer's instructions for proper use of each type of treated material.

B. Pressure treatment:

1. For each type specified, include certification by treating plant stating chemicals and process used, net amount of preservative retained and conformance with applicable standards.
2. For water-borne preservatives, include statement that moisture content of treated materials was reduced to a maximum of 19 percent prior to shipment to Project site.

- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit MR 7, Certified Wood.
6. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
7. Credit EQ 4.1, Low Emitting Materials, Paints.
8. Credit EQ 4.1, Low Emitting Materials, Composite Wood.

1.5 HANDLING

- A. Procedure: In accordance with AWWPA recommendations for storage and protection of pressure-treated wood.
- B. Storage:
 - 1. Do not store materials in wet or damp areas. Keep materials dry. Protect against exposure to weather and contact with damp or wet surfaces.
 - 2. Stack lumber, plywood and other panels to provide for air circulation within and around stacks and under temporary coverings.
 - 3. Protect plywood from moisture by covering with waterproof coverings until the plywood has been covered with a finish material, or the building has been completely enclosed.
 - 4. Protect materials from damage during unloading and storage. Do not use damaged materials, or plywood panels with damaged corners, except after removing damaged portion.

PART 2 - PRODUCTS

2.1 FRAMING LUMBER

- A. S4S grade-marked Douglas Fir/Larch, of the grades and sizes indicated on the Drawings, manufactured and graded according to WCLIB or WWPA rules.
- B. Sizes indicated are nominal. Actual sizes shall conform to NIST PS 20.
- C. Lumber up to 2-inch thick shall be seasoned to a moisture content of 19 percent or less and be stamped "S-Dry." Lumber over 2-inch thick can be shipped unseasoned and stamped "S-Green".
 - 1. For exposed framing lumber provide material complying with the following requirements:
 - 2. Grading:
 - a. Material hand-selected at factory from lumber that complies with "Appearance" grade requirements of ALSC National Grading Rule; issue inspection certificate of inspection agency for selected material.
 - b. Unless otherwise indicated, provide lumber of same species and grade as indicated for structural framing.
- D. Grade-stamp: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
 - 1. For lumber that will remain exposed, furnish pieces with grade stamp applied to ends or back of each piece; or omit grade stamp entirely and provide certificates of grade compliance issued by inspection agency.

2.2 PLYWOOD SHEATHING

- A. Structural plywood – roof and wall sheathing: APA grade-stamped Douglas Fir plywood of the grades indicated on the Drawings and complying with US Product Standard PS-1.
- B. Plywood used as a substrate directly under PVC roofing: Minimum 1/4-inch thick, Exterior Grade, with a B or a C-plugged face under the roof membrane.
- C. Do not use OSB.

2.3 ACCESSORIES

- A. Builder's rough hardware: Verify that fasteners for pressure-treated wood will not corrode due to treatment materials used in the manufacture or present at time of use when in the presence of moisture. Use hot-dip galvanized or stainless steel fasteners where carpentry will remain exposed to the weather.
- B. Fasteners:
 - 1. General:
 - a. For pressure-treated wood, use hot-dip galvanized (not electro-plated) fasteners complying with G185 to attach pressure-treated wood.
 - b. Use hot-dip galvanized fasteners to attach exterior work.
 - c. In all cases use fasteners of size and type indicated, or if not indicated complying with Code. Use annular ring or screw nails for floor sheathing.
 - d. Nails to be used with framing accessories shall be those furnished by the manufacturer with the framing accessories.
 - 2. Anchor bolts: ASTM A 307 or A 36, non-headed type, hot-dip galvanized when used in contact with pressure-treated lumber.
- C. Metal framing accessories: Code-approved galvanized or cadmium-plated steel joist hangers, framing anchors, fasteners and other such connection devices of standard manufacture and of the types indicated, Simpson Strong Ties, KC Metals Superspeed, or equal. Use offset and skewed hangers, where required by framing geometry.
- D. Construction adhesive (roof sheathing): ASTM D 3498 with VOC no more than 70 g/l when computed in accordance with 40 CFR 59, subpart D (EPA Method 24), Franklin International Titebond, Bostick Chem-Calk, Schnee-Morehead SM9200, Grabber Subfloor Adhesive, or equal.
- E. Flashing at perimeter of exterior openings: 6-inch wide Sealtight Air-Shield by WR Meadows, Ice and Water Shield by WR Grace, or equal.
- F. Building paper: Rosin-sized building paper 0.010-inch thick, or 15 lb. unsaturated felt.
- G. Sill sealer:
 - 1. Protecto Wrap "Premium Energy Sill Sealer."
 - 2. Amofoam "Sill Sealer."
 - 3. Dow Chemical Co. "Sill Seal Gap Filler."
 - 4. Owens Corning "Foamsealr Sill Plate Gasket."
 - 5. Sandell Manufacturing "AF 500 Sill Seal."
- H. Plate liner (use under sill plate on sheathing): "Protecto Energy Plate Liner" by Protecto Wrap.

2.4 TREATMENT OF LUMBER AND PLYWOOD

- A. Preservative treatment by pressure process: AWP C2 (lumber) and AWP C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWP C31 with inorganic boron (SBX).
 - 1. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - 2. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

3. Application: Treat items indicated on Drawings, and the following:
 - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing.
 - b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - c. Wood framing members less than 18 inches above grade.
 - d. Wood floor plates that are installed over concrete slabs directly in contact with earth.
- B. Fire retardant treatment: TBD.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 GENERAL

- A. Erect framing neatly and substantially to best trade standards, including preparatory work for subsequent trades and conditions not actually detailed.
- B. Unless otherwise indicated. Do not space framing and furring members over 16 inches o.c.
- C. Selection of lumber pieces:
 1. Carefully select all members. Select individual pieces so that knots and defects will not interfere with placement of bolts, with nailing or when making connections.
 2. Cutout and discard pieces with defects that make the piece unable to serve its intended function. The Design Consultant may reject lumber, whether or not it has been installed, for excessive warp, twist, bow, crook, mildew, fungus or mold, as well as for improper cutting or fitting.
 3. Do not shim sills, joists, short studs, trimmers, headers, lintels and other framing members.
- D. On framing and furring members to receive a finished wall or ceiling, align the finish surface to vary not more than 1/8-inch from a theoretical plane or surfaces of the room or space, unless more stringent tolerance is specified. Make corners square.
- E. Install wood screws and lag bolts with complete penetration up to head. Bore lead holes approximately 3/4 of diameter and same depth as shank; continue holes to a depth equal to length of the screw but with diameter approximately 3/4 of thread root.
- F. Drill holes in pieces where splitting may occur.
 1. Remove split lumber and replace with new members.
 2. Fasten framing anchors and steel bridging with galvanized special nails furnished with hardware in every nail hole, except where noted to be welded to structural steel supports in which case comply with AWS requirements.
- G. No penetrated nail points are allowed in exposed construction.
- H. Install sill plates on continuous layer of "Sill Sealer" held in place temporarily with compatible adhesive. Seal plate continuously to foundation wall with Protecto Wrap "Triple Guard Energy Sill Sealer."

- I. Where possible, assemble nailed joints so that load acts at right angle to the nail (shear). Where nailing at right angle is impossible, toe-nail at an angle approximately 30-degree to the wood grain.
- J. Tighten bolts and re-tighten shortly before being covered.
 - 1. Make bolt holes in wood the same diameter as the bolt. After tightening, nick bolt threads to prevent nut loosening.
 - 2. Provide bolts and lag screws with washers under heads and nuts that bear on wood.
 - 3. Where a finish material will be installed over the bolt, install bolt head or nut so that they are recessed or flush with the face of the member being bolted.
- K. Anchor sills with fasteners of the size and spacing indicated. Provide a minimum of 2 fasteners per piece. Bed sill on cement/sand dry-pack (1:3 mix) for full bearing where the floor is irregular.
- L. Do not cut or notch structural members, except as indicated or directed by the Design Consultant. Reinforce interrupted members as detailed.
- M. Make joints accurately and neatly for a square, tight fit. Remove and replace defective work.
- N. Frame walls and partitions at corners and intersections so no wall material can extend from one room to another. Where 2 or more studs are cut, provide header beams over the opening.
 - 1. Extend wall and partition studs and mullions continuously from sill to plate, unless otherwise indicated. In stud walls and partitions, extend at least one stud from sill to plate on each side of interior openings and 2 studs on each side of exterior openings. In addition, place one stud trimmer to support each end of lintels over openings.
 - 2. Double plates unless a lintel replaces the lower member. Stagger plate joints at least 4-feet.
 - 3. Frame stud partitions, furring or walls containing electrical panels, plumbing, or other pipes to give required clearance for piping and fixtures. Do not place pipes exceeding 1/3 of plate width in partitions used as bearing or shear walls. Locate in furring clear of studs unless detailed otherwise. Place approved piping in center of plates using a neat hole; no notching will be allowed. Pipes shall not pass through plates less than 5-1/2-inch wide.
- O. Install joists, lintels, beams and rafters with crown up, unless otherwise noted. Cut members making structural contact with bearings or each other for full bearing.
- P. No splices are permitted in structural members.
- Q. Treat field cuts and penetration in pressure-treated lumber in compliance with AWPA M4.
- R. Provide flashing membrane, minimum of 6-inch wide at perimeter of exterior openings. Lap in the direction of water flow.
 - 1. Where no solid backing exists to support the flashing membrane, provide either plywood, or tight, solid blocking between studs. Membrane must be solidly supported at all locations.

3.3 PLYWOOD SHEATHING

- A. Layout and attach to supports as indicated on the Drawings. Use screws for roof sheathing directly under the PVC roofing membrane; DO NOT use nails. Drive screws slightly below the surface of the plywood without breaking the plywood face layer. Replace misplaced screws by removing completely and driving new screws in solid roof framing member.
 - 1. Install plywood with 1/16-inch space between panels for expansion and contraction. Do not force panels in place.

2. Place end joints over supports with structural plywood roof sheathing face grain running perpendicular to supports except as otherwise shown. Install top layer of roof sheathing perpendicular to the base layer.
 3. Solid block unsupported panel edges in all cases for structural roof sheathing; where indicated elsewhere.
- B. Install floor sheathing with best side up. Fasten with construction adhesive and annular ring or screw nails.
1. Comply with APA requirements for glued floor system.
 2. Where a double layer is indicated, cover first layer of plywood with building paper stapled, and joints lapped 2-inches. Cover the building paper with a second layer of plywood with joints staggered at least 16-inches from first layer.
- C. Cover roof sheathing with roofing material as soon as possible after installation. Do not leave exposed to the elements longer than 2 days.

3.4 BLOCKING/FURRING/BRIDGING/NAILERS

- A. Blocking:
1. Solid block joists and rafters over all supports with blocking of the same size and material as the joist or rafter.
 2. Provide fire blocking where required by Code. Locate other blockings to facilitate installation of finishing materials, fixtures, trim and soffits.
- B. Furring:
1. Continuous and spaced at 16-inches o.c. maximum.
 2. Install plumb and level. Shim where necessary to provide a true, even plane suitable to receive the finish required.
 3. Attach to concrete and masonry with shot pins in pre-drilled holes.
- C. Bridging:
1. Use 2 by 3 inches cross bridging, 2 inches solid bridging or 16-gage galvanized metal bridging.
 2. Nail bottom ends of bridging only after sheathing has been nailed.
- D. Nailers:
1. Provide nailers at connections of wood materials, and other finish materials to concrete, CMU and metal framing.
 2. Template and drill nailers to match holes provided in steel framing and clips and install same, furnishing necessary bolts and washers.

3.5 CLEANING

- A. Dispose of pressure-treated wood in authorized disposal area. Do not bury wood on the jobsite.

END OF SECTION

SECTION 06 10 53 – WOOD COMPOSITE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Wood composite decking (Trex).
 - 2. Rough hardware.
 - 3. Plywood backboards for electrical and telephone equipment.
 - 4. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Samples: 12-inch long samples of wood composite.
- B. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit MR 7, Certified Wood.
 - 6. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 7. Credit EQ 4.1, Low Emitting Materials, Paints.
 - 8. Credit EQ 4.1, Low Emitting Materials, Composite Wood.

PART 2 - PRODUCTS

2.1 MANUFACTURER/TYPE

- A. Trex Co., Inc., or equal.

2.2 MATERIALS

- A. Wood composite: Trex lumber by of type and color selected by the Design Consultant from the manufacturer palette.
- B. Rough hardware:
 - 1. For wood composites, use stainless steel screws and Trex Co., Inc. "Start/Stop Clips" and "Connector Clip" for concealed fasteners.
 - 2. Elsewhere, use hot-dip galvanized (not electro-plated) fasteners complying with G185 to attach pressure-treated wood.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing supports and verify that the surface of any framing member does not vary more than 1/4-inch from the plane of faces of adjacent members.
- B. Correct detrimental conditions before proceeding with installation.

3.2 DECKING INSTALLATION

- A. Install on wood composite sleepers.
- B. Set lumber pieces parallel to building features, nail-spaced using 16p nails, unless otherwise indicated.
- C. When cutting composite lumber, finish cut edges to match factory-finished edges.
- D. Attach to sleepers in accordance with manufacturer's instructions using concealed clips. Where fastening with screws is unavoidable, recess screws a maximum of 1/2-inch and plug screws holes.

END OF SECTION

SECTION 06 18 00 - GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section Includes: Provisions of glued-laminated wood items as indicated in the contract drawings.
- B. Related Section:
 - 1. Section 06 10 00 - Rough Carpentry
 - 2. Section 01 81 13 - "SUSTAINABLE DESIGN REQUIREMENTS": LEED Requirements

1.2 REFERENCES

- A. Requirements of GENERAL CONDITIONS and DIVISION NO. 1 apply to all Work in this Section.
- B. Published specifications standards, tests, or recommended methods of trade, industry, or governmental organizations apply to Work in this Section when cited by abbreviations noted below (latest additions apply).
 - 1. California Code of Regulations. Title 24, 2007 edition, also known as California Building Code (CBC).
 - 2. American Institute of Timber Construction Standards.
 - a. AITC 110 - Standard Appearance Grades for Structural Glued Laminated Timber.
 - b. AITC 111 - Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection.
 - c. AITC 113 - Standard for Dimensions of Glued Laminated Structural Members.
 - d. ANSI/AITC 190.1 - Standard for Structural Glued Laminated Timber.
 - e. AITC 117 – Standard Specifications for Structural Glued Laminated Timber of Softwood Species
 - f. AITC 119 - Standard Specifications for Structural Glued Laminated Timber of Hardwood Species
 - g. AITC 109 - Standard for Preservative Treatment of Structural Glued Laminated Timber.
 - h. AITC 404 – Standard for Radially Reinforcing Curved Glued Laminated Timber Members to Resist Radial Tension
 - 3. American Society of Testing and Materials (ASTM).
 - 4. American Wood Preservers Association.
 - a. AWP Standard T1 – "Processing and Treatment Standard"
 - b. AWP Standard U1 – "Use Category System: Use Specification for Treated Wood"
 - 5. US Green Building Council (USGBC), www.usgbc.org

1.3 QUALITY ASSURANCE

- A. Source Quality Control: Manufacturing and quality assurance procedures shall be in accordance with ANSI/AITC A190.1 and CBC 1704.6.
 - 1. Glued laminated members shall be identified by mark and report pertinent data as follows:

- a. Species, grade and slope of grain of lumber meets specification.
- b. Glue is of quality specified.
- c. Glue bond is over entire surface, and specified pressure and temperature has been adhered to.
- d. Moisture content meets specifications.

1.4 SUBMITTALS

- A. Submit Shop drawings showing complete layout, fabrication, and erection drawings. Drawings shall show all members, including shop cuts and holes, dimensions, laminations, scarfing, adhesive type, moisture content, lumber grade and finish.
- B. Submit AITC or equal Certificate of Conformance indicating that members are in conformance with product standard ANSI/AITC A190.1.
- C. Sample of Preservative – Treated glulam timber to architect for color and appearance.
- D. LEED certification product data as specified in Division 1, Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 1. Credit MR 4.1 & 4.2, Recycled Content
 2. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally
 3. Credit MR 7, Certified Wood
 4. Credit EQ 4.4, Low Emitting Materials, Composite Wood & Agrifiber Products

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Do not deliver members to site until adequate preparation for storage is made. Do not erect members until preparation to receive are completed including installation of miscellaneous metal and connecting hardware.
- B. Store member on support not less than twelve (12) inches above ground or one and one-half (1-1/2) inches above concrete slab on grade.

1.6 JOB CONDITIONS

- A. Protection
 1. Wrap individual members for protection during shipment, storage and erection, using Sisalkraft paper without adhesive in accordance with AITC 111. Protect members after erection until acceptance of Work. All field-trimmed ends of surfaces must receive a coat of penetrating-type sealer prior to erection.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber: Lumber used shall be uniformly manufactured and shall be Douglas Fir (Laminating Grades), Grade Combination as noted in the Structural Drawings, graded in accordance with the Standard Grading and Dressing Rules No. 17 of the West Coast Lumber Inspection Bureau with the following additional requirements: Each piece shall be grade marked or certified prior to selection for laminating. When lumber to be used for lamination is resawn, the new size shall meet the grade requirements.
- B. Glues: Use exterior type adhesive conforming to ASTM D2559, resin adhesive of phenol, or melamine base applied in accordance with manufacturer's recommendations. Approved adhesives shall be those which have been acceptably certified as performing satisfactorily for mixing, spreading, storage life, pot life, working life and assembly life recommendations.
- C. Laminating Combinations for Douglas Fir shall meet 24F-V4 for simple beams and 24F-V8 for cantilevered beams (tension lams top and bottom).
- D. Preservative Treatment

1. Water-borne preservative treatment conforming to AITC 109.
2. Provide treatment which is either neutral in color or leaves a light brown tint.

2.2 FABRICATION

- A. Fabrication shall be in accordance with the best shop practices, with adequate plant and equipment, and under the supervision of properly qualified personnel, and shall comply with the Standards established by the American Institute of Timber Construction.
- B. The fabricator shall provide adequate facilities and equipment so that laminations are prepared, selected, spread, laid-up, clamped and set within the adhesive manufacturer's specified time limit.
- C. The fabricator shall provide extra length of at least six (6) inches at each end for field trim of all members, or he shall verify field dimensions prior to fabrication of members to ensure proper fit. All holes for connections shall be field drilled for proper fit, unless otherwise shown.
- D. At the time of gluing, the lumber shall be conditioned to a moisture content conforming to AITC/ANSI 190.1, Section 4.3.9.
- E. Surfaces of laminations to be glued shall be clean, and shall be free from oil, dust, and other foreign matter which will be detrimental to satisfactory gluing.
- F. Laminations shall be machine finished, but not sanded, to a smooth surface and to a uniform thickness, with a maximum allowable variation of 1/64". Wrap, twist or other characteristics which will prevent intimate contact of adjacent glued faces, or interfere with uniform bending to the required curvature when under clamping pressure shall not be permitted.
- G. Glue shall be applied to both sides of each lamination, except for the outer laminations. Mechanical spreaders shall be used, except at scarfs.
- H. The clamping time and curing processes required for the setting of adhesives manufacturer's recommendations. Gluing pressure shall be uniform and shall be at least one hundred (100) lbs. per square inch and the minimum pressure shall assure close contact of the wood surfaces and provide a uniformly thin glue line.
- I. All end joints shall comply with AITC/ANSI A190.1.
- J. Appearance Grade: Appearance of members shall be Industrial grade if concealed by finishes; Architectural Grade if exposed.

2.3 PRESERVATIVE TREATMENT

- A. All exterior exposed glulam timbers shall be preservative treated.
- B. Douglas Fir glulams shall be treated prior to gluing.
- C. Retention and penetration requirements shall be those shown in AITC 109.
- D. Inspect treated members prior to gluing per AWPA M2, "Standard for Inspection of Wood Products Treated with Preservatives." A quality mark shall be furnished by the treater to the laminator identifying the type of treatment used and that treatment conforms to the requirements of CBC Section 2303.1.8.1.

PART 3 - EXECUTION

3.1 ERECTION

- A. General: Erection shall be in accordance with the best practices, with adequate personnel and equipment and under experienced, qualified supervision. Unless otherwise specified, erection shall conform with standards established by the American Institute of Timber Construction.
- B. Methods of Erection: Prior to starting work the Contractor shall submit to the Architect a description of the methods, sequence of erection and type of equipment he proposes to use for erecting the timber work. This submission and/or review shall not relieve the Contractor

of his responsibility for providing the proper methods, equipment, workmanship or safety precautions necessary to satisfactorily complete the work.

C. Framing and Bracing:

1. All glued-laminated timber work shall be erected true and plumb, temporary bracing shall be used wherever necessary and shall be adequate for all vertical and lateral loads to which the structure may be subjected, including wind and erection equipment and operation of same. Leave temporary bracing in place as long as may be required for safety, and until final framing construction is completed.
2. Wherever piles of materials, erection equipment or other loads are carried by the timber during its erection and until it is braced by final construction, proper provision shall be made to take care of the stresses resulting from such construction loads.
3. No final connections shall be made until the structure has been properly aligned.
4. Notify the Architect at least 2 working days in advance of all erection.

D. Temporary Construction Platforms: All temporary flooring, planking and scaffolding necessary in connection with the erection of the timber framing or the support of erection machinery shall be provided as part of the erection work. The temporary floors and scaffolding shall conform to the requirements of municipal and/or state laws and governing safety regulations.

E. Fabrication Errors: The cutting or drilling of timber members in the field for the correction of fabrication errors will not be permitted without prior written approval from the Structural Engineer.

F. Protect treated wood from mechanical injury when handling. For handling damage, cuts, daps or drilling done in the field, the cuts and holes shall be field treated per AWWA Standard M4.

3.2 DEFECTIVE WORK

A. Any errors in fabrication or erection shall be cause for rejection of the member or members. Any necessary corrections to make the work proper shall be at the contractor's expense.

3.3 FIELD QUALITY CONTROL

A. The Owner's Testing Agency shall:

1. Inspect erected glulam framing as required to establish conformity of Work with Drawings.
2. Inspect all bolted connections.

B. Architect shall inspect exposed glulam timbers for appearance quality and be the final arbiter on acceptability.

END OF SECTION

SECTION 06 20 00 - FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes exposed, site finished, non-structural wood items other than casework:
 - 1. Interior wood frames, trim and moldings.
 - 2. Rough and finish hardware for this work.
 - 3. Nailers and blockings for the work of this Section.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 06 for rough carpentry and all other architectural woodwork.
 - 3. Division 08 for wood doors and all other hardware.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org .

1.3 SUBMITTALS

- A. Shop drawings: Detailed, large shop drawings showing materials, dimensions, profiles, and fabrication details.
- B. Samples:
 - 1. Minimum twelve-inch length of each type of wood and finish.
 - 2. Full size samples of each type of hardware.
 - 3. Approved samples will serve as Design Consultant's control samples.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit MR 7, Certified Wood.
 - 6. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 7. Credit EQ 4.1, Low Emitting Materials, Paints.
 - 8. Credit EQ 4.1, Low Emitting Materials, Composite Wood.

1.4 QUALITY ASSURANCE

- A. Installer qualifications: As specified in Section 06 40 23.

1.5 HANDLING

- A. As specified in Section 06 40 23.

1.6 PROJECT CONDITIONS

- A. As specified in Section 06 40 23.

PART 2 - PRODUCTS

2.1 LUMBER

- A. Seasoning: Wood shall be properly kiln-dried according to accepted methods for the thickness and species required in compliance with the reference WI standard.
- B. Species and grade:
 - 1. Concealed nailers and blockings: As specified in Section 06 10 00.
 - 2. Exposed surfaces: Birch or Poplar.

2.2 ROUGH HARDWARE

- A. Wood screws, nails and bolts: As selected by the Contractor.

2.3 FINISH MATERIALS

- A. Fillers, sealers, stains and finish coating systems: RJ McGlennon Co., Inc. Sherwin Williams, Sikkens, Minwax, or WD Lockwood, or equal (stains and dyes), used with compliant stains and bases.

2.4 FABRICATION

- A. General:
 - 1. Fabricate finish carpentry to the dimensions, profiles and details shown.
 - 2. Unless otherwise acceptable to the Design Consultant, do not use finger-jointed lumber.
 - 3. Where necessary to fit at site, provide ample allowance for cutting and fitting.
 - 4. Whenever possible, conceal means of fastening various parts and members together in windows. Where exposed nailing is unavoidable, neatly set nails for putty stopping.
- B. Wood trim:
 - 1. Fabricate to profiles and dimensions shown in compliance with WI section 7 and 10, Premium Grade requirements where scheduled to receive a transparent finish; Custom Grade requirements where scheduled to receive an opaque finish.
 - 2. Rout-out the back of trim members to be applied to flat surfaces, except for members with ends exposed in the finished work.

2.5 FINISHING

- A. In preparation for finish, clean woodwork and fill nail holes. Use matching wood filler where woodwork will receive a transparent finish.
- B. Finish woodwork smoothly dressed, belt-sanded at mill and hand sanded before its installation. Finish surfaces shall be free from open joints, hammer and machine marks, structural defects and surface blemishes.

- C. For woodwork scheduled to receive a transparent finish: Comply with WI Manual of Millwork and the following.
 - 1. Grade: Match the WI Grade of the finish to the WI Grade of the items to be finished.
 - 2. System: WI system No. 2, water reducible acrylic lacquer.
 - 3. Filler: Fill open grain wood.
 - 4. Staining: Match Design Consultant's control samples.
 - 5. Sheen: Match Design Consultant's control samples.
- D. Backprime woodwork on all surfaces which will be concealed with one coat of wood primer. Schedule delivery to allow time for application and drying of backprime coat before installation of woodwork for those items that are not backprimed in the shop; for work scheduled to receive a transparent finish, backprime with a clear varnish.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Verify that detrimental conditions are corrected before proceeding with installation.
- C. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

3.2 INSTALLATION

- A. Install work of this Section, plumb, level, with tight, hairline, flush joints. Shim as required using concealed shims.
- B. Cut to fit when not shop-fabricated or shop-cut to exact size. Where woodwork abuts other finished surfaces, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners.

3.3 FIELD QUALITY CONTROL

- A. Clean exposed surfaces and leave ready to be painted for surfaces to be field painted (opaque finish only).
- B. Field touchup, for work with a transparent finish, is the responsibility of the installer and shall include filling in of nail holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars, and final clean-up of the finished surfaces.
- C. Protecting:
 - 1. Do not store materials adjacent to woodwork unless it is protected against damage and staining.
 - 2. When painting or touching-up surfaces contiguous to woodwork, mask it with non-staining Kraft paper and tape.
- D. Replace woodwork damaged beyond satisfactory field repair, as determined by the Design Consultant, with satisfactory millwork.

END OF SECTION

SECTION 06 40 23 – INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Plastic laminate-clad casework.
2. Plastic laminate-clad countertops.
3. Veneered plywood casework and shelving.
4. Veneered plywood countertops.
5. Factory-finishing architectural woodwork.
6. Items associated or integral with architectural woodwork:
 - a. Supports, reinforcement, and like components.
 - b. Hardware and accessories.
 - c. Concealed steel supports.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 06 for the following:
 - a. Rough carpentry for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - b. Solid surfacing countertops.
3. Division 22 for plumbing fixtures and fittings related to architectural woodwork.
4. Division 26 for electrical connections to LED lighting.

1.2 REFERENCES

- A. Architectural Woodwork Standards (AWS) published jointly by the Woodwork Institute (WI), the Architectural Woodwork Institute (AWI), and the Architectural Woodwork Manufacturers of Canada (AWMC).
- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Procedure: In accordance with AWS.
- B. Product data: Submit for specialty items required by this Section that are not manufactured by the millwork manufacturer.
- C. Shop drawings:
 1. Comply with AWS standards.
 2. Furnish a WI Certified Compliance Label on the first page of shop drawings.
 3. The Drawings are diagrammatic and show required profiles and dimensions. Submit large scale, dimensioned, shop drawings showing location of each item of millwork, plans and elevations, large-scale details, attachment devices, finishes, and finish hardware types and locations.
 - a. Include hardware list, identifying each item by manufacturer, catalog number, size, finish and intended use. Include catalog cut sheets.

- b. Indicate method of seismic construction by WI-Seismic Test Codes Number.
- c. Coordinate shop drawings with the work of other related trades which is a part of, or will be incorporated with the architectural woodwork, such as plumbing, electrical, and electronic equipment, along with adjacent and abutting materials to which this work is to be secured.
- d. Obtain the approval of the millwork shop drawings by these related trades (as evidenced by their stamp and signature thereon) before submitting shop drawings to the Design Consultant.

D. Samples:

- 1. Lumber and panel products:
 - a. Submit 4 samples for the following, minimum 8 by 10 inches:
 - 1) Lumber with or for transparent finish for each lumber specie and cut, finished on one side and one edge.
 - b. Veneer: Leaves representative of and selected from flitches showing species, cuts, finishes, textures and patterns to be used.
 - c. Veneer-faced panel products with or for transparent finish for each species and cut: Include at least one face-veneer seam and finish as specified.
- 2. Plastic laminates: For each type, color, texture, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
- 3. Corner pieces:
 - 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 for each type of finish.
 - b. Miter joints for standing trim.
- 4. Hardware: One unit for each type of exposed cabinet hardware and accessories, and finish samples.
- 5. Approved samples will serve as Design Consultant's control samples.

E. Product data:

- 1. Evidence of no added Formaldehyde panel products.
- 2. FSC Certified products.

F. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

- (a) Credit MR 4.1 & 4.2, Recycled Content.
- (b) Credit MR 5.1, Regional Materials, Manufactured Locally.
- (c) Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
- (d) Credit MR 6, Rapidly Renewable Materials.
- (e) Credit MR 7, Certified Wood.
- (f) Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
- (g) Credit EQ 4.1, Low Emitting Materials, Paints.
- (h) Credit EQ 4.1, Low Emitting Materials, Composite Wood.

G. Closeout: Deliver all documentation required herein, including but not limited to:

- 1. WI Certificates of Compliance.
- 2. As-built shop drawings reflecting changes made in the course of the Project.

1.4 QUALITY ASSURANCE

- A. General: Work shall be in accordance with AWS standards for the grade or grades specified.
- B. Certified compliance:
 - 1. Before delivery to the jobsite the woodwork supplier shall provide a WI Certified Compliance Certificate indicating the millwork products being supplied and certifying that these products fully meet the requirements of the Grade or Grades specified.
 - 2. Each elevation of casework and each laminated plastic top shall bear a WI Certified Compliance label.
 - 3. At completion of installation the woodwork installer shall provide a WI Certified Compliance certificate indicating the products installed, and certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
 - 4. Fees charged by WI for their Certified Compliance program shall be included in the bid.
- C. Manufacturer/installer qualifications:
 - 1. Firm licensed by WI under their "Certified Compliance Program."
 - 2. Firm with not less than 5 years of production experience similar to this Project, whose qualifications indicate the ability to comply with the requirements of this Section.
 - 3. Firm must have at least one project in the past 5 years where the value of the woodwork was within 20 percent of the cost of woodwork for this Project.
- D. Single source responsibility: A single manufacturer shall produce and install the work of this Section.
- E. Special design requirements: Sequence-matched wood veneers.
- F. Quality standard: Unless otherwise indicated, comply with AWS standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. Provide WI-certified compliance labels and certificates indicating that woodwork, including installation, complies with requirements of grades specified.
- G. Requirements of regulatory agencies: Provide evidence of compliance with Code for architectural woodwork.
 - 1. Particle board, MDF, and hardwood plywood used in this project must comply with California Air Resource Board standards for formaldehyde emissions.
- H. Mockups:
 - 1. Before starting production work, assemble a mockup for each type of finish as follows for Design Consultant's approval:
 - a. One base cabinet with one drawer, one door, a countertop, and hardware.
 - b. Finish the mockups as intended for the finish work.
 - c. Mockups must be located within a 25-mile radius of the Project site.
 - d. Approved mockups will be used as a standard for the Work and may be used for the Project.

1.5 HANDLING

- A. Procedure: In accordance with AWS standards.

B. Delivery:

1. Deliver materials to Project site in protective wrappings clearly labeled with identification of manufacturer, item name and specific installation location.
2. Deliver architectural woodwork only when the area of operation is enclosed and broom clean, and cementitious work is dry.

C. Storage:

1. Store materials in a clean, well-ventilated storage area protected from direct sunlight, excessive heat, rain and moisture; in which relative humidity is between 45 and 65 percent at 60 to 90 degrees F.
2. The air conditioning or heating system shall be on and functioning and the architectural millwork shall be acclimated to these conditions for 72 hours prior to installation.
3. Do not subject millwork to abnormal heat, extreme dryness, humid conditions, sudden changes in temperature, or direct sunlight.
4. Store cabinets carefully and set or store on a level floor. Protect the exposed finished portions from bumping, scratching, staining and other damage.

D. Handling: Handle with clean hands, taking care not to slide one item over the other; when primed or sealed, properly re-stack when dry. Handle prefinished materials with white gloves.

1.6 PROJECT CONDITIONS

A. Acclimation: Condition materials to moisture content between 8 percent and 12 percent.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements AWS quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Lumber:

1. Seasoning: Wood shall be properly kiln-dried according to accepted methods for the thickness and species required, with moisture content of 6 percent to 12 percent for boards up to 2 inches nominal thickness, and shall not exceed 19 percent for thicker pieces.
2. Pressure-treatment: As specified in Section 06 10 00.
3. For a transparent finish: Match species and cut of contiguous veneer specified below.

C. Panel core products:

1. Medium density fiberboard (MDF) or particleboard.
2. Softwood Plywood: DOC PS 1, Medium Density Overlay.
3. Veneer-faced panel products (hardwood plywood): HPVA HP-1, non-telegraphing hardwood manufactured with exterior adhesive containing no urea formaldehyde.

D. Prefinished panel products:

1. 3/4-inch pre-finished plain sliced Russian Baltic Birch plywood, Grade 4B, 13-ply for open shelves and boxes.
 - a. Edges: Exposed.
 - b. Sealer: Clear.

E. Plastic laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by AWS quality standards.

1. Manufacturers:

- a. Abet Laminati, Inc.
- b. Arborite; Division of ITW Canada, Inc.
- c. Formica Corporation.
- d. Lamin-Art, Inc.
- e. Nevamar Company, LLC; Decorative Products Div.
- f. Panolam Industries International Incorporated.
- g. Westinghouse Electric Corp.; Specialty Products Div.
- h. Wilsonart International; Div. of Premark International, Inc.
- i. Or equal.

F. Edgebands: TBD.

2.2 HARDWARE AND ACCESSORIES

A. General:

1. As required for a complete installation, as indicated and specified, and as listed in WI's current Approved Hardware Listings, except as herein modified.
2. Hardware finish shall match door hardware specified in Section 08 71 00, unless otherwise noted.

B. Hinges:

1. AWS-compliant, concealed, by Blum, Inc., or equal.
2. Grade 1 (institutional), OR Grade 2, concealed (European style) with 3-way independent adjustment.
3. Self-closing, 165-degree opening, except 90 degrees where door opens against a wall, or otherwise limited to 90 degrees.
 - a. Hafele, Model 329.07.6XX, or equal, 165 degree hinges.

C. Pulls:

1. Back-mounted pulls: BHMA A156.9, B02011 by Doug Mocket & Co., Hafele, or equal.
2. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter 2-1/2 inches deep.

D. Catches: Magnetic, BHMA A156.9, B03141.

- E. Adjustable shelf standards and supports:
 - 1. BHMA A156.9, B04071; with shelf rests, B04081.
 - 2. Shelf supports for adjustable shelves in wall-hung cabinets and the upper half of tall cabinets shall be designed to prevent shelves from sliding forward in a seismic event.
- F. Sliding mechanisms: Woodwork Institute approved, self-closing metal runners with ball-bearing rollers, full extension type, side or bottom mounted, or 110-lb progressive under-mount.
 - 1. Pencil Drawers: 50 lb rated, Hafele Model 422.24.XXX, or equal.
 - 2. General purpose drawers: 75 lb rated, Hafele Model 422.88.XXX, or equal.
 - 3. General purpose drawers more than 24 inches wide or 6 inches deep: 110 lb rated. Hafele Moov-it or equal double-walled drawer.
 - 4. File drawers: 100 lb rated.
 - 5. Lateral file drawers more than 24 inches wide: 150 lb rated. Hafele Model 422.17.XXX, or equal.
 - 6. Keyboard Slides: Grade 1HD-100; for computer keyboard shelves.
 - 7. Trash Bin Slides: Grade 1HD-200; for trash bins not more than 20 inches high and 16 inches wide.
- G. Keyboard and mouse tray:
 - 1. Human Scale Model A115.
 - 2. Doug Mockett & Co., Inc. Model KP6.
 - 3. Rockler Woodworking & Hardware Model 37930.
 - 4. Accuride Model CBERGO-Tray 200, or Hafele Model 632.52.300.
 - 5. Knape & Vogt Model 5710.
 - 6. Hafele Model 632.68.430.
- H. Door locks; BHMA A156.11, E07121, Hafele Model 232.14.XXX, or equal.
- I. Drawer Locks: BHMA A156.11, E07041, Hafele No. 232.14.XXX., or equal
- J. Grommets for Cable Passage through Countertops: 2-inch OD, brown molded-plastic grommets and matching plastic caps with slot for wire passage, by Hafele, Doug Mockett & Company, Inc., or equal.
- K. Paper Slots: 12 inches long by 1-3/4 inches wide by one inch deep; brown, molded-plastic, paper-slot liner with 1/4-inch lip by Doug Mockett & Company, Inc., or equal.
- L. Wire managers: Plastic, of the color selected by the Design Consultant, by Hafele, Doug Mockett & Co., Inc. WM-2A, or Blanton & Moore WMC-4000 Series, or equal. Provide at each computer station.
- M. Casters: TBD.
- N. Internal LED lighting: TBD.
- O. Anchors:
 - 1. Select material, type, size, and finish required for each substrate for secure anchorage.
 - 2. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
 - 3. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- P. Adhesives: Type I, water-resistant.

2.3 FINISHES

- A. Wood fillers, sealers, stains and finish coating systems (stains and dyes), used with compliant stains and bases by one of the following manufacturers:

1. Minwax.
2. RJ McGlennon Co., Inc.
3. Sikkens.
4. Sherwin Williams.
5. WD Lockwood.
6. Or equal.

Hardware finishes:

7. Exposed hardware finishes, complying with BHMA A 156.18 for BHMA finish number indicated.
 - a. Dark, oxidized, satin bronze, oil rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Design Consultant's sample.
 - b. Bright brass, clear coated: BHMA 605 for brass base; BHMA 632 for steel base.
 - c. Satin brass, blackened, bright relieved, clear coated: BHMA 610 for brass base; BHMA 636 for steel base.
 - d. Satin chromium plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - e. Bright chromium plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
 - f. Satin stainless steel: BHMA 630.
8. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 FABRICATION, GENERAL

- A. Casework:

1. General: Fabricate casework in compliance with requirements of AWS Custom Grade.
2. AWS construction types A, frameless.
3. AWS cabinet and door interface style 1 - overlay.

- B. Openings in casework for equipment provided under this Contract:

1. Examine size of equipment by measuring the actual equipment, from shop drawings, or from templates provided by those furnishing the equipment.
2. Make accurate cutouts and openings, plumb, level and square. When the equipment does not cover cut edges, finish edges same as faces.
3. Sand edges of cutouts to remove splinters and burrs.
4. Seal edges of openings with a coat of varnish.

- C. Finish hardware:

1. Fit hardware accurately and install in compliance with the hardware manufacturer's instructions. Accurately fit doors and drawers with uniform clearance at all edges. Gaps between doors, drawers and false fronts shall not exceed 1/8 inch.

2.5 WOOD CABINETS FOR TRANSPARENT FINISH

A. General:

1. Match Design Consultant's control samples. In preparation for finish, clean woodwork and fill nail holes using matching wood filler.
2. Finish woodwork at the mill, smoothly dressed. Sand, using same sequence and grade of abrasive used in the Design Consultant's control sample to achieve the same finish. Clean woodwork thoroughly with a tack cloth.
3. Produce surfaces free from open joints, hammer and machine marks, structural defects and surface blemishes.

2.6 PLASTIC-LAMINATE CABINETS

- A. Grade: AWS Premium.
- B. Exposed interior surfaces: Low pressure melamine overlay.
- C. Semi-exposed surfaces: Low pressure melamine overlay.
- D. Doors, drawer fronts, and false fronts: Flush overlay.
 1. Edge bands at doors, drawer fronts, and false fronts: TBD.
- E. Drawers: Meet AWS requirements for the Grade specified.
- F. Colors, patterns, and finishes: Match Design Consultant's sample.

2.7 COUNTERTOPS

- A. Plastic laminated tops:
 1. Core material: Particleboard, unless otherwise indicated.
 2. Backsplash: Straight edge.
 3. Edge configurations: TBD.
- B. Hardwood plywood tops:
 1. Backsplash: Straight edge.
 2. Edge configurations: Exposed multi-ply.

2.8 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Seal plywood edges to remain exposed with clear sealer.
- D. Back prime woodwork on all surfaces that will be concealed with one coat of wood primer or clear varnish. Schedule delivery to allow time for application and drying of back prime coat before installation of woodwork for those items that are not back-primed in the shop.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas prior to installing.

3.3 INSTALLATION

A. General:

1. Comply with AWS requirements for Grade of the items being installed, and Code for seismic attachment and bracing.
2. Install work plumb, level, true and straight with no distortions, to a tolerance of 1/8 inch in 8 feet from plumb and level.
3. Shim using concealed shims.
4. At gypsum board construction, anchor through wall surface to backing plates and studs. Indicate location of required concealed backing on casework shop drawings.
5. Furnish fillers, closures and trim as required for a complete installation. Scribe in place where required.
6. Subdrill holes in pieces where splitting may occur; size holes slightly smaller than diameter of nail.
7. Do not drive nails closer to edge of lumber than 1/4 length.
8. Remove lumber split in nailing and replace with sound members.
9. Make joints accurately and neatly, square, flush and tight.
10. Install wood screws and lag bolts with complete penetration to head. Bore lead holes equal to root diameter of the screw or bolt. Drive flush or recess with nailer face.
11. Provide nailers and blockings where indicated and required.
 - a. Template and drill to match anchor bolts in steel members, concrete and masonry.
 - b. Where materials are applied over flush nailer surfaces, use carriage bolts with heads drawn flush into top of nailer or blockings, or counterbore holes to recess washers and heads of nuts.

- B. Pressure-treated wood products: Do not rip or mill treated lumber. End cuts, drilling holes and joining cuts are permitted. Plywood may be cut in any direction.

1. Use pressure-treated wood where required by Code and as specified above.
2. Use fire-treated wood where required for blockings and nailers located in metal-framed walls, partitions and ceilings.

3.4 ANCHORAGE

A. Fastening lumber or plywood to lumber:

1. Space nails a maximum of 12 inches o.c. and stagger across face of piece. Locate fastener also within 3 inches of each end of piece.
2. Drive nail heads flush with wood surfaces. Nails shall penetrate adjoining piece a minimum of 1-1/4-inch.

B. Fastening lumber or plywood to concrete:

1. Space anchors a maximum of 36 inches o.c. and stagger if lumber is more than 5 inches wide.
2. Make anchor heads flat or countersunk flush with surface, but not countersunk more than 1/3 the thickness of piece to be fastened.

3. Anchor withdrawal resistance shall be a minimum of 400 lb. per anchor, or number of fasteners increased accordingly from that specified. Minimum penetration of 1-1/2-inch into concrete or masonry.

C. Fastening lumber or plywood to steel:

1. Space screws a maximum of 24 inches o.c. and stagger if lumber is more than 5 inches wide.
2. Drive screw heads flush with face of plywood or lumber.
3. Anchor shall penetrate a minimum of 1/4 inch through the steel.

3.5 CASEWORK

A. Cabinets:

1. Install in a manner consistent with the specified quality grade, plumb, level, true and straight with no distortions.
2. 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.
3. Maintain veneer sequence matching of cabinets with transparent finish.

- B. 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.

- C. Install cabinets with no more than 1/8-inch in 96-inch sag, bow, or other variation from a straight line.

- D. Doors and drawers shall operate freely, but not loosely, without sticking or binding, with all hardware adjusted and functioning properly.

- E. Secure to ground, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a satisfactory installation. Scribe and cut for accurate fit to adjacent finished surfaces.

- F. Properly scribe work abutting other building components.

- G. Countersink mechanical fasteners used at exposed and semi-exposed surfaces, excluding installation attachment screws and those securing cabinets end to end.

3.6 COUNTERTOPS

- A. Comply with WI Manual of Millwork.

- B. Anchor securely to base units and other support systems as indicated. Fasten joints in tops with draw-bolt type fasteners let into underside of top.

- C. Install countertops with ends **[flush with –OR- overhanging by __inches]** exposed ends of base cabinets unless otherwise indicated.

- D. Verify opening requirements and make cutouts as required.

- E. Scribe laminated plastic tops to walls and other adjacent items indicated.

- F. Fill gaps between tops and walls and other adjacent items with color matched sealant.

3.7 FIELD QUALITY CONTROL

- A. General: Field touchup shall be the responsibility of the installer and shall include filling in of nail holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and mars, and final clean-up of the finished surfaces.

- B. Protecting:
 - 1. Do not use the top of casework for storage.
 - 2. Do not store materials adjacent to woodwork unless it is protected against damage and staining.
 - 3. When painting or touching-up surfaces contiguous to woodwork, mask it with non-staining Kraft paper and tape.
- C. Replace millwork damaged beyond satisfactory field repair with satisfactory woodwork, as determined by the City.
- D. During final cleaning, remove protective covering and clean interior and exterior surfaces using procedures and materials recommended by manufacturer.

3.8 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 woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.
- C. Clean, lubricate, and adjust hardware.
- D. Do not bury wood of any type on the jobsite.

END OF SECTION

SECTION 06 61 16 - SOLID POLYMER COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes solid polymer countertops.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 06 for casework supporting countertops.

1.2 DEFINITIONS

- A. Solid polymer is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.3 REFERENCES

- A. Architectural Woodwork Institute "Architectural Woodwork Standard Section 11, "Premium Grade."
- B. USG Green Building Council (USGBC), www.usgbc.org.

1.4 SUBMITTALS

- A. Shop drawings:
 - 1. Indicate materials, fabrication details, field jointing, adjacent construction and methods of support, integration of plumbing components, if applicable, and anchorages.
 - 2. Show joint locations; locations is subject to the Design Consultant's relocation at no additional to the City.
 - 3. Show position of openings, with rough-in sizes. Provide templates for cast-in or placed frames or anchors; tolerances for item placement and temporary bracing of components.
- B. Data: Manufacturer product data for specified products.
- C. Samples:
 - 1. 6-inch square samples representative of color, texture and finish to be expected for final product, with a finished edge.
 - 2. Cut sample and seam together for representation of inconspicuous seam.
 - 3. Approved sample will be retained as a standard for the work of this Section.
- D. Manufacturer certificate: Certification that polymer meets or exceed specified requirements for stain resistance.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

- F. Maintenance: Submit solid polymer manufacturer's care and maintenance data, including repair and cleaning instructions, and maintenance kit.

1.5 QUALITY ASSURANCE

- A. Fabricator qualifications: Firm specializing in manufacturing the products specified in this Section with minimum 3 years documented successful experience.
- B. Flammability and toxicity: Conform to applicable code for flame/smoke rating in accordance with ASTM E 84.

1.6 HANDLING

- A. Store indoors, properly supported and off the floor.

1.7 WARRANTIES

- A. Combined manufacturer/installed warranty:
 - 1. Fabrication and installation must be performed by a solid polymer manufacturer Certified Fabrication/Installation source who will provide a brand plate for the application.
 - 2. This warranty shall cover all fabrication and installation performed by the certified/applicator for 10 years from Substantial Completion.

1.8 MAINTENANCE

- A. Furnish list of approved cleaning materials and procedure required and provide list of substances that are harmful to product. Include instructions for stain removal, surface and gloss restoration and scratch removal.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid polymer components: Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, complying with the following:
 - 1. Tensile Strength: 6,000 psi, ASTM D 638.
 - 2. Tensile Modulus: 1.5×10^{-6} psi, ASTM D 638.
 - 3. Tensile Elongation: 0.4% min., ASTM D 638.
 - 4. Flexural Strength: 10,000 psi, ASTM D 790.
 - 5. Flexural Modulus: 1.2×10^{-6} psi, ASTM D 790.
 - 6. Hardness: >85, Rockwell "M" Scale, ASTM D 785.
 - 7. 56 Barcol Impressor, ASTM D 2583.
 - 8. Thermal Expansion: 1.80×10^{-5} in./in./°F, ASTM D 696.
 - 9. Gloss (60° Gardner): 5–75 (matte—highly polished), ANSI Z124.
 - 10. Light Resistance: (Xenon Arc) No effect, NEMA LD 3-2000, Method 3.3.
 - 11. Wear and Cleanability: Passes, ANSI Z124.3 & Z124.6.
 - 12. Stain Resistance: Sheets: Passes, ANSI Z124.3 & Z124.6.
 - 13. Fungus and Bacteria Resistance: Does not support microbial growth, ASTM G21&G22.
 - 14. Boiling Water Resistance: No visible change, NEMA LD 3-2000, Method 3.5.
 - 15. High Temperature Resistance: No change, NEMA LD 3-2000, Method 3.6.
 - 16. Izod Impact: 0.28 ft.-lbs./in. of notch, ASTM D 256, (Notched Specimen), (Method A).

17. Ball Impact: No fracture—1/2 lb. ball, NEMA LD 3-2000.
18. Resistance: Sheets: 1/4" slab—36" drop, Method 3.8, 1/2" slab—144" drop.
19. Specific Gravity: 1.7.
20. Water Absorption, Long-term: ASTM D 570.
 - a. 0.4% (3/4").
 - b. 0.6% (1/2").
 - c. 0.8% (1/4").
21. Toxicity:
 - a. 99 (solid colors), Pittsburgh Protocol.
 - b. 66 (patterned colors), Test ("LC50"Test)
22. Flammability: All colors, ASTM E 84,
 - a. (Class I and Class A): NFPA 255 & UL 723.
 - b. Flame Spread Index: <25.
 - c. Smoke Developed Index: <25
23. Superficial damage to a depth of 0.010 inch shall be repairable by sanding and/or polishing.
24. Thickness: As indicated on the Drawings.
25. Color: TBD.
26. Sheen: [matte] [semigloss] [polished gloss] TBD.
27. Edge treatment: TBD.
28. Sink mounting: TBD.
29. Splashes: TBD.

- B. Adhesive: Permanent, waterproof, non-staining, as recommended by the solid polymer top manufacturer.
- C. Sealants: As specified in Section 07 92 00.
- D. Sink/lavatory mounting hardware: Manufacturer's standard bowl clips, panel inserts and fasteners for attachment of undermount sinks/lavatories.
- E. Insulating felt tape: Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.2 FABRICATION

- A. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
- B. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 1. Reinforce with strip of solid polymer material, 2" wide.
 2. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
 3. Rout and finish component edges with clean, sharp returns.
 4. Rout cutouts, radii and contours to template.
 5. Smooth edges.

2.3 FINISHING

- A. Polished finish on exposed surfaces to uniform sheen and texture and to match approved sample.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Install components in compliance with the approved shop drawings, the reference standard, and the polymer manufacturer's instructions, plumb, level, with tight, flush joints.
- B. Install plumb and level, with tight, hairline, flush joints. Shim as required using concealed shims.
- C. Anchor securely to base cabinets or other supports into underside of countertop.
- D. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and to walls with adhesive.
- E. Scribe and fit accurately where they abut adjacent surfaces for a close fit.
 - 1. Fill space between countertops and walls with sealant; comply with the requirements of Section 07 92 00.
 - 2. Tool sealant uniformly to form a cove and shed water.
- F. Apply backsplashes using manufacturer's standard color-matched silicone sealant.
- G. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

3.3 CLEANING/PROTECTING

- A. Repair or replace damaged work which cannot be repaired to Design Consultant's satisfaction.
- B. Protect finished work from damage by covering with heavy Kraft paper until final cleaning.

END OF SECTION

DIVISION 07

THERMAL & MOISTURE PROTECTION

SECTION 07 13 13 - RUBBERIZED-ASPHALT SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes sheet waterproofing membrane and drainage panels at below-grade building walls and in planters.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 DEFINITIONS

- A. Waterproofing membrane: Pliable, self adhering sheet membrane, not less than 60 mils thick, consisting of a high density polyethylene film bonded to a layer of rubberized asphalt waterproofing compound.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting:
 - 1. Prior to start of installation, arrange a pre-installation meeting between the waterproofing manufacturer authorized representative, the Contractor, the installer, and the Design Consultant to review conditions of surfaces to be waterproofed, the Drawings and Specifications, the waterproofing manufacturer's data and other conditions that would affect the quality of this work.
 - 2. Invite other trades whose work will affect, or be affected by the work of this Section.
 - 3. Review typical and atypical details to verify the method of waterproofing system installation and flashing requirements that the Contractor will follow, as well as corrective actions that are required.
 - 4. Special conditions not specifically referenced or addressed by the Project Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified, reviewed and discussed.
 - 5. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions so that a determination can be made of actions to be taken to assure an installation that will be acceptable watertight and to the waterproofing material manufacturer for issuance of the warranty.
 - 6. Record meeting minutes and distribute copy to all concerned, and the Design Consultant, within 7 days after the meeting.
- B. Sequencing/scheduling:
 - 1. Sequence/schedule installation of waterproofing membrane so that it will be covered as soon as possible so as not to be damaged by construction activities and ultraviolet rays.
 - 2. Do not leave waterproofing exposed to the elements longer than recommended by its manufacturer.

1.5 SUBMITTALS

- A. Data: Manufacturer Product Data of proposed materials.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, flashings, corners, and other termination conditions.
- C. Samples: 12-inch square Samples of waterproofing membrane and drainage panel.
- D. Manufacturer's acceptance: Letter from the manufacturer to verify its acceptance of the applicator and acceptance of substrates as satisfactory to receive this work.
- E. Warranty: Sample copies of warranty form.
- F. Manufacturer field reports: Reports of field observations, supplemental instructions issued and corrections made during installation.
- G. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

Credit MR 4.1 & 4.2, Recycled Content.

Credit MR 5.1, Regional Materials, Manufactured Locally.

Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.

Credit MR 6, Rapidly Renewable Materials.

Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.6 QUALITY ASSURANCE

- A. Installer qualifications: Firm authorized, approved, or licensed to install products specified and eligible to receive warranty specified.

1.7 HANDLING

- A. Store rolled goods on end.

1.8 JOB CONDITIONS

- A. Apply waterproofing materials only in dry weather when the outside temperature is above 40-degree F.
- B. Do not apply waterproofing materials to damp, wet or frost covered surfaces.

1.9 SPECIAL WARRANTY

- A. Submit a joint and several warranty against leakage thru waterproofed surfaces, including against faulty materials and workmanship, for 5 years after installation.
- B. Include removal and replacement of materials concealing waterproofing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide waterproofing that prevents the passage of water thru waterproofed surfaces.

2.2 WATERPROOFING MEMBRANE

- A. "Bituthene 4000" by WR Grace Construction Products (basis of design), "Blueskin WP 200" by Henry, or equal with the following properties:

- 1. Thickness, ASTM D 3767, Method A: 0.060 inch nominal.

2. Low temperature flexibility, ASTM D1970: Unaffected at -45 degrees F.
 3. Resistance to hydrostatic head, ASTM D 5385: 231 feet.
 4. Lap adhesion at minimum application temperature ,width, ASTM D 1876, Modified: 5.0 lb/in.
 5. Tensile strength, membrane, ASTM D 412 (Die C), modified: 325 psi minimum.
 6. Tensile strength, film, ASTM D 882, Modified 5000 psi minimum.
 7. Elongation, ultimate failure of rubberized asphalt, ASTM D 412, Modified: 300 percent minimum.
 8. Cracking cycling, 100 cycles, ASTM D 836: Unaffected at -25 degrees F.
 9. Peel strength, width, ASTM D 903, Modified: 9.0 lb/in.
 10. Puncture resistance, membrane, ASTM E 154: 50 lb.
 11. Permeance, maximum, ASTM E 96 Water Method: 0.05 perms.
 12. Water absorption, 72 hr, ASTM D 570: 0.1 percent maximum.
- B. Primer, adhesive, mastic, sealant and other miscellaneous materials: As recommended by the membrane manufacturer for installation of the membrane and the conditions of use.

2.3 ACCESSORIES

- A. Drainage panels/protection board: One of the following, unless otherwise recommended by the waterproofing membrane manufacturer.
1. Miradrain 6000 by Nicolon/Mirafi Group.
 2. J-Drain 300 Composite Drainage System by JDR Enterprises, Inc.
 3. Or equal.
- B. Other materials: As recommended by the membrane system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine surfaces to be waterproofed.
- B. Check that areas to be waterproofed are clean and dry.
- C. Fill voids and cracks and remove ridges and fins, leaving a smooth, clean surface.
- D. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Membrane:
1. In accordance with the membrane manufacturer's instructions and the following.
 - a. Install the membrane with lapped joints, fused to provide a continuous water barrier.
 - b. On walls below grade, install 2 layers of membrane with staggered joints.
 - c. Properly seal breaches and penetrations
 - d. Roll membrane for complete adhesion to substrate as soon as possible after installation.
 - e. Seal membrane edges continuously.

- B. Drainage/protection panels: Install in accordance with their manufacturer's instructions and the following.
 - 1. Cover entire membrane with drainage/protection panels.
 - 2. Attach panels to the waterproofing with contact adhesive or tape in accordance with the panel manufacturer's instructions.
 - 3. Remove the bottom 12 inches of the panel below the foundation drain but keep the fabric intact; then wrap the fabric around the drain pipe to provide a continuous path for water to foundation drain/storm drain system
 - 4. Backfill walls as soon as possible after inspection to at least 6 inches above the top edge of the drainage panel.

3.3 CLEANING

- A. Remove bituminous and other markings from finished surfaces.
- B. Where finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and complying with their documented instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this Section.

3.4 PROTECTING

- A. Use caution to avoid damage to the membrane at all times. Do not permit traffic over unprotected or uncovered membrane.
- B. Protect membrane as necessary until wearing surfaces are installed.
- C. If damage occurs, repair and test to the satisfaction of the City and Design Consultant.

END OF SECTION

SECTION 07 19 16 - WATER-REPELLENT & GRAFFITI CONTROL COATING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes clear water-repellent and graffiti control coating on exposed, exterior concrete surfaces.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for opaque graffiti-resistant coating on plaster.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting:
 - 1. Prior to start of installation, arrange a pre-installation meeting between the coating manufacturer, the applicator, and related trades whose work will be in contact with the treated surface, including but not limited to joint sealers, windows and doors.
 - 2. Record minutes of the meeting, file in the Project file, and send a copy to the Design Consultant.

1.4 SUBMITTALS

- A. Data: Manufacturer Product Data of the proposed coating, including recommended coverage rates, include material test reports indicating and interpreting test results for compliance of coating with criteria specified.
- B. Samples: Coating applied to cast-in-place concrete sample panel where designated by the Design Consultant at the site.
- C. Coating manufacturer certifications:
 - 1. Letter from the coating manufacturer to verify its acceptance of the applicator and acceptance of substrates as satisfactory to receive coating.
 - 2. Duplicate copies of manufacturer affidavit with each shipment of materials delivered to the jobsite certifying that material furnished complies with specified requirements.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 QUALITY ASSURANCE

- A. Pre-installation Samples: When requested by the coating manufacturer, or necessary to adjust coating formulation, provide coating manufacturer with sufficient Samples of substrate to be coated to determine exact formulation and coverage rates.

- B. Manufacturer's inspections: Obtain materials only from manufacturer who will send a qualified technical representative to the Project site for the following.
 - 1. Before start of this work to verify substrate acceptability, and as required thereafter to review installation procedures and completed work, and to issue warranty specified.
 - 2. Unsatisfactory conditions disclosed by the manufacturer's visits to the site shall be promptly and satisfactorily repaired and the areas reinspected by the manufacturer before work starts or resumes in affected areas.
- C. Mockup:
 - 1. Apply coating to the left half of the concrete mockup specified in Division 03; identify the coated side.
 - 2. Do not proceed with application at the site until the Design Consultant's approval of the coated mockup is obtained and test results are satisfactory.
- D. Pre-installation testing:
 - 1. Test mockup by demonstrating removal of graffiti in the presence of the City designated representative.
 - 2. Report results of test and apply additional coating, when appearance is unchanged, or re-formulate and re-apply coating, when test results are not satisfactory.

1.6 JOB CONDITIONS

- A. Comply with manufacturer recommendations regarding environmental requirements, and temperature and conditions of surfaces to receive coating.

1.7 SPECIAL WARRANTY

- A. Warrant coating against water penetration through treated surfaces, peeling, cracking, discoloration and other defects of the coating, caused by faulty materials and workmanship, for 5 years after Substantial Completion.
- B. The warranty shall include repair of defects and failures in the coating during the warranty period, at no additional cost to the City.
- C. Warranty does not include deterioration or failure of coating due to failure of substrate, formation of new joints and cracks in excess of 1/16-inch wide, fire, vandalism, or abuse by maintenance equipment.

1.8 MAINTENANCE

- A. With closeout submittals, deliver one identified unopened 5 one-gallon container of cleaner to be used for graffiti removal, to the City. Identify with area and material for future identification.
- B. Provide the City copy of instructions for graffiti removal and maintenance recommendations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide water repellents with the following properties based on testing manufacturer's standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and application methods to be used for Project.
 - 1. Absorption: Minimum 90 percent reduction of absorption after 24 hours in comparison of treated and untreated specimens.
 - 2. Hardened concrete: ASTM C 642.
 - 3. Water-vapor transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, ASTM E 96.
 - 4. Water penetration and leakage through masonry: Maximum 90 percent reduction in leakage rate in comparison of treated and untreated specimens, ASTM E 514.
 - 5. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, ASTM G 53.
 - 6. Permeability: Minimum 80 percent breathable in comparison of treated and untreated specimens, ASTM D 1653.
- B. Appearance: When compared visually to an untreated sample under same lighting conditions, the coating shall not change the color and sheen of the coated substrate, and shall be invisible after application and over the life of the building.

2.2 COATING/MANUFACTURER

- A. ProSoCo "Blok-Guard & Graffiti-Control" (basis of design).
- B. Tnemec "626 Dur-A-Pell"
- C. Or equal by the following:
 - 1. BSAF.
 - 2. Harris Specialty Chemicals, Inc.
 - 3. Pecora Corp.
 - 4. Sivento.
 - 5. Or equal.

2.3 MISCELLANEOUS MATERIALS

- A. ProSoCo Defacer Eraser Graffiti Wipes.
- B. ProSoCo Enviro Klean SafStrip (Gelled graffiti removal product.)
- C. Or equal.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Verify that surfaces to be coated are clean, dry and free of dust, dirt, oil, grease and other foreign material which would affect the application and performance of the coating.
- B. Correct detrimental conditions before proceeding with installation.

3.2 PROTECTION

- A. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of coating.
- B. Cover adjoining and nearby surfaces where there is a possibility of coating being deposited on these surfaces.

3.3 PHASING

- A. Where feasible delay coating application until installation of sealants is completed in joints of adjoining surfaces to be coated.
- B. Coating may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, coating, and sealant materials identical to those used in the work.

3.4 APPLICATION

- A. Test application:
 - 1. Before performing work of this Section, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Design Consultant to demonstrate the final effect (visual, physical, and chemical) of planned application.
 - 2. Proceed with work only after Design Consultant review of test application.
- B. Apply coating by manufacturer approved applicators using recommended methods and equipment, uniformly on all above grade exposed formed concrete surfaces.
 - 1. Do not allow coating to puddle or build-up.
 - 2. Do not exceed the application rate recommended by the manufacturer.

3.5 FIELD QUALITY CONTROL

- A. Provide services of a factory-authorized technical service representative, from the coating manufacturer, to inspect and approve the substrates before application and to instruct the applicator on the product and application method to be used.
- B. The City may employ a testing agency to test the in-place coating in compliance with ASTM standards specified.
- C. Cost of test will be paid by the City, except, should the test disclose that the coating tested does not comply with these Specifications, the cost of the test and subsequent retests shall be paid by the Contractor.
- D. In the event test shows that the coating is deficient, apply additional coating.
- E. Repetition of the above procedure on all previously treated surfaces will be at Contractor's expense.

3.6 CLEANING

- A. Clean coating from adjoining and nearby surfaces immediately after spillage.
- B. Comply with manufacturer's recommendations for cleaning.

END OF SECTION

SECTION 07 21 00 - THERMAL BUILDING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes thermal insulation at locations specified in Article 1.3 below and the following.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 07 for firestopping.
 - 3. Division 07 for insulation in roof hatch.
 - 4. Division 09 for acoustical insulation.
 - 5. Division 22 for pipe and duct insulation.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling and sequencing: Schedule installation of insulation so that it will remain exposed to the elements for the shortest time possible.

1.4 DEFINITIONS

- A. Thermal insulation: Provide insulation for the building envelope to provide the thermal resistance (R value) indicated to limit building thermal gains and losses. Provide insulation for the following locations.
 - 1. Building envelope excluding roof insulation specified elsewhere.
 - 2. Exterior soffits of air-conditioned spaces.
- B. Exclusions: Insulation is not required at parapets, and openings in walls, including louvers, vision glass and doors.

1.5 SUBMITTALS

- A. Data: Manufacturer Product Data for materials specified.
- B. Samples:
 - 1. Of each type of insulation, 24 inches square Samples.
 - 2. Impaling pins, full size.
 - 3. Twelve inches long Samples of tape.
- C. Test reports:
 - 1. For each product submit based on evaluation of comprehensive tests performed by a qualified testing agency that products conform to requirements of authorities having jurisdiction.

- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.6 QUALITY ASSURANCE

- A. Surface-burning characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Certification: All insulation materials shall conform to requirements of Title 24 CCR, Section 531.1(a), and materials shall be installed to meet flame spread rating and other requirements of Section 531.1(b).

1.7 HANDLING

- A. Packaging: In unopened containers and packages with labels bearing producer(s) name and source of product, date of manufacture, with UL classification on package, and R value.
- B. Storage:
1. Keep insulation protected while stored; keep dry during application.
 2. Outdoors, store off ground on pallets, protected with breathing type covers.
 3. Insulation shall be dry when installed.
 4. Remove insulation that becomes wet or damp immediately from the job site.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Install insulation in dry weather, unless building is enclosed and watertight.
- B. If insulation will be exposed to the elements after installation, cover with waterproof membrane each day; do not enclose wet insulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fiber glass insulation:
1. Owens Corning.
 2. CertainTeed.
 3. Knauf Insulation.
 4. Johns Manville.
 5. Or equal.
- B. Mineral wool insulation:
1. Roxul.
 2. Thermafiber.
 3. Partek Insulations, Inc.
 4. Rock Wool Manufacturing Co.

5. Fibrex Insulation, Inc.
6. Industrial Insulation Group, LLC.
7. Or equal.

2.2 PERFORMANCE/DESIGN CRITERIA

- A. Comply with these Specifications for the thermal resistance, and to the Drawings for maximum or minimum thickness of insulation required.
 1. Select appropriate products from list of materials to provide thermal value of envelope, compatibility when incorporated into finished system while ensuring substrate conditions as well as their ability to adhere components permanently, where applicable in rigid manner and maintain flexibility where required in finished work.
 2. Provide insulation materials and their facings that do not support fungal growth when tested in accordance with ASTM C1338.

2.3 INSULATION

- A. Thermal resistance ("R" value): Minimum of 11, except as noted.
- B. Sprayed foam sealant: Fire-rated polyurethane foam insulation meeting ASTM E 84, one- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 pcf density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
 1. Dow.
 2. Tiger Foam Insulation.
 3. Fomo Products, Inc.
 4. Or equal.
- C. At all other locations:
 1. Type: Glass fiber or mineral wool batt or blanket insulation complying with ASTM C 665, Type III, Class A, flame spread (FSK) 25 or less, formaldehyde-free by Johns Manville, Knauf, or equal.
 2. Width: Batt width shall match the stud spacing and be sized for a friction-fit to be self-supporting.

2.4 INSTALLATION MATERIALS

- A. Impaling pins and clips: Cemco 1500 Series, Tactoo Insul-Hangers Series T by AGM Industries, Inc. or equal by Eckel Industries, Inc., of appropriate length required for insulation thickness used.
- B. Insulation supports for between rafters insulation: 13-gage steel, IS16 and IS24 (depending on wood framing spacing) by Silver Metal Products, Inc., Southeastern Wire, Moore Products, or equal.
- C. Adhesive used with impaling pins shall be made, or approved by the clip manufacturer. Do not use "peel and press" hangers with self-adhesive back.
- D. Staples, zinc-coated wires and other devices for fastening insulation: As recommended by the insulation manufacturer.
- E. Insulation tape:
 1. Polyethylene Adhesive Tape: "Scotch brand No. 483" by 3M, or equal.

2. Foil Vapor Barrier Tape:
 - a. Pressure sensitive aluminum foil tape, 2 mils thick, 3-inch wide, "Scotch brand No. 425" by 3M.
 - b. "Dead Soft Aluminum Foil Tape" by Hanson Ltd.
 - c. "FSK Copolymer" by Compac Corp.
 - d. "General Purpose FSK Facing Tape" by Venture Tape.
 - e. Or equal FSK-faced cold weather tape.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.
- C. Before installing insulation in stud walls, thoroughly vacuum space clean of dust and debris. Also clean spandrel cavities in the same manner.

3.2 INSTALLATION

- A. Install insulation where shown and specified. Cut to fit irregular spaces, butt edges into firm contact with each other and adjoining surfaces.
 1. Hand pack around pipes, ducts, conduits, electrical boxes, and other penetrations as required to thoroughly fill all voids and spaces between framing members and to form a continuous thermal barrier.
 2. Do not compress insulation more than 10 percent.
 3. Where door and window frames occur in insulated assemblies, cut additional strips of insulation and hand-pack to fill all voids in and around the frames or use foam insulation.
 4. Insulate boxed headers and studs in exterior walls.
 5. Use foam insulation for small spaces that are difficult to insulate otherwise. Fill space completely and trim insulation flush with face of wall when cured.
 6. Comply with the National Electrical Code (NEC) for installation in proximity to light fixtures. Do not install insulation closer than recommended by NEC.
 7. Where in-wall electrical conduit is parallel to the wall, slit the insulation halfway to bury the conduit in it. Where the conduit is perpendicular to the wall, do not oversize the penetration; tape the conduit to prevent heat leakage.
 8. Install foil-faced insulation with foil facing the building interior.
- B. Attach insulation to solid surfaces as follows:
 1. Provide insulation fasteners at typical spacing specified, or equivalent area for panels of a different size and for any cut panel sizes, except not less than 2 fasteners for any single piece.
 2. Lay out panels for minimum of joints, and with any single piece not less than 24 inches wide or less than 48 inches long, unless otherwise approved.
 3. Offset intermediate end joints in adjacent panels not less than 48 inches.
 4. For 48-inch wide units follow insulation manufacturer's instructions. Provide a minimum of 8 fasteners. Space edge fasteners no more than 3-inch from edges.
 5. For 24-inch wide units, comply with the above, except use no less than 6 fasteners.
 6. Secure each metal clip base in full bed of adhesive as recommended by their manufacturer.
 7. Do not install panels until clip adhesive is fully set.

8. Cut panels in straight lines using tools which minimize fraying. Neatly and carefully precut small slots through panels to facilitate placing insulation over fasteners.
 9. Install panels fully bearing against substrates, and neatly and tightly fitted at joints and around surfaces of penetrations.
 10. Install fastener caps firmly against panel faces and without compressing insulation, and turn clip prongs or steps flat against caps.
- C. Where insulation in stud walls is not self-supporting, hold it in place with wires spaced not more than 16 inches o.c. horizontally or by other methods acceptable to the Design Consultant.
- D. Between rafters, support insulation with insulation supports spaced at 16 inches o.c. maximum.
- E. After installation is complete, tape penetrations and ruptures in insulation facing and tape joints between batts continuously.

3.3 FIELD QUALITY CONTROL

- A. Prior to closing-in of insulated assemblies, or prior to Substantial Completion for insulation that will remain exposed in the building, refit, reinstall and/or replace wet, damaged and displaced insulation.

END OF SECTION

SECTION 07 26 16 - BELOW GRADE VAPOR RETARDER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes aggregate bed and vapor retarder under building concrete slabs-on-grade.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 31 for grading and compacting aggregate bed to receive vapor retarder.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer Product Data, specifications, typical installation details and other data as necessary to demonstrate vapor retarder compliance with the specified requirements.
- B. Samples: 24-inch square Samples of vapor retarder with a taped joint at third point.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

PART 2 - PRODUCTS

2.1 TYPE/MANUFACTURERS

- A. Vapor retarder: "Griffolyn Type 105" by Reef Industries, Inc., or equal by one of the following complying with ASTM E 1745 Class A, and the values given below.
 - 1. Fortifiber Corp.
 - 2. WR Meadows.
 - 3. Soco Shield.
 - 4. Raven Industries.
 - 5. Insulation Solutions.
 - 6. Or equal.

2.2 MATERIALS

- A. Vapor retarder:
1. Material: 7-ply laminate, combining 4 layers of high-density polyethylene and 3 high-strength non-woven cord grid.
 2. Weight: 91 lb/1,000 square feet when tested in accordance with ASTM D 3776.
 3. Puncture propagation Tear: 55 lb when tested in accordance with ASTM D 2582.
 4. Permeance (Perm): 0.019 grains/hr-sq ft-in Hg when tested in accordance with ASTM E 96.
 5. Drop dart: 2300 g, when tested in accordance with ASTM D 1709.
 6. Tensile strength: 275 lb/5,464 psi when tested in accordance with ASTM D 882, 3 inch wide specimen.
 7. Puncture strength: 79 lb when tested in accordance with ASTM D 4833.
 8. Classification: Class A, when tested in accordance with ASTM E 1745.
 9. Usable temperature range: Minus 45 to 170 degrees F.
- B. Sealing material: Mastic, adhesive or pressure-sensitive adhesive tape recommended by the vapor retarder manufacturer.
1. VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Repair tape: Self-adhesive tape recommended by vapor retarder manufacturer to repair holes in membrane by jobsite activities.
1. VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Pipe boots: Of sizes indicated, compatible with vapor retarder and adhesive materials.
- E. Stone aggregates (base course): Washed, evenly graded mixture of gravel conforming to the following gradation.

Sieve size	Percent passing
3/4-inch	90 to 100
No. 4	0 to 10
No. 100	0 to 3

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions affecting the work of this Section at the site.
- B. Verify below-grade work and items penetrating moisture retarder are complete.
- C. Verify that subgrade is level and compacted to 95 percent maximum density, determined in compliance with ASTM D 1557.
- D. Correct detrimental conditions before proceeding with installation.

3.2 AGGREGATE BEDDING

- A. Cover subgrade with a minimum 4-inch layer of stone aggregate.
- B. Work to fill voids; vibrate to compact and leave with finished surfaces reasonably uniform at established grade.

3.3 VAPOR RETARDER

- A. Cover aggregate bed with the vapor retarder.
- B. Comply with ASTM E 1643 and the following:
 - 1. Layout to minimize running and side joints with long dimension parallel with the direction of the pour.
 - 2. Spread sheeting over undamaged vapor retarder, smooth and even; lap edge and end joints 6 inches; turn-up perimeters against concrete walls/footings 2 to 3 inches.
 - 3. Offset intermediate end joints in adjacent sheets 4 feet minimum.
 - 4. Seal laps and perimeters using continuous beads or strips of sealing material applied to bottom layer or tape. When using sealing material, apply top layer and press sufficiently to assure complete contact.
- C. Penetrations:
 - 1. Cut sheeting to fit closely and neatly.
 - 2. Slip sheeting over penetrations where possible, otherwise slit from penetration hole to nearest edge.
 - 3. Seal pipe penetrations with prefabricated boots made from vapor retarder and seal tight with tape to the vapor retarder.
 - 4. Seal edges continuously around penetrations.
 - 5. For smaller penetrations, repair slits with 12-inch wide strips of sheeting set centered on slit and sealed on each side.
- D. Cuts and accidental tears: Repair with tape, or if too large, with patches of the vapor retarder continuously taped.

END OF SECTION

SECTION 07 27 26 - FLUID-APPLIED AIR & WATER BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Fluid-applied, vapor permeable air and water barrier membrane system (A&WB) on above-grade exterior wall surfaces, except where doors and glazed assemblies occur.
2. Bridging and sealing air leakage pathways at roof and foundation junctions, window and door openings, control and expansion joints, piping and other penetrations through the wall assemblies.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 06 for plywood sheathing.
3. Other Sections of Division 07 for the following:
 - a. Membrane roofing.
 - b. Sheet metal flashing and trim.
 - c. Joint sealants.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling and sequencing: Schedule the work of this Section so the A&WB exposure to the elements is kept to a minimum and does not exceed time period recommended by its manufacturer.
- B. Coordination:
1. Notify concerned trades of items required to be incorporated into work of separate Sections. Certain components specified under this Section include items which are closely integrated with A&WB transitions, entrances, glazed assemblies, glazing components, flashing pieces and architectural metalwork specified in other Sections and consequently require close coordination with such allied trades. Perform coordination required to ensure correct installation procedures and results.
 2. Coordinate and cooperate with other trades and determine where and when phased installation of A&WB will be necessary as well as its extent; document in writing and have all affected trades sign the document before submitting one copy to the Design Consultant.

- C. Pre-installation meeting: Hold pre-installation conference at the site prior to commencement of field operations to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Pre-installation conference shall include the Contractor, installer, Design Consultant, and system manufacturer's field representative. Agenda for meeting shall include but not be limited to the following.

1. Review of submittals.
2. Review of surface preparation, minimum curing period and installation procedures.
3. Review of special details and flashings.
4. Sequence of construction, responsibilities and schedule for subsequent operations.
5. Review of mockup requirements.
6. Review of inspection, testing, protection and repair procedures.

1.4 SUBMITTALS

- A. Data: Manufacturer product data for each type of material. Including the following.

1. Application instructions.
2. Instructions for evaluating, preparing, and treating substrates.
3. Temperature and other limitations of installation conditions.
4. Technical data and tested physical and performance properties.
5. Certification of compatibility, listing all materials on the Project that the specified materials come in contact with.

- B. Shop drawings: Large scale, dimensioned shop drawings specific to the Project to supplement manufacturer data. Show the following.

1. Locations and extent of A&WB.
2. Details of typical and atypical conditions.
3. Intersections with other envelope systems and materials.
4. Membrane counterflashings.
5. Details showing bridging of gaps in the construction, treatment of inside and outside corners and sealing of miscellaneous penetrations.
6. Test results:
 - a. Air permeability testing of primary A&WB material in accordance with ASTM E 2178.
 - b. ABAA test protocol for the A&WB system.

- C. Samples: Minimum 6-inch square of each A&WB material required for the Project.
- D. Installer qualifications: Written approval from the A&WB manufacturer that the applicator of the system is qualified for the work of this Section.
- E. Certification: From an approved independent testing laboratory certifying that the air leakage rates of the membrane, including primary membrane and transition sheets, does not exceed the requirements of the Massachusetts Energy Code.
- F. Warranty: Sample copies of warranty for assembly to be furnished under this Section, clearly defining terms, conditions, and time periods for the warranty.
- G. Letter of acceptance: From the manufacturer to verify its acceptance of the applicator and acceptance of substrates as satisfactory to receive this work.
- H. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.

5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.5 QUALITY ASSURANCE

- A. Source limitation: Obtain primary air-barrier material and through wall flashing through one source from a single manufacturer.
- B. Applicator qualifications: Firm experienced in applying barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- C. Mockup: Before starting work of this Section, provide barrier work for exterior wall assembly mockup specified elsewhere, incorporating backup wall construction, external cladding, window, door frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of barrier membrane.
 - 1. Coordinate construction of mockup to permit inspection by City's testing agency of barrier before external insulation and cladding is installed.
 - 2. If Design Consultant determines mockup does not comply with requirements, reconstruct mockup(s) and re-apply barrier until mockup is approved.
 - 3. Accepted mockup may remain a part of the work when properly identified and protected.

1.6 HANDLING

- A. Deliver materials and products in labeled packages.
- B. Store and handle in compliance with their manufacturer's instructions and recommendations.
- C. Protect from damage from sunlight, weather, excessive temperatures and construction operations.
- D. Remove damaged material from the site.

1.7 PROJECT CONDITIONS

- A. Apply barrier within the range of ambient and substrate temperatures recommended by barrier manufacturer.
- B. Protect substrates from environmental conditions that affect performance of air and water barrier.
- C. Do not apply barrier to a wet substrate or during rain, fog, or mist.

1.8 WARRANTIES

- A. Special warranties: Provide the following warranties for 5 years after Substantial Completion.
 - 1. Material warranty: Manufacturer standard form in which manufacturer agrees to replace fluid-applied barrier membrane materials that fail within specified warranty period when installed and used in conformance with manufacturer's instructions.
 - 2. Workmanship warranty: Installer warranty, in form acceptable to the City, agreeing to replace fluid-applied barrier membrane that fail within specified warranty period when installed and used in conformance with manufacturer's instructions.

3. Failures include, but are not limited to, the following:
 - a. Failure to remain watertight.
 - b. Failure to maintain air permeance rating not to exceed 0.004 cfm/square foot when tested per ASTM E 2178, within specified warranty period.
 - c. Failure to maintain a vapor permeance rating greater than 10 perms when tested in accordance with ATM E 96, Method B.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Physical and performance properties: Provide products with the following minimum properties.
 1. Air permeance: Not to exceed 0.0004 cfm/square foot (at specified thickness) at 1.57-lbf/square foot pressure difference of surface area when applied to CMU wall; when tested per ASTM E 2178.
 2. Membrane vapor permeance: Not less than 11.2 perms when tested per ASTM E 96.
 3. Water resistance: Watertight when tested at the same pressure as for air permeance above.
 4. Assembly performance: Provide a continuous air and water barrier assembly that has an air leakage not to exceed 0.0008 cfm/square foot of surface area under a pressure differential of 0.3-inch water (1.57 pounds per square foot) when tested in accordance with ASTM E 2357.
 5. UV exposure limit: Not more than 180 calendar days per ASTM D 412 and ASTM E 96 Method B.

6. Property Typical Value Test Method

Air permeance at 1.57 psf (75 Pa)	<0.0002 cfm/ft2 (<0.001 L/s/m2)	ASTM E 2178 pressure difference
Assembly air permeance at 1.57 psf (75 Pa)	<0.0008 cfm/ft2 (<0.004 L/s/m2)	ASTM E 2357 pressure difference
Water vapor permeance	0.08 Perms (4.6 ng/Pa.s.m2)	ASTM E 96—method B
Water vapor permeance after aging2	0.033 Perms (1.9 ng/Pa.s.m2)	CAN/CGSB-51.33-89
Pull adhesion to concrete block (CMU)	35 psi (0.24 N/mm2)	ASTM D4541
Pull adhesion to glass faced wall board	18 psi (0.12 N/mm2)	ASTM D4541
	(pulls board apart)	
Peel adhesion to concrete	5 lbs/in. (880 N/m)	ASTM D903 modified
Elongation	500 percent	ASTM D413
Pliability, 180° bend over 1-inch (25 mm) mandrel at -23°F (-30°C)	Unaffected	ASTM D1970
Low temperature flexibility and crack bridging	Pass	ASTM C836
1/8-inch (3.2 mm) crack cycling at -15°F (-26°C)		
Extensibility over 1/4-inch (6.4 mm) crack	Pass	ASTM C836 after heat ag-ing
Solids content	100 percent	ASTM D1644

2.2 AIR AND WATER BARRIER

- A. Type/manufacturer: Single component, fluid-applied, fully-adhered, vapor-permeable air and water acrylic membrane. Provide one of the following.
 1. Perm-A-Barrier VP by Grace Construction Products (basis of design),
 2. Perm-A-Barrier® VPO (black) by Grace Construction Products (basis of design),
 3. Henry Air Bloc 33 UV-resistant.
 4. Or equal.

2.3 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air and water barrier manufacturer for intended use and compatible with air and water barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Liquid membrane for details and terminations: Bituthene Liquid Membrane.
- C. Wall primer (for use with through-wall flashing and tapes applied to substrate): Liquid waterborne primer recommended for substrate by manufacturer of air and water barrier material.
 - 1. Flash point: No flash to boiling point.
 - 2. Solvent type: Water.
 - 3. VOC content: Not to exceed 10 g/l.
 - 4. Application temperature: Minus 25-degree F and above.
 - 5. Freezing point (as packaged): Minus 7-degree F.
 - 6. Product: Perm-A-Barrier WB Primer.
- D. Flexible membrane wall flashing: 0.8 mm of self-adhesive rubberized asphalt integrally bonded to 0.2 mm of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming with the following.
 - 1. Water vapor transmission ASTM E 96, Method B: 0.05 perms maximum.
 - 2. Water absorption ASTM D570: Maximum 0.1 percent by weight.
 - 3. Puncture resistance ASTM E 154: 80 lb. minimum.
 - 4. Tear resistance:
 - a. Initiation ASTM D 1004: Minimum 13 lb M.D.
 - b. Propagation ASTM D 1938: Minimum 9 lb. M.D.
 - 5. Lap adhesion at minus 25-degree F, ASTM D 1876: 5 lb./inch of width.
 - 6. Low temperature flexibility ASTM D1970: Unaffected to minus 45-degree F.
 - 7. Tensile strength: ASTM D 412, Die C Modified: Minimum 800 psi.
 - 8. Elongation, ultimate failure of rubberized asphalt ASTM D 412, Die C: Minimum 200 percent.
 - 9. Product: Perm-A-Barrier Wall Flashing.
- E. Joint reinforcing strip: Air and water barrier manufacturer approved tape.
- F. Transition membrane: 32 mils of self-adhesive rubberized asphalt integrally bonded to 8-mil of cross-laminated, high-density polyethylene film to provide a minimum 40-mil thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed, conforming to the following:
 - 1. Water vapor transmission ASTM E 96, Method B: 0.05 perms maximum.
 - 2. Water absorption ASTM D 570: Maximum 0.1 percent by weight.
 - 3. Puncture resistance ASTM E 154: 80 lb. minimum.
 - 4. Tear resistance:
 - a. Initiation ASTM D 1004: Minimum 13 lb. M.D.
 - b. Propagation ASTM D 1938: Minimum 9 lb. M.D.
 - 5. Lap adhesion at 25-degree F: ASTM D 1876: 5 lb./inch of width
 - 6. Low temperature flexibility ASTM D 1970: Unaffected to minus 45-degree F.
 - 7. Tensile strength ASTM D 412, Die C Modified: Minimum 800 psi.

8. Elongation, Ultimate Failure of Rubberized Asphalt ASTM D 412, Die C: Minimum 200 percent.
9. Product: Perm-A-Barrier Wall Flashing manufactured by Grace Construction Products.
- G. Substrate patching membrane: Bituthene Liquid Membrane manufacturer standard trowel-grade substrate filler.
- H. Sprayed polyurethane foam sealant: One- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cubic foot density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- I. Joint sealant ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with manufacturer's recommendations and other conditions affecting performance.
 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 2. Verify that concrete has cured and aged for minimum time period recommended by barrier manufacturer.
 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
- B. Correct detrimental conditions before proceeding with installation.

3.2 SURFACE PREPARATION

- A. General:
 1. Comply with the barrier manufacturer's requirements for preparation of substrates.
 2. Surfaces shall be sound and free of voids and sharp protrusions.
 3. Remove contaminants such as grease, oil and wax from exposed surfaces.
 4. Remove dust, dirt, and debris.
 5. Use repair materials and methods that are acceptable to manufacturer of the fluid-applied barrier system.
 6. Provide clean, dust-free, and dry substrate for barrier application.
 7. Mask adjoining surfaces not covered by barrier to prevent spillage and overspray affecting other construction.
- B. Gypsum sheathing panels:
 1. Verify that the boards are sufficiently stabilized with corners and edges fastened.
 2. Pre-treat board joints with 2 to 3 inches wide manufacturer's recommended self-adhesive tape.
 3. Fill gaps greater than 1/4 inch wide with mastic or calk, allowing sufficient time to fully cure before taping.
 4. Tape joint prior to installing fluid barrier membrane.

- C. Plywood sheathing:
- D. Treat construction joints and install flashing as recommended by manufacturer.
- E. At changes in substrate plane, apply sealant or Bituthene Liquid Membrane at sharp corners and edges to form a smooth transition from one plane to another.
- F. Cover gaps in substrate and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for the barrier.

3.3 BARRIER MEMBRANE

- A. Apply barrier membrane to achieve a continuous barrier according to its manufacturer's instructions, within manufacturer's recommended application temperature ranges.
- B. Apply a continuous unbroken barrier to substrates 90-mil WMT to result in a minimum DFT of 45-mil.

3.4 TRANSITION MEMBRANE

- A. Install strips, transition membrane, and auxiliary materials according to the barrier manufacturer's instructions to form a seal with adjacent construction and to maintain a continuous air and water membrane.
 - 1. Coordinate the installation of the barrier with installation of roofing membrane and base flashing to ensure continuity of barrier with roofing membrane.
 - 2. Install strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved on both substrates.
 - 3. Install flashings only after application of air and water barrier.
- B. Apply primer to substrates to receive transition membrane at required rate and allow to dry. Limit priming to areas that will be covered by transition tape in same day. Reprime areas exposed for more than 24 hours.
 - 1. Prime gypsum sheathing not covered with air membrane material with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. Connect and seal barrier membrane continuously to roofing membrane air and water barrier, floor-to floor construction, exterior glazed assemblies, door framing, and other assemblies in exterior wall openings, using accessory materials.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Prime concealed perimeter frame surfaces of exterior glazed assemblies and doors. Apply transition strip so that a minimum of 3-inch of coverage is achieved over both substrates. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than one-inch of full contact.
- G. Roll transition membrane firmly to enhance adhesion.
- H. Fill gaps in perimeter frame surfaces of glazed assemblies, doors, and miscellaneous penetrations of barrier membrane completely with foam sealant.
- I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 FIELD QUALITY CONTROL

- A. Testing agency: City may engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Inspections: Barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following.
 - 1. Continuity of barrier system is achieved throughout the building envelope with no gaps or holes.
 - 2. Continuous structural support of barrier system is provided.
 - 3. Site conditions for application temperature and dryness of substrates have been maintained.
 - 4. Maximum exposure time of materials to UV deterioration is not exceeded.
 - 5. Surfaces have been primed, if applicable.
 - 6. Laps in strips and transition strips comply with minimum requirements and are shingled in the correct direction (or mastic is applied on exposed edges), with no fishmouths.
 - 7. Termination mastic is applied on cut edges.
 - 8. Strips and transition strips are firmly adhered to substrate.
 - 9. Compatible materials have been used.
 - 10. Transitions at changes in direction and structural support at gaps are provided.
 - 11. Connections between assemblies (membrane and sealants) comply with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 - 12. All penetrations are sealed.
- C. Tests: Testing may be performed and will be determined by City's testing agency for evidence of air leakage according to ASTM E 1186, smoke pencil with pressurization or depressurization.
- D. Deficiencies:
 - 1. Do not cover barrier until it is tested and inspected by City's testing agency, unless City decides not to have tests performed in which case cover barrier after work is reviewed and found acceptable.
 - 2. Correct deficiencies in or remove barrier components that do not comply with specified requirements; repair substrates and reapply.

3.6 CLEANING/PROTECTING

- A. Protect barrier system from damage during application and remainder of construction period, according to its manufacturer's instructions.
- B. Protect barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace barrier exposed to UV for more than 150 days.
- C. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Remove masking materials after installation.

END OF SECTION

SECTION 07 42 00 - PREFORMED WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Preformed wall, fascia, soffit and ceiling panels, their support system, special shapes, and all other panels elements for the building.
2. Cladding contiguous steel doors with metal panels.

B. Related requirements:

1. Division 01 for LEED requirements..
2. Division 07 for the following:
 - a. Insulation.
 - b. Other flashing and sheet metal.
 - c. Air/water barrier.
 - d. Sealants.
3. Division 08 for glazed assemblies adjacent to the panels.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org .

1.3 SYSTEMS DESCRIPTION

- A. General: Single-skin concealed fastener metal wall panel systems applied as exterior components of an insulated wall system.

1.4 SUBMITTALS

- A. Shop Drawings: Dimensioned Shop Drawings for the preformed panel system, including design and detailing of the panel support framing elements and their attachment to the structural frame. Coordinate Drawings and their submittal with other adjacent exterior wall components.
1. Show in detail the panel layout on each plane, support framing system, panel attachment members, jointing, dimensions, sizes and locations of cut-outs, relation to work of other trades, and other pertinent data and information.
 2. Indicate and dimension adjoining, abutting and penetrating work, to be performed by other trades.
 3. Number each panel to correspond to the markings shown on the fabrication/shop drawings. Mark the identification number on the back of each panel.
 4. The shop drawings and calculations shall bear the seal of a California-registered professional engineer. The engineer shall also perform and submit structural calculations to document all panel conditions.

B. Samples:

1. Prior to fabrication, submit preliminary Samples of panels showing corners, special shapes, or other conditions, all finished as specified.
2. Samples will serve as the control for limiting acceptable range of appearance.

C. Data:

1. Manufacturer product data sheet or equivalent printed literature indicating product information for panel anchorages, setting accessories and other related materials.
2. Data shall substantiate that the materials comply with the specified requirements.

D. Calculations: Calculations, stamped and certified by a California-registered professional engineer, to demonstrate structural adequacy of panels and anchorage system, and compliance with criteria specified. Coordinate calculations submitted with shop drawing submittals.

E. Manufacturer instructions: Manufacturer instructions for care, repair and replacement procedures, and samples showing repaired panels.

F. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 QUALITY ASSURANCE

A. Fabricator/installer qualifications:

1. Single firm with a minimum of 5 years successful experience in the fabrication and erection of panel systems of similar sizes, shapes and finishes required for this Project, and which has ample production facilities to produce, furnish and supply the panels as required for installation without delay to the Work.
2. Firm must be regularly engaged in the engineering, fabrication, finishing and installation, of similar work.

B. Mockups: Build mockups to verify selections made under sample submittals, to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical wall panel, including soffit, approximately one bay wide by one story high by full thickness, including 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 Design Consultant specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 HANDLING

A. Delivery:

1. After fabrication, protect panels with strippable plastic film.
2. Deliver panels to ensure that there will be no damage or staining.
3. Deliver other materials, except bulk materials, in manufacturer's unopened containers with name, brand, type, grade and color fully indicated thereon. Store bulk materials as required to avoid any deleterious effects of weather, soiling or contamination.
4. Delivered items shall be properly boxed or crated. Mark containers with installation location, fabrication/piece numbers, shop drawings reference, etc., as applicable.

B. Storage:

1. Store above grade on suitable surfaces using polyethylene film to separate panels from supporting or protecting members.
2. Protect from weather, soiling and damage of every kind.
3. Crate panels to prevent accumulation of moisture between panels.

1.7 SPECIAL WARRANTIES

A. Warrant that wall panels and their support system elements will meet the specified performance criteria specified and will be free from defects in materials and workmanship for 2 years after Substantial Completion, except where longer warranties are specified below.

1. Certify in writing that installed work is in accordance with the Contract Documents and authorized alterations and/or additions thereto and that, should defect develop during the warranty period due to improper workmanship or materials installed as a part of this Section, such defects will upon written request, be repaired or replaced at no additional cost to the City.
2. If exploratory work is required to determine the cause of the defects, the cost of such work shall be borne by the Contractor when his work is found to be at fault.

B. Further warrant the City in writing that wall panels will not evidence delamination of any type for 10 years after Substantial Completion.

C. Warrant finish against fading, chalking, peeling, cracking, checking, chipping, or erosion to base metal of the exterior panel finish for 10 years after Substantial completion.

D. Defective materials and workmanship are hereby defined to include evidence of abnormal deterioration or aging or weathering or work, structural failure of components resulting from exposure to normal load and forces, sealant failures, deterioration or discoloration of finishes in excess of normal weathering and aging, delamination, and failure to fulfill other specified performance requirements.

E. The warranty, the enforcement or lack of enforcement thereof, shall not deprive the City of other actions, rights or remedies available to him. Warranty shall be in form approved by City.

PART 2 - PRODUCTS

2.1 METAL PANELS

A. Manufacturers: Hendrick Manufacturing Company, or equal.

B. Custom dimpled aluminum wall panels:

1. Die-pressed panels with 2- to 3-inch diameter varying depth dimples.
2. Metal thickness: 1/8 inch.
3. Finish: Powder coat Tiger Drylac 75.
4. Color: TBD.

C. Custom perforated aluminum screen panels over exterior plaster wall.

1. Pattern as indicated on the Drawings.
2. Metal thickness: 1/8 inch.
3. Finish: Powder coat Tiger Drylac 75.
4. Color: TBD.

2.2 PERFORMANCE REQUIREMENTS

A. Design requirements, general: Design system so individual panel can be removed without removing or disrupting adjacent panels or materials.

1. The Drawings and Specifications establish visual and performance requirements for the design, fabrication and installation of the metal panels.
 - a. The Contractor is responsible for the engineering, and design of all components and materials as well as the fabrication, installation and performance of the panel system.
 - b. Contractor shall obtain necessary approvals and permits, and pay costs therefore from public authorities having jurisdiction.
2. Drawings are diagrammatic:
 - a. The details shown are intended to establish basic profiles and dimensions, and interfacing requirements of the metal panels to and with other work.
 - b. Contractor is responsible for the design and engineering of the metal panels within these parameters.
 - c. The details indicated are incomplete. The Contractor shall develop conditions not detailed during the engineering and shop drawing process to reflect the level of aesthetics of the Project, and to comply with performance criteria specified.

B. Panel design: Design panels to meet or exceed the following structural and weather resistance requirements, as demonstrated by engineering calculations. Loads used in design shall be those prescribed by Code.

1. Structural requirements:
 - a. Perpendicular to the plane of the wall, net deflection of framing members shall not exceed $L/175$ times span, or 3/4 inch, whichever is less. Span is defined as the distance between anchor centerline. For cantilevers, span is defined as twice the distance between anchor centerline and end of cantilever.
 - b. Perpendicular to the plane of a soffit, net deflection of framing members shall not exceed $L/600$ times span under dead load support of panels. Span is defined as the distance between anchor centerlines.
 - c. In the plane of the wall, deflection of horizontal framing members shall not exceed $L/360$ or 1/8 inch, whichever is less. This includes horizontal rail sag due to dead load.
 - d. At connection points of framing members to anchors, combined movement of anchor relative to building structure, and framing member relative to anchor, shall not exceed 1/16 inch in any direction.

- e. Stresses shall not exceed the allowable values established by the specifications listed in reference standards. In no case shall allowable values exceed the yield stress. Where permitted by Code, a 1/3 increase in allowable stress for wind or seismic load is generally acceptable, but not in combination with any reduction applied to combined loads.
- f. Limit deflection of metal panels to L/120 of the span or 1/4 inch, whichever is less when tested in accordance with ASTM E 330 at specified design pressure. Measure deflection relative to the horizontal and vertical support members with the allowable deflection being determined by the lesser dimension.
- g. At 150 percent of the design pressure loads for metal members supporting panels the net permanent deflection of framing members shall not exceed 1/1000 times span. There shall be no failure or gross permanent distortion of framing members, anchors or connections. At connection points of framing members to anchors, combined movement of anchor relative to building structure, and framing member relative to anchor, shall not exceed 1/16-inch set after load is removed.
- h. Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening or fracturing of attachments or components of system are not permitted in the installed work.

C. Weather requirements:

- 1. Design wind loads shall be as indicated acting normal to the plane of the wall.
- 2. Wall panels shall be designed for a maximum deflection of L/180 under load.
- 3. Air infiltration of the wall panel system shall be limited to 0.06 CFM/ft² at a positive pressure differential of 1.57 psf when tested in accordance with ASTM E 283.
- 4. There shall be no uncontrolled water penetration to the building interior when the wall panel system is tested per ASTM E 331 at a positive pressure differential of 6.24 psf or 20 percent of the design wind pressure whichever is greater. The test pressure need not exceed 12 psf.
- 5. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): 120 deg F ambient; 180 deg F., material surfaces.

2.3 ACCESSORIES

- A. Concealed fasteners shall be cadmium plated carbon steel or 300 series stainless steel with 5/8" bonded neoprene and galvanized or stainless steel washers.
- B. Sealants: Exposed sealant shall be as specified in Section 07 92 00.

2.4 FABRICATION

- A. Panel system components shall be fabricated in the factory for field-assembly to the greatest extent possible, under controlled environment in fabricator's plant in conformance with accepted shop drawings and calculations so tolerances, as stated herein, are not exceeded. Field fabrication of panels is not permitted.
- B. Fabrication tolerances:
 - 1. Panel bow: Maximum 0.2 percent of width or length, whichever is greater.

2. Width or length: Plus 0.064 to 48-inch; Plus 0.032 to 144-inch.
3. Thickness: Plus 0.008-inch
4. Squareness: 0.1875-inch difference between diagonals.
5. Camber: 0.062-inch maximum.
6. Radius of exterior bent corners: 1/16-inch maximum.

2.5 FINISHING

- A. Finish panel to match approved samples.
- B. Paint surfaces within panel cavity exposed to air or moisture.
- C. For uniformity finish each panel type for an entire elevation at the same time.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine structure that will support the metal panel support system. Verify elevation, tolerances, offset lines, and other conditions that would affect the satisfactory installation and performance of the panels.
- B. Correct unsuitable conditions before proceeding with erection.

3.2 PREPARATION

- A. Examine surfaces and supports to receive panels. Make sure they are secure and properly aligned.
- B. Do not begin installation of panels until Design Consultant has accepted secondary air/water barrier.

3.3 INSTALLATION

- A. Install panels and panel support members in compliance with the approved shop drawings, calculations, and fabricator's published instructions.
- B. Install panels so that in their final location and position joints are uniform, perfectly aligned, with flush joints, and panels are not twisted out of plane.
- C. Adjust work to conform to the following tolerances (maximum variations):
 1. Face width of joints: Plus 1/32-inch.
 2. Joint taper: 1/100-inch/foot length, with a maximum length of tapering in one direction of 6 feet.
 3. Jog in alignment of edge: Plus 1/16-inch.
 4. Rough opening dimension: Plus 1/16-inch at head, Plus 1/16-inch at sill, and Plus 1/16-inch at jamb.
 5. Deviation from plumb, 1/16-inch maximum per one story height and a maximum of 1/8-inch in a 45 feet run.
 6. Deviation from horizontal: 1/8-inch maximum in a 30 feet run.

3.4 SEALANTS

- A. Comply with the requirements of Section 07 92 00 for sealants, backer rods, and their installation.

3.5 CLEANING AND PROTECTING

- A. Leave protective film on panels in place as long as possible where doing so will not produce discoloration or other undesirable visual defects.
- B. Remove protective film when, and in the manner, recommended by panel manufacturer's instructions.
- C. Clean panels in accordance with their manufacturers' published recommendations.
- D. Protect panels from damage. Repair or replace damaged panels to Design Consultant's satisfaction.

3.6 ACCEPTANCE

- A. Each and every panel will be subject to the Design Consultant's approval or rejection.
- B. Panel or panels may be rejected after installation.
- C. Carefully remove rejected panels and replace with new panels without delay and without cost to the City.
- D. Remove panel or panels damaged in the removal of defective or rejected panels, and replace with new panels.

END OF SECTION

SECTION 07 52 00 – PATCHING EXISTING ROOFING

PART 1 - GENERAL

1.0 SUMMARY

- . Section includes patching existing roofing and base flashings to keep the building watertight whether an existing condition when the Contractor is given access to the site, or damaged by the work of this Contract
- . Demolition is specified in Division 02 but preparation of existing roof and base flashing to receive the work of this Section is a responsibility of this Section.
- . Related requirements:
 - 0. Division 01 for LEED requirements.
 - 0. Other Section of Division 07 for single ply roof assembly.

2.0 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

3.0 ADMINISTRATIVE REQUIREMENTS

- . Pre-installation meeting: Prior to start of installation, arrange a pre-installation meeting between the manufacturer of existing roofing membrane (if known), the roofer responsible for patching the existing roof, and trades responsible for metal flashings, roof penetrations, or mounting equipment on the roof.
 - 0. If more than one trade will be responsible for the work of this Section, these trades shall attend the meeting.
 - 0. Those present shall review the Drawings, Specifications, roofing manufacturer's instructions, and the roof and base flashings surfaces to be patched.
 - 0. Record minutes of the meeting, decisions made, and corrective measures to be taken before the work of this Section starts.
 - 0. Send copy of the minutes to the Design Consultant no later than 48 hours following the meeting.

4.0 SUBMITTALS

- . Data: Manufacturer Product Data consisting of a detailed list of materials proposed for use, with make and manufacturer's designation.
- . Shop Drawings:
 - 0. Details of flashing at penetrations and terminations.
 - 0. Coordinate other trades Shop Drawings with the work of this Section which is a part of, or will penetrate the roof, or mount to the roof.
- . LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - Credit SS 7.2, Reduce Heat Islands, Roof.
 - Credit MR 4.1 & 4.2, Recycled Content.
 - Credit MR 5.1, Regional Materials, Manufactured Locally.
 - Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - Credit MR 6, Rapidly Renewable Materials.

Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

5.0 SPECIAL WARRANTY

- . Installer (roofer) shall warrant to the City that the existing roof, after patching, will be watertight for 5 years following Substantial Completion.
- . Installer shall, within the warranty period, make repairs should roof leaks at no cost to the City no later than 24 hours after notification by the City of such an event.

PART 2 - PRODUCTS

1.0 PERFORMANCE REQUIREMENTS

- . Patch existing roofing membrane, and associated base flashing, to prevent the passage of water into the building.

2.0 MATERIALS

- . As selected by the Contractor, compatible with existing materials, and acceptable to the Design Consultant.

PART 3 - EXECUTION

1.0 PATCHING

- . Supervise the cutting of the existing roof membrane to make sure that the patchwork will perform as intended.
- . Clean the deck of foreign materials. Make sure that it is completely dry.
- . Replace removed roof insulation when applicable. If insulation is damaged, provide new matching insulation cut for a tight fit.
- . Apply a minimum of 3 layers of 15 lb. fiber glass or polyester-reinforced roofing plies and a cap sheet matching the existing.
 - 0. Make the first ply 6-inch wider than the patch and each succeeding felt and the cap sheet 6-inch wider than the felt below.
 - 0. Apply each ply in full mopping of hot asphalt or cold roof adhesive where acceptable to the Design Consultant, so that in no place felt touches felt.
- . Patch base flashing with matching materials to make the patch watertight.
- . Mask adjacent cap sheet and surfaces so as not to spill asphalt on these surfaces.

END OF SECTION

SECTION 07 54 19 - THERMOPLASTIC ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Thermoplastic (PVC) roofing membranes Adhered to clean, dry, undamaged plywood sheathing.
2. Sheet metal flashings at the perimeter penetrations of the roof membrane.
3. Insulation crickets.
4. Adhesive, fasteners and anchors to attach the roof membrane to wood deck.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 06 for plywood roof sheathing.
3. Division 07 for other sheet metal flashings and insulation.
4. Division 48 for roof-mounted solar panels and inverters.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org .

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting:

1. Prior to start of installation arrange a pre-installation meeting between the roofing manufacturer authorized representative, the Contractor, the Design Consultant, and the roofer and the framer to review Project conditions, the Drawings, Specifications and the roofing manufacturer data.
2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
3. Ascertain requirements for set-up, construction schedule and coordination of the Work.
4. The parties named above shall survey the roof decks and identify areas of concern and remedial measures.
5. Note that the roof is a major design element and the execution of the work of this Section is paramount to the success of the Project.
6. Record meeting minutes and distribute copy to all concerned, including the Design Consultant, within 7 days after the meeting.

B. Scheduling and sequencing:

1. Sequence work to avoid traffic by equipment or personnel as much as possible over completed roofing. Where such access is absolutely required, provide necessary protection and/or barriers to segregate the work area and to prevent damage to adjacent areas.
2. Do not store materials on completed membrane surfaces. Where storage or traffic is unavoidable, provide plywood, additional protection boards or similar protection to prevent damage to the membrane. Notify the membrane manufacturer that traffic or storage is anticipated.

3. All conduit, utilities boxes, inserts, penetrations and drains shall be in place, grouted where required and permanently fixed to the substrate before the insulation and membrane are installed.

1.4 SUBMITTALS

A. Shop Drawings:

1. Show outline of roofs and their respective size.
2. Show roof topography, identify slopes and gradients.
3. Locate and dimension all proposed seams; seam location is subject to the Design Consultant's approval and shall be relocated, at no cost to the City, when requested by the Design Consultant.
4. Provide large scale details of fascia treatment, each flashing component, penetrations and terminations.

B. Samples: Samples of each primary material and each color of membrane to be used in the roof systems including each component manufacturer's literature.

1. Make roof membrane samples a minimum of 24 inches square with one welded joint.
2. Make flashing samples a minimum of 6 inches long.

C. Data: Manufacturer Product Data, including installation instructions.

D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit SS 7.2, Reduce Heat Islands, Roof.
2. Credit MR 4.1 & 4.2, Recycled Content.
3. Credit MR 5.1, Regional Materials, Manufactured Locally.
4. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
5. Credit MR 6, Rapidly Renewable Materials.
6. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

E. Warranty:

1. Roofing membrane manufacturer warranty form.
2. Roofer warranty form.

1.5 QUALITY ASSURANCE

A. Acceptance: Submit the following.

1. Technical acceptance from roofing membrane manufacturer of the roofing system.
2. Certifications by producers of roofing materials that materials supplied comply with requirements of the identified ASTM and industry standards.
3. Certification that system specifications meet code and insurance requirements (available from the City).

B. Roofer qualifications:

1. Roofing system shall be applied only by a firm authorized in writing, by the roofing membrane manufacturer, to apply the roof membrane specified.
2. Work pertaining to the installation of roofing membrane and flashings shall only be completed by applicator personnel trained and authorized by roofing membrane manufacturer in those procedures, and having a minimum of 5 years application experience.

- C. Completion: On completion of installation, and delivery to roofing membrane manufacturer by the Contractor of a certification that work was done in accordance with these Specifications and roofing membrane manufacturer requirements, an inspection shall be made by a technical representative of roofing membrane manufacturer to observe the roof system.
- D. Code requirements: Submit evidence that the proposed roof system will meet Code requirements and has been tested and approved or listed by the following testing organizations.
 - 1. FM (Factory Mutual Research Corp.) FM I-90 wind uplift resistance.
 - 2. UL (Underwriters Laboratories, Inc.) Class A membrane.
- E. Mockup: Build a mockup of the main roof system (gray), minimum 4 feet by 4 feet by 4 feet at the site.
 - 1. As a minimum, include one membrane seam, one ridge, fascia all around the mockup, and one valley.
 - 2. Install the roof membrane on T&G plywood, same as will be used for the building roof sheathing and fascia. Provide 2 by 4 framing to support the mockup.
 - 3. The mockup will be reviewed by the Design Consultant; modify mockup until the Design Consultant's approval is obtained.
 - 4. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockup unless Design Consultant specifically approves such deviations in writing.
 - 5. Approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 HANDLING

- A. Delivery: In original unopened containers or wrappings.
- B. Storage:
 - 1. Handle materials to prevent damage. Place materials on pallets and fully protected from moisture.
 - 2. Store membrane rolls lying down on pallets, and fully protected from moisture with clean canvas tarpaulins. Unvented polyethylene tarpaulins are unacceptable.
 - 3. Store adhesives above 40-degree F.
 - 4. Store flammable materials in a cool, dry area away from sparks and open flames.
 - 5. Remove damaged materials from the job site and replace at no cost to the City.

1.7 JOB CONDITIONS

- A. Install materials when environmental conditions are within range acceptable to the roofing membrane manufacturer.
- B. Install only materials as much of new roofing as can be made weathertight each day, including all flashing and detail work.
- C. Surfaces to receive insulation, membrane, and flashings shall be dry. Should surface moisture occur, provide the necessary equipment to dry surface prior to application.
- D. Install uninterrupted waterstops at the end of each day's work, and completely remove them before proceeding with the next day's work.
- E. Prior to and during application of insulation and roofing membrane, remove dirt, debris and dust from surfaces either by vacuuming, sweeping or blowing with compressed air and/or similar methods.
- F. Conduct fastener pullout tests in accordance with industry standards to help verify condition of deck/substrate and to confirm expected pullout values.

1.8 WARRANTIES

- A. Special warranties: Defects: The manufacturer and the roofer, as noted below, shall repair defects within the warranty period at no cost to the City. If work related to roofing, flashing, or metal is found to be within the roofer and/or manufacturer warranty term, defective or otherwise not in accordance with the Contract Documents, the roofer and/or manufacturer, as specified below, shall repair defect(s) at no cost to the City. Defects are defined as follows.
 - 1. Failure of the roof and flashings to remain weathertight during the warranty period.
 - 2. Discoloration of the roof membrane other than caused by normal aging; uneven discoloration will be deemed a defect.
 - 3. Lack of adhesion to substrate, such as evidenced by bubbles (trapped air) under the roof membrane.
- B. Manufacturer warranty: Manufacturer shall warrant roofing and flashings against defective materials for all supplied components, and roofer's workmanship, for 20 years after Substantial Completion. Warranty shall not be prorated, shall not include dollar limit, and shall not exclude, without time restriction, ponding water.
- C. Roofer's warranty: Roofer shall supply the City with a separate 2-year workmanship warranty. The installer's warranty obligation shall run directly to the City, and a copy shall be sent to the manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Sika Sarnafil (basis of design.)
- B. Or equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide roofing system that prevents the passage of water in the building.

2.3 MEMBRANE SYSTEM

- A. Basis of design: Sika Sarnafil 60 mils thick (not to exceed +/- 2 mills) G410-15FB fiberglass reinforced membrane with a lacquer coating. Membrane shall conform to ASTM D 4434, "Standard for Polyvinyl Chloride Sheet Roofing" Classification: Type II, Grade I.
 - 1. Colors: Light gray and white, as indicated on the Drawings.

2.4 MECHANICAL PAD UNDERLAYMENT

- A. PVC underlayment under mechanical pad sheet metal cover: G476 Self-Adhered 120-mil waterproofing membrane, composed of a 60-mil vinyl waterproofing membrane and an integral 60-mil non-permeable, closed cell foam backing layer coated with a pressure-sensitive adhesive.

2.5 FLASHING MATERIALS

- A. As supplied by roofing membrane manufacturer.
- B. Flashing materials shall be same material as roofing membrane, except that the metal portion of the flashing shall be Type 316 stainless steel.

2.6 ADHESIVES

- A. Water-based adhesive for membrane attachment to cover board substrate.
- B. Low rise foam adhesive for insulation and cover board attachments.
- C. Adhesives must be acceptable to the roof membrane manufacturer for the conditions of use.
 - 1. PVC surfaces: Sarnacol 2121 VOC-compliant adhesive for vertical concrete and steel deck surfaces.
 - 2. Stabond Adhesive.: Low VOC reactivating-type adhesive used to attach membrane to flashing substrate.

2.7 CRICKETS

- A. TBD

2.8 FASTENERS

- A. Fastener: Corrosion-resistant fastener recommended by the roofing membrane manufacturer. Length of fasteners shall penetrate the sheathing a minimum of 3 full threads.
 - 1. The fastener manufacturer, or and accredited testing agency acceptable to the City, shall perform pullout tests.
 - 2. Results of these tests plus and an assessment by the fastener manufacturer regarding the suitability of the fastener for the Project is required.

2.9 ACCESSORIES

- A. Sarnaclad: PVC-coated, heat-weldable 25-gage, Type 316 stainless steel sheet with a 20-mil unsupported Sarnafil membrane laminated to one side.
- B. Sarnastack: Vent pipe flashing fabricated from 0.048-inch thick Sarnafil G410 membrane.
- C. Sarnacircles "G": Circular 0.048-inch thick G410 membrane patches welded of T-joints formed by overlapping membranes.
- D. Sarnafiller: 2-component urethane sealant used for pitch pocket topping.
- E. Sarnacorner: Prefabricated inside and outside corners made of 0.060-inch thick Sarnafil membrane that is heat-welded to membrane or flashing.
- F. Sarnafasteners:
 - 1. XPS, #15 heavy-duty, corrosion resistant fastener, shank diameter of 0.21-inch and thread diameter of 0.26-inch, with a driving head of 0.435-inch and #3 Phillips design.
 - 2. Sarnadisc XPS, 18 gage, 2-inch by 3-3/4-inch linear steel plate.
- G. Sarnastop: Extruded aluminum, low profile bar installed over the membrane and made watertight with a welded cover-strip, used at all angle changes.
- H. Sealants: Sarnafil multi-purpose sealant for termination details.
- I. Aluminum tape: 2-inch wide pressure-sensitive tape.
- J. Sarnasolv: Solvent cleaner for the specified membrane surface.
- K. Walkway pads: Sarnatred (welded) or Cross Grid - (loose laid), matching colors for each roof area.
- L. Peelstop: Extruded aluminum, low profile bar used with appropriate fasteners to attach to the roof deck or to walls/curbs at terminations, penetrations and at incline changes of the substrate.
- M. All other accessories: As recommended by the roofing membrane manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Manufacturer's inspections:
 - 1. Request the manufacturer's presence before start of this work to review installation procedures and completed work, and to issue warranty specified.
 - 2. Unsatisfactory conditions disclosed by the manufacturer visits, and that of other entities listed in Article 1.2 above, to the site shall be promptly and satisfactorily repaired and the areas re-inspected by the manufacturer before work starts or resumes in affected areas.
- B. Examine substrates, conditions and surfaces to/under which materials will be applied/installed/to receive materials.
- C. Conduct fastener pullout tests in accordance with industry standards to help verify condition of deck/substrate and to confirm expected pullout values. Remove loose and misplaced fasteners and drive into a solid framing member.
- D. Coordinate the installation so that each roofed area is made watertight at the end of each day.

3.2 SUBSTRATE PREPARATION

- A. Inspect deck for defects that will adversely affect the quality of this work.
- B. Verify that screws are slightly depressed without breaking the plywood veneer and that other defects have been corrected – depressions filled with compatible wood filler, and roughness sanded flush with adjacent surfaces.
- C. Substrates shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until defects are corrected, and work of penetrating and adjacent installations has been completed.
- D. Apply roofing systems over compatible and acceptable substrates only.

3.3 WOOD NAILERS

- A. Install continuous treated wood nailers, of same thickness as insulation height, at the perimeter of the entire roof and around roof projections and penetrations.
- B. Screw nailers to sheathing.
- C. Provide a 1/2-inch space between nailer lengths.
- D. Individual nailer lengths shall not be less than 3-foot long.
- E. Space fasteners at 12 inches o.c. Stagger fasteners 1/3 the nailer width and install within 6-inch of each end.
- F. Nailer attachment shall meet this requirement and current FM Loss Prevention Data Sheet 1-49.

3.4 INSULATION

- A. Mechanically-attach insulation with approved fasteners to the decks as recommended by roofing membrane manufacturer and in compliance with FM for fastening rates and patterns.
- B. Do not install more insulation board than can be covered with membrane by the end of the day or the onset of inclement weather.
- C. Use at least 2 layers of insulation when the total thickness exceeds 2.5-inch. Stagger joints at least 12-inch between layers.

- D. Attach insulation as recommended by the insulation manufacturer, FM and roofing membrane manufacturer instructions, and so that insulation boards rest evenly on the substrate. Install each insulation board tightly against the adjacent boards on all sides.

3.5 ROOFING MEMBRANE & WALKWAY PADS

- A. Install roof membrane over clean, dry substrate in accordance with its manufacturer's instructions.
- B. Place seams only where accepted on Shop Drawings.
- C. Hot air-weld seams continuously.
- D. Match approved Mockup.
- E. Install walkway pads in the patterns indicated over the completed roof membrane. Space panels one-inch apart. Adhere fully to roof membrane as recommended by the membrane manufacturer.

3.6 FLASHINGS

- A. Install concurrently with roof membrane as the work progresses, in accordance with the roofing membrane manufacturer instructions, to seal all edges and penetrations.

3.7 FIELD QUALITY CONTROL

- A. Seams:
 - 1. Check welded seams for continuity daily where directed by roofing membrane manufacturer's representative.
 - 2. When and where directed by the Design Consultant, take one-inch wide cross-section samples of welded seams at least 3 times a day.
 - 3. Correct welds displaying failure from shearing of membrane prior to separation of weld. Patch each test cut.
- B. Roofing membrane is subject to review by Design Consultant and roofing membrane manufacturer.
 - 1. Note defects and non-compliance with Specifications, and itemize roofing membrane manufacturer's recommendations in a punch list.
 - 2. These items must be corrected immediately to the satisfaction of the Design Consultant and roofing membrane manufacturer prior to demobilization.

END OF SECTION

SECTION 07 62 00 - FLASHINGS AND SHEET METALWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes flashings and sheet metal items shown or required to make the building weathertight and not specified in other Sections.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 07 for roof hatch.
 - 3. Division 08 for flashings in connection with exterior glass assemblies and counterflashings at perimeter of skylights.
 - 4. Division 09 for finish painting flashings and sheet metalwork.
 - 5. Division 23 for mechanical sheet metal work, and flashings and collars for mechanical and electrical work, except as specified herein for roof drains.
- C. Demolition is specified in Division 02 but preparation of existing sheet metal to be patched is a responsibility of this Section.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting:
 - 1. Prior to start of installation, arrange a pre-installation meeting between the Contractor, the installer, and the Design Consultant to review areas where flashings will be installed, as well as other conditions that would affect the quality of this work, the Drawings and Specifications.
 - 2. Review existing building and conditions, all typical and atypical details to verify the fabrication and installation methods that the Contractor will follow, as well as corrective actions that are required.
 - 3. Special conditions not specifically referenced or addressed by the Project Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified, reviewed and discussed.
 - 4. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions so that a determination can be made of actions to be taken to assure an installation that will be visually acceptable to the Design Consultant, and watertight.
 - 5. Record meeting minutes and distribute copy to all concerned, and the Design Consultant, within 48 hours after the meeting.

1.4 SUBMITTALS

- A. Data: Manufacturer product specifications, installation instructions and general recommendations for installation of prefabricated assemblies.

- B. Shop Drawings:
1. Show typical and atypical details, material weight, methods of joining and attachment, and relationship with adjacent materials and supports of all sheet metal assemblies.
 2. Detail interface with adjacent materials. For interface between flashings with different profiles and conditions difficult to illustrate in 2-dimension, furnish isometric drawings.
- C. Samples: Assembled Samples of the following at least 6 inches long, except as otherwise specified. Mount on plywood and include all components to be installed under this Section for each Sample.
1. Complete coping, including inside and outside corner condition, with legs at least 12 inches long, with typical moving and non-moving joints. Inside and outside corners must be fully soldered; sealed joints at those locations are unacceptable.
 2. Gutter including holding strap, and attached conductor head and downspout.
 3. Counterflashing with receiver.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content.
 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 4. Credit MR 6, Rapidly Renewable Materials.
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design criteria and performance requirements: Fabricate and install the work of this Section to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, excessive oil-canning, and fastener disengagement.
1. Thermal movements:
 - a. Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects.
 - b. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements.

- c. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - d. Temperature change (range) of 120-degree F ambient; 180-degree F, material surfaces.
2. Water infiltration: Provide sheet metalwork and flashings that do not allow water infiltration to building interior, and to damage materials, such as insulation, in exterior walls.

2.2 MATERIALS

- A. Sheet steel: Commercial quality carbon steel sheets complying with ASTM A 653, lock-forming grade, galvanized with a G90 zinc coating, 24-gage (0.025 inch) minimum unless otherwise indicated.
- B. Nails:
 - 1. For attaching sheet steel to wood: Large flat head "stronghold" type roofing nails with barbed point, formed of hot-dip galvanized steel of sufficient length to penetrate a minimum of one-inch into the wood nailer.
 - 2. For attaching sheet steel to concrete: 1-1/4-inch by 8d hot-dipped, galvanized hardened steel nails with lead washers.
- C. Hot-dip galvanized self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - 1. Fasteners for flashing and trim: Blind fasteners or self-drilling screws, gasketed with hex washer head.
 - 2. Blind fasteners: High-strength aluminum or stainless-steel rivets.
- D. Solder and flux: 50-50 lead/tin solder complying with ASTM B 32 and ASTM B 284 used with a non-corrosive flux.
- E. Sealing tape:
 - 1. Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing.
 - 2. Provide permanently elastic, nonsag, non-toxic, non-staining tape.
- F. Expansion-joint sealant: For hooked-type expansion joints, which must be free to move, provide non-setting, non-hardening, non-migrating, heavy-bodied polyisobutylene sealant.
- G. Bituminous coating:
 - 1. Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.
 - 2. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- H. Slip sheet: Building paper, minimum 5 lb./100 square feet, rosin-sized.
- I. Flexible flashing (for use under copings): 9-inch wide self-adhering (peel and stick) flexible modified bitumen flashings by one of the following.
 - 1. CCW-705-TWF by Carlisle Coatings & Waterproofing.
 - 2. Fast Flash by Protecto Wrap Co.
 - 3. Sealtight Air-Shield by WR Meadows, Inc.
 - 4. Seam Seal Tape by SafSeal Innovations (butyl).
 - 5. Vycor Weather Barrier Strips by Grace Construction Products.

2.3 PREFABRICATED ASSEMBLIES

- A. Counterflashing assemblies: Formed of 24-gage galvanized sheet steel, of the profiles shown on the Drawings, complete with factory-formed internal and external corners, and end closures by one of the following.
 - 1. Type ST (stucco)[, CO (concrete), SM (surface mounted).
 - 2. Fry Reglet Corp. (basis of design.)
 - 3. Keystone Flashing Co.
 - 4. CF Cheney Flashing Co.
 - 5. MM Systems Corp.
 - 6. Pacific Loxtite Flashing Co.
 - 7. National Cornice Works.
 - 8. Or equal.
- B. Roof expansion joint covers:
 - 1. Prefabricated assembly consisting of an insulated neoprene or EPDM bellows, filled with mineral insulation, bonded to 26-gage galvanized sheet steel flanges, Expand-O-Flash by Johns Manville, Metalastic by GAF Materials Corp., or equal by York Manufacturing Inc.
 - 2. Provide complete units with factory-fabricated transitions and end pieces.
- C. Strainer units for conductor heads: Removable beehive design fabricated from 0.062-inch diameter galvanized steel wire or wire mesh with openings not more than 1/2-inch.

2.4 FABRICATION

- A. General:
 - 1. Shop fabricate flashings and sheet metal work to comply with profiles and sizes indicated on the Drawings and standard Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) detail plates of the "Architectural Sheet Metal Manual."
 - 2. Form sheet metal on bending brake with straight, sharp edges. Shape, trim, and hand seam sheet metal on bench; keep job site forming to a minimum.
 - 3. Comply with metal producers' recommendations for tinning, soldering, and cleaning flux from metal.
 - 4. Fabricate with joints and corners accurately machined, filed and fitted, and rigidly framed together and connected.
- B. Fabricate in as long length as possible to minimize field joints.
- C. Prefabricate intersections, including counterflashings, with mitered, riveted joints. Make corners and intersections with legs a minimum of 24-inch long extending in each direction.
- D. Tinning and soldering:
 - 1. Tin edges on both sides of sheet steel to be soldered.
 - 2. Perform soldering slowly, thoroughly heating seams and completely sweating solder through full width of seams.
- E. Exposed edges: Neatly double back sheet metal 1/2 inch to stiffen edges and to provide a finished appearance.
- F. Provisions for attachment to structure: Furnish supports, hangers, bracing, anchors and other devices shown, specified or necessary for reinforcement and proper attachment of flashings and sheet metal to building.

- G. Isolation of incompatible materials: As specified in Section 05 50 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 GENERAL REQUIREMENTS

- A. In addition to the assemblies listed above, provide required sheet metal flashings, counterflashings, transitional and interface flashings required to achieve a properly weatherproofed, flashed and counterflashed building envelope, including sheet metal flashings in the angles formed where exterior waterproofed decks abut walls, and as well at curbs, platforms, ventilators, pipes, roof hatch, and other vertical and horizontal surfaces, where indicated and necessary to make the Work weatherproof.
- B. Comply with manufacturer's installation instructions where applicable, and applicable SMACNA and NRCA details, except as indicated and specified.
- C. Install counterflashing assemblies at a constant height above the roof.
 - 1. Anchor counterflashing securely into reglet by friction, or provide lead wedges spaced 2-foot o.c. maximum.
 - 2. Use manufacturer standard splice plates and preformed corners for a weathertight assembly.
- D. Coordinate this work with other trade whose work penetrate, intersects and adjoins flashings and sheet metal work, to permit the correct sequencing and the watertightness of the assemblies.

3.3 PATCHING EXISTING SHEET METALWORK

- A. Provide new sheet metal work of the same profiles and dimensions as the existing work.
- B. Make junction of new and existing sheet metal installations weatherproof. When joining existing sheet metalwork, lap new and existing flashings a minimum of 2 inches and make lap weathertight either with sealant, by soldering, or by mechanical means.

3.4 INSTALLATION

- A. General:
 - 1. Install sheet metal work in accordance with the approved shop drawings.
 - 2. Fasten coping on inside wall with hex head screws and bonded sealing washers through oversized holes in the back of the coping. Except as specified, lap and solder corners and angles; lapping and sealant method is not an acceptable substitute for coping corners; provide for thermal movement no more than 10 feet from corner.
 - 3. Slope copings and sills with a minimum slope of 10 percent to drain away from walls and building interior. Slope gutters 1/4-inch per foot to drain.
 - 4. Solder joints of window flashings (pans) and saddles.
 - 5. Attach work securely to supporting construction, plumb, level, with tight, flush joints allowing for thermal movements.
 - 6. Install work with lines, arises, and angles sharp and true.

7. Fold exposed edges neatly to form a 1/2-inch hem on the concealed side; hem all exposed edges, unless otherwise indicated.
8. Assemble work so that face of metal in contact has hairline joints, except where required for expansion or fitting. Provide backup plates at joints.
9. Conceal fastenings and reinforcement where they would be visible by the public and the building occupants.
10. Vulcanize joints of the roof expansion joint covers and lap the sheet metal portion, after sealing for water tightness.
11. Finish work shall be straight, smooth and continuous, without dimples, dents and other damage.

B. Soldering:

1. Protect underlying waterproof membrane (flexible flashing) when soldering sheet metal.
2. Except as specified, solder all joints not intended for expansion and contraction.
3. Clean material and tin prior to soldering.
4. Solder slowly. Heat the seams thoroughly, and completely fill with solder.
5. Make exposed soldering on finish surfaces neatly, full flowing and smooth.
6. Wash acid flux with a soda solution after soldering and remove soldering flux on exposed surfaces.

C. Nailing:

1. Confine nailing of sheet metal generally to sheet metal having a maximum width of 18-inches. Nailing of flashings shall be confined to one edge only.
2. Space nails evenly not over 12-inches o.c., and approximately 2-inches from the edge.
3. Face nailing is not permitted. Do not nail sheet metal assemblies on horizontal surfaces.
4. Where sheet metal is applied to surfaces other than wood, furnish detailed shop drawings showing locations of required sleepers and nailing strips specified in Section 06 10 00.

D. Cleats:

1. Provide cleats for sheet metal 18-inch and over in width. Space cleats evenly not over 12 inches o.c.
2. Make cleats not less than 2 inches wide by 3 inches long, and of the same material and thickness as the sheet metal being installed.
3. Secure one end of the cleat with 2 nails and the cleat folded back over the nail heads. Lock the other end into the seam. Pre-tin cleats for soldered seams.

E. Bolts, rivets, and screws:

1. Install bolts, rivets, and screws where required. Space equally and symmetrically.
2. Provide compatible washers to protect surface of sheet metal and to provide a watertight connection.

F. Dissimilar material protection:

1. Protect sheet metal in contact with dissimilar metals, concrete, masonry and plaster with a heavy coating of bituminous paint, approved separation tape, or building felt or paper.

2. Set sheet metal assemblies supported by pressure-treated wood on building paper or felt attached to the wood nailer, except set copings on flexible flashing specified. Lap on vertical surfaces at least 2 inches.
- G. Seams - general: Make seams straight, uniform in width and height, with no solder showing on the face.
1. Flat-lock seams: Finish not less than 3/4-inch wide made in the direction of water flow.
 2. Lap seams: Finish soldered seams not less than one-inch wide. Overlap seams not soldered at least 3-inches.
 3. Loose-lock expansion seams: No less than 3 inches wide, designed to provide minimum one-inch movement within the joint. Fill joint completely with sealant applied at not less than 1/8-inch thick bed.
 4. Standing seams: Not less than one-inch high, double locked without solder.
- H. Expansion and contraction:
1. Provide for thermal and building movement without overstressing the material, breaking connections or producing wrinkles and distortion in finished surfaces. Make sheet metal installations weathertight at all locations.
 2. Provide expansion and contraction joints at not more than 40-foot intervals, except that where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing, provide an additional joint. Where expansion and contraction joints are exposed to view, their location is subject to the Design Consultant's approval.
 3. Exposed surfaces shall be free from visible wave, warp, and buckle.
- I. Flexible flashing: Install under all parapet caps. Lap joints 2-inches. Carry flexible flashing down wall as far as the edge of the coping; overlap wall weather barrier at least 2-inches.
- J. Completed work: Completed flashings and sheet metal work shall be watertight, free of tool marks, dents, scratches and other damages, with joints and corners accurately machined, filed and fitted, and rigidly framed together and connected.

END OF SECTION

SECTION 07 72 33 - ROOF HATCH

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Single leaf roof hatch.
 - 2. Hatch railing.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 05 for "Safety Post" attached to ladder and for all other railings.
 - 3. Division 09 for finish painting hatch.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Shop drawings:
 - 1. Large scale, dimensioned drawings, showing fabrication and installation details. Indicate dimensions, weights, loading, required clearances, method of field assembly, and components.
 - 2. Include plans, elevations, sections, details, and attachments to other work.
- B. Data:
 - 1. Manufacturer product data for the hatch and railing.
 - 2. Supplement with details showing attachment to supports and interface with adjacent construction, including roof membrane.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - Credit MR 4.1 & 4.2, Recycled Content.
 - Credit MR 5.1, Regional Materials, Manufactured Locally.
 - Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - Credit MR 6, Rapidly Renewable Materials.
 - Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - Credit EQ 4.1, Low Emitting Materials, Paints.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The Bilco Co. (basis of design.)
- B. Babcock-Davis Hatchways, Inc.

- C. Nystrom Inc.
- D. Precision Stair Corp.
- E. Williams Brothers Corp.
- F. Inryco, Inc.
- G. Or equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire resistance: UL 790, Class A.
- B. Design loads:
 - 1. Hatch: Design, fabricate, and install so that the completed assembly will be weathertight when closed, will withstand dead and live loads caused by personnel and wind pressure and wind uplift. Provide additional support and reinforcement to manufacturer standard assembly as required to conform to specified performance requirements.
 - a. FM rating: Comply with insurance rating bureau requirements for class and securement rating (wind uplift resistance) of Factory Mutual (FM) Class I-90 requirements.
 - b. Live load: 40 psf minimum.
 - c. Concentrated load: 250 lb.
 - d. Internal pressure: 20 psf
 - e. Design loads shall be supported without permanent deformation, or disengagement of seals or anchors.
 - 2. Railing and gate: Design, fabricate, and install to comply with Code and OSHA.

2.3 MATERIALS/CONSTRUCTION HATCH

- A. Cover: 14-gage hot-dip galvanized steel with 3-inch beaded and welded flange, insulated with one-inch thick fiber glass insulation, and lined with a 22-gage galvanized steel liner.
- B. Curb:
 - 1. 12 inches high, fabricate from 14-gage hot-dip galvanized steel with integral flanges.
 - 2. Continuously weld the curb at corners to insure watertightness.
 - 3. Insulate the exterior face of the curb with one-inch thick rigid fiberboard or Perlite insulation.
- C. Hardware: Assemble the hatch with heavy stainless steel pintle hinges and compressive spring operators enclosed in telescopic tubes.
 - 1. Provide positive snap latch with exterior and interior turn handles and padlock hasps inside and outside.
 - 2. Equip cover with compression-spring-operated enclosed in telescopic tubes, and an automatic hold-open arm complete with vinyl grip handle for one hand release, and weatherstrip with neoprene draft seals.
- D. Finishes:
 - 1. Hardware: Zinc- or cadmium-plating standard with the manufacturer.
 - 2. All other surfaces: Bonderized for paint adhesion and painted with manufacturer's standard rust-inhibitive primer.

2.4 RAILING

- A. "Bil-Guard Hatch Railing System" , or equal, (no known equal) fixed railing system complying with OSHA fall protection regulations (29 FR 1910.23) with self-closing gate and self-latching gate lock.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that opening is within allowable tolerances, plumb, level, will provide a solid anchoring surfaces.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Comply with the hatch manufacturer's instructions.
- B. Install the hatch over the opening, plumb, level and square.
- C. Attach securely to supporting structure with a minimum of 2 bolts per side.
- D. Mount railing securely to curbs in accordance with its manufacturer's instructions; do not attach to, or on roof.
- E. Verify operation of hatch cover and railing gate; adjust and lubricate the cover for ease of operation and watertightness where applicable.

END OF SECTION

SECTION 07 92 00 - JOINT SEALERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements pertaining to all sealants required for the Project (except as specified below).
- B. This Section becomes an integral part of all Sections containing references to this Section, and applies to all locations where sealants are indicated on the Drawings and required to make the building weathertight.
- C. Section also includes sealants for interior joints in vertical applications, where required to close gap between different materials (paintable and non-paintable), and horizontal traffic surfaces as follows:
 - 1. Control and expansion joints on exposed interior surfaces of exterior walls.
 - 2. Perimeter joints of exterior openings.
 - 3. Tile control and expansion joints.
 - 4. Perimeter joints between interior wall surfaces and frames of interior doors and windows.
 - 5. Perimeter joints of toilet fixtures.
 - 6. Other joints indicated.
- D. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 03 for preformed compressible expansion joint fillers for concrete slabs.
 - 3. Division 07 for firestopping sealants.
 - 4. Division 08 for storefronts and glazing sealants.
 - 5. Division 09 for acoustical sealants.
 - 6. Division 23 for duct sealants.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting:
 - 1. Prior to start of installation of exterior vertical sealants, arrange a pre-installation meeting between the sealant manufacturer authorized representative, the Contractor, the installer, and the Design Consultant to review conditions of surfaces to be sealed, as well as other conditions that would affect the quality of this work, the Drawings and Specifications, and the sealant manufacturer's data.
 - 2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
 - 3. Review all typical and atypical details to verify the method of sealing joints that the Contractor will follow, as well as corrective actions that are required.
 - 4. Special conditions that are not specifically referenced or addressed by the Project Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified, reviewed and discussed.

5. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions so that a determination can be made of actions to be taken to assure an installation that will be acceptable, watertight and acceptable to the sealant material manufacturer for issuance of the warranty.
6. Record meeting minutes and distribute copy to all concerned, and the Design Consultant, within 7 days after the meeting.

1.4 DEFINITIONS

A. Substrates:

1. M type substrates: Concrete, concrete masonry units, brick, mortar, natural stone. The term "masonry" means brick, stone, and concrete masonry work.
2. G type substrates: Glass and transparent plastic glazing sheets.
3. A type substrates: Metals, porcelain, glazed tile, and smooth plastics.
4. O type substrates: Wood, unglazed tile; substrates not included under other categories.

1.5 SUBMITTALS

A. Data:

1. Manufacturer product data sheets and published instructions for each type of sealant, backing, bond breaker, and other accessory materials, together with statement that the proposed materials comply with these Specifications.
2. Include manufacturers' recommendations for surface preparation and priming for all substrates to be in contact with sealant on the Project.

- B. Certification: Sealant manufacturer certification that sealants, backing rods, and other materials proposed for use in the application of sealants, are chemically compatible with the materials which will come in contact with the sealants and will not cause deterioration, premature aging and staining of adjacent materials, or the sealants.
- C. Test results: Results of adhesion and staining tests performed on same materials as those intended for use on the Project.
- D. Samples: Cured samples of the various types and colors of materials proposed for use, approximately 12 inches long, mounted on hardboard backing.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

Credit MR 4.1 & 4.2, Recycled Content.
Credit MR 5.1, Regional Materials, Manufactured Locally.
Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
Credit MR 6, Rapidly Renewable Materials.
Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.6 QUALITY ASSURANCE

- A. Uniformity: All sealants used in or on the exterior walls of the buildings shall be made by the same manufacturer.
- B. Installer qualifications: Firm with a minimum 5 years of experience with joint sealant applications similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.

C. Color selection:

1. Final color selection of sealants to be used for exterior locations will be made by the Design Consultant from job-applied samples on in-place materials.
2. The Design Consultant will select locations and extent of these samples but their lengths will not exceed 10 feet for vertical and horizontal joints of each sealant color.

D. Quality control by sealant manufacturer:

1. Submit statements on the manufacturer's letterhead, dated no earlier than one year prior to submittal, for tests listed below.
2. Test data more than a year old will be acceptable provided manufacturer states that formulations or manufacturing methods have not changed sufficiently to change test results.
3. Submit samples of materials to be used for the Project to the manufacturer as required for tests.
4. Test methods: The following ASTM standards methods apply to sealants to be provided for the Project.
 - a. C 794: Sealant compatibility and adhesion to each substrate to be encountered on the Project.
 - b. Compliance with C 920 for elastomeric sealants. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (ASTM C 719), low temperature flexibility, modulus of elasticity at 100 percent strain, effects of heat aging, and effects of accelerated weathering.
 - c. C 1087: Sealant compatibility with backing.
 - d. C 1087: Sealant compatibility and lack of adhesion to bond breaker.
 - e. C 1184: Structural Glazing Specifications.
 - f. C 1193: Guide for Use of Sealants.
 - g. C 1248: Stain Test Method.
 - h. C 1401: Guide for Structural Glazing.
 - i. C 1472: Guide for Calculating Joint Movement.
5. Include identification of any special substrate cleaning process, and required adhesion promoter or primer.

E. Preconstruction field testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows.

1. Locate test joints where indicated or, if not indicated, as directed by Design Consultant.
 - a. Each type of non-elastomeric sealant and joint substrate indicated.

1.7 HANDLING

- A. Store sealant containers in a protected location in compliance with their manufacturer's instructions until their use. Do not store at temperature higher than 80 degrees F.

1.8 JOB CONDITIONS

- A. Do not install sealants under adverse weather conditions, or when temperatures are beyond manufacturer's recommended limits.

- B. Proceed with the installation only when forecasted weather conditions are favorable for proper sealant cure and development of early bond strength.

1.9 WARRANTY

- A. Warrant sealants against defective materials and workmanship for the following length of time after Substantial completion:
 - 1. Manufacturer:
 - a. Exterior vertical sealant: Manufacturer's 20-year weatherseal warranty, including non-staining warranty for Dow Corning 795 and 756 SMS.
 - b. All other exterior locations: Manufacturer's 5 years weatherseal warranty.
 - 2. Installer: 5 years labor and material warranty.
- B. Warranty shall further state that installed sealants are warranted against the following:
 - 1. Water leakage through exterior sealed joints.
 - 2. Adhesive or cohesive failure of sealant.
 - 3. Staining of adjacent surfaces caused by migration of sealants or primer.
 - 4. Chalking or visible color change of the cured sealants.
- C. Make repairs during the 5-year warranty period at no cost to the City.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Exterior joint sealants are required to establish and maintain airtight and waterproof continuous seals on a permanent basis, with recognized limitations of wear and aging as indicated for each application.

2.2 MANUFACTURER/TYPE - SEALANTS

- A. Colors: Match sealant color to color of adjacent materials as closely as possible using colors selected from the manufacturer's standard palette, as approved by the Design Consultant.
- B. General:
 - 1. Do not mix multiple component materials until required for use.
 - 2. Use materials "as received" from manufacturer, without additions, deletions and adulterations of materials.
 - 3. Do not use sealants that have started to cure and those whose shelf life expired.
- C. Compatibility: Provide joint sealers, joint fillers and other related materials as follows:
 - 1. That will not cause staining, degradation and premature aging of the adjacent surfaces and the sealant itself, when in contact with these surfaces.

2. 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.
- D. Bulk sealants for interior and exterior horizontal application subject to pedestrian or vehicular traffic: Single component silicone sealant.
1. Products:
 - a. Dow Corning Corp.; "890-SL" or "SL Parking Structure Sealant" (basis of design).
 - b. Pecora Corp.; "300 SL Pavement Sealant."
 - c. Crafco Inc.; "RoadSaver Silicone SL."
 - d. Or equal.
- E. For all other exterior applications:
1. Dow Corning "795" (basis of design).
 2. General Electric "Silpruf," "Silpruf LM," "Silpruf NB."
 3. Tremco "Spectrem 1."
 4. Or equal.
- F. For interior damp, wet and semi-wet locations, other than floors, such as toilet rooms where a mildew-resistant sealant is required: Provide white sealant, unless otherwise noted. Single-component mildew-resistant neutral-curing silicone sealant:
1. Dow Corning Corp. "786" basis of design.
 2. Pecora Corp. "898."
 3. General Electric Corp. "1700."
 4. Or equal.
- G. For all other interior applications (paintable sealant): Latex sealant complying with ASTM C 834, Type P, Grade NF.
1. Pecora Corp. "AC-20+."
 2. Schnee-Morehead, Inc. "SM 8200."
 3. Sonneborn, Division of ChemRex Inc. "Sonolac."
 4. Tremco "Tremflex 834" or "Acrylic Latex 384."
 5. Or equal.
- H. Tape sealants:
1. American Saint-Gobain "Norseal 730."
 2. "Norseal 770,"
 3. Or equal by Pres-On Tape & Gasket Corp. or Schnee-Morehead.

2.3 ACCESSORY MATERIALS

- A. Sprayed polyurethane foam sealant: One- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 pcf density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- B. Joint cleaner, primer and sealer: As recommended by the sealant manufacturer, for the surfaces to be cleaned, primed or sealed.

- C. Bond breaker tape:
 - 1. Polyethylene or other plastic tape recommended by the sealant manufacturer to prevent 3-sided adhesion where backer rod cannot be used, except for non-moving joints.
 - 2. Use self-adhering tape wherever possible.
- D. Backer rod: Provide size, density and shape of rod which will control the joint depth for sealant placement, break bond of sealant at bottom of joint, form optimum shape of sealant bead on back, and provide a highly compressible backer to minimize the possibility of sealant extrusion when joint is compressed.
- E. Elastomeric tubing sealant backings:
 - a. Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, non-absorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26-degree F.
 - b. Provide products with low compression set.
- 2. In paving subject to traffic: Provide hard joint filler such as cork; prevent 3-sided adhesion by using bond breaker tape.
- F. Masking tape: Non-staining, non-absorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 JOINT PREPARATION

- A. Clean-out joints immediately before installing sealants to comply with recommendations of joint sealant manufacturer and the following.
- B. Remove foreign material from joint substrates that could interfere with adhesion of 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.
- C. Clean concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 1. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
- D. Remove laitance and form release agents from concrete.
- E. Clean metal, glass, glazed surfaces of ceramic tile, and other non-porous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.

- F. Do not proceed with sealant installation over surfaces that have been painted, waterproofed or treated with water-repellent or other coating unless specifically approved in writing by the sealant manufacturer.
- G. Use masking tape or other protection to limit coverage of sealant to joints to be sealed. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION

- A. Comply with sealant manufacturer's instructions and ASTM C 1193, except where more stringent requirements are specified herein. At the Design Consultant's option, ASTM C 1193 may also be used for rejection of unacceptable installations.
- B. Prime or seal surfaces when recommended by the sealant manufacturer; when the manufacturer's instructions on priming are optional, prime the surface. Do not allow primer/sealer to spill or migrate onto adjacent surfaces.
- C. Install backer rod for all sealants, except (1) for exterior sealants subject to traffic (verify that joint filler in paving is installed at the proper depth), (2) where the size of joint prevents the insertion of a backer rod, and (3) where recommended otherwise by the sealant manufacturer.
 - 1. Install backer rods with blunt or rounded tools to avoid puncturing the material.
 - 2. Do not twist, stretch or braid the backer rod.
- D. Install bond breaker tape where space limitation does not permit use of a backer rod.
- E. In no case shall sealant have 3-sided adhesion, except for non-moving joints.
- F. Employ only proven installation techniques that will ensure that sealants are installed in uniform, continuous ribbons without gaps or air pockets and with complete "wetting" of the rabbet surfaces equally on opposite sides.
 - 1. Fill concave joints to the configuration shown on Figure 8A of ASTM C 1193.
 - 2. Provide flush joints to the configuration shown on Figure 8B of ASTM C 1193.
 - 3. Provide recessed joints configuration as shown on Figure 8C of ASTM C 1193, unless otherwise indicated or required to match adjacent non-moving joint.
 - 4. Where horizontal joints occur between horizontal and vertical surfaces, fill joints to form a slight cove to prevent trapping moisture and dirt.
 - 5. Immediately after sealant application and prior to beginning of skinning or curing, tool sealant using tooling agents that will not discolor sealants or adjacent surfaces and are approved by sealant manufacturer.
- G. Do not allow sealant or other compound to overflow, spill or migrate into voids of adjacent construction.
- H. Remove excess sealant spillage promptly as this work progresses. Clean adjacent surfaces by recommended means to remove sealant, but not damage the surfaces.

3.4 CURING/PROTECTING

- A. Cure sealants in compliance with their manufacturer's instructions to obtain high early bond strength, internal cohesive strength and durability.
- B. Protect sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion.

- C. Remove existing sealant, mortar, fill, and debris from joints to be sealed.
 - 1. Consult with the sealant manufacturer. Sealant manufacturer shall perform necessary tests to verify compatibility of sealant with all materials that will be in contact with sealant to determine if priming of the surfaces to receive sealant is required, and to determine if the existing sealant to be removed from the joints will adversely affect the new sealant.
- D. Special requirements for sealant in existing work:
 - 1. Remove all dirt, debris, existing sealant, and other foreign and deleterious matter from joint to be sealed. Depth of existing sealant may vary from that shown on Drawings.
 - 2. Clean sealant contact surfaces with sealant manufacturer's approved solvent and cleaner.
 - 3. Apply sealant primer recommended by sealant manufacturer to sealant contact surfaces.
 - 4. Install compressible backer.
 - 5. Place bond breaker tape and backer rod in joint as shown on Drawings. Install backer rod to provide a cavity with a width-to-depth ratio equal to one for joints less than 1/2 inch. For expansion joints 1/2 inch or greater in width, install backer rod to provide a cavity with a width-to-depth ratio equal to 2.

END OF SECTION

SECTION 07 95 00 - SEISMIC JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes prefabricated seismic joint cover assemblies.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 07 for roof expansion joint cover.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer product data for each type and profile of assembly, including material list, finish, and test results for fire-rated assemblies.
- B. Shop drawings: Supplement data with shop drawings showing the following.
 - 1. Placement drawings: Include line diagrams showing plans, elevations, sections, details, splices, block-out 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. 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. Joint system location cross-referenced to Drawings.
 - c. Nominal joint width.
 - d. Movement capability.
 - e. Classification as thermal or seismic.
 - f. Materials, colors, and finishes.
 - g. Product options.
 - h. Fire-resistance ratings.
- C. Samples:
 - 1. For each joint, complete assembly of each type. Include prototype units for custom fabrication.
 - 2. Each color and finish selected. Include custom colors.
 - 3. Representative transition and corner fitting fabrications to confirm quality of work as a standard for work on the Project.
- D. Certificates: Certificates, research report number, or other proof that assemblies used in fire-rated construction are approved by the authorities having jurisdiction for the conditions of use.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.

2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.4 QUALITY ASSURANCE

- A. Requirements of regulatory agencies:
 1. Comply with fire resistance ratings indicated and required by Code.
 2. Provide materials, accessories and application procedures which have been tested by a testing agency acceptable to authorities having jurisdiction.
- B. Single source responsibility: Provide all components for each assembly from one manufacturer.

1.5 HANDLING

- A. Wrap joint assemblies individually, and provide strippable protection on metal surfaces to avoid damage during handling and installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Construction Specialties, Inc. (CS Group).
- B. InPro Corporation.
- C. Or equal.

2.2 SEISMIC JOINT COVER TYPES

- A. Exterior and interior wall: TBD.
- B. Interior floor: TBD.
- C. Interior ceiling: TBD.

2.3 PERFORMANCE REQUIREMENTS:

- A. Joint assemblies shall permit unrestrained movement of joint without disengagement of and, where applicable, maintain moisture, watertight and fire-rated protection.
- B. Provisions for movement of the structure:
 1. The building is in the Seismic Design Category (SDC) indicated, as defined by the CBC. Install joint assemblies requiring special bracing or mounting to meet seismic movements for the SDC indicated.
 2. This work shall be engineered, detailed, and installed to accommodate dead load and live load deflection, thermal expansion, creep, sway, drift, and torsion of the structure as may be anticipated by seismic and other conditions.
 3. The amount of such movement that is accommodated in the engineering and details shall be identified on the shop drawings.

2.4 MATERIALS

- A. Aluminum: ASTM B 221, alloy 6063-T5 for extrusions; ASTM B 209, alloy 6061-T6, sheet and plate.
- B. Stainless steel: ASTM A 167 and A 480, non-magnetic, 300 series.
- C. Non-metallic products:
 - 1. Extruded preformed seals: Single- or multi-layered rubber extrusions as classified under ASTM D 2000, designed with or without continuous, longitudinal, internal baffles and formed to fit compatible frames, in color indicated, or, if not indicated, as selected by Design Consultant from manufacturer's standard colors.
 - 2. Elastomeric sealant: Manufacturer's standard elastomeric sealant complying with ASTM C 920, Use T, factory-formed and bonded to metal frames or anchor members; in color selected by Design Consultant from manufacturer's palette.
 - 3. Seismic seals: Typically 2 single layered rubber extrusions, one interior and one exterior, as classified under ASTM D 2000, retained in a set of compatible frames, in color indicated selected by Design Consultant from manufacturer's palette.
 - 4. Water barrier sheets: Neoprene or EPDM flexible sheet materials minimum 45 mils thick.
 - 5. Fire barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue. Tested in maximum joint width condition with a field splice as a component of an expansion joint in compliance with UL 263, NFPA 251, UBC 43-1, or ASTM E 119 and E 814 including hose stream test at full-rated period by a nationally recognized testing and inspecting organization or by other means acceptable to authorities having jurisdiction.
- D. Protective coatings:
 - 1. Bituminous paint: FS TT-C-494.
 - 2. Zinc-dust primer: FS TT-P-460.
 - 3. Galvanized repair paint: Tneme-Zinc 90-97 by Tnemec Co., Amercoat 68HS by Ameron Protective Coating Division or MZ-4 by Valspar Corp.
- E. Fastening devices:
 - 1. General: Provide type and size required to suit each loading condition. If not otherwise indicated, fasteners and anchors shall be non-magnetic stainless steel, Series 300.
 - 2. Threaded fasteners:
 - a. Metal-to-metal: Machine bolts and nuts, self-tapping screws, and other as engineered by unit manufacturer to suit condition.
 - b. Metal-to-concrete: Expansion bolts, drilled-in type.
 - c. For stainless steel and aluminum: Stainless steel, ANSI Type 304 at exterior conditions; aluminum or stainless steel at interior conditions.
 - d. For steel: Low carbon steel, ASTM A 307, hot-dip galvanized for exterior use and where galvanized assemblies are indicated.
- F. Accessories: Manufacturer's standard spacers, flexible vapor seals and filler materials, drain tubes, adhesive, and other accessories compatible with material in contact.

2.5 FABRICATION

- A. Provide joint assemblies of design, basic profile, materials, and operation indicated.

- B. Furnish units in longest practicable lengths to minimize number of joints. Provide hairline mitered corners where joint changes directions or abuts other materials.
- C. Include closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories required to provide continuous joint assemblies.
- D. Fabricate special transitions and closures, corner fittings and the like as required to minimize field joints. Miter and weld joints as applicable to condition. Provide monolithic elastomeric seal and sealed butt joints where indicated and to form watertight or airtight seals.
- E. Shop prime/protective coat metals to be in contact with cementitious materials for corrosion resistance. Use aluminum primer (alkyd barium metaborate) on aluminum.

2.6 FINISHING

- A. Aluminum: Finish exposed surfaces with a clear anodized finish complying with AA-C22A41; medium matte etched finish with 0.7 mil minimum thick anodic coating.
- B. Stainless steel:
 - 1. Bright, directional polish: NAAMM No. 4 finish.
 - 2. 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 conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. General:
 - 1. Comply with the joint assembly manufacturer's instructions and the tested procedure for fire-rated assemblies.
 - 2. Install assemblies over the prepared opening, plumb, level and square, with hairline, flush joints.
 - 3. Provide concealed back-up plates at sliding joints to avoid exposed fasteners, whenever possible. Attach assemblies securely to supports. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
 - 4. Protect aluminum surfaces in contact with cementitious materials as specified above.
- B. Cutting, fitting and placement:
 - 1. Perform cutting, drilling, and fitting required for installation of joint assemblies.
 - 2. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling.
 - 3. Set floor covers flush with adjacent finished floor materials.
 - 4. Locate wall and ceiling covers flush with, and in continuous contact with adjacent surfaces.
- C. Joinery and continuity:

1. Maintain continuity of joint assemblies with end joints held to a minimum and metal members aligned mechanically using splice joints.
2. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal without buckling of frames.
3. Adhere flexible filler materials to frames as recommended by manufacturer.

D. Extruded preformed seals:

1. Install with minimum number of end joints. For straight sections provide preformed seals in continuous lengths. Vulcanize or heat-seal field splice joints to provide watertight joints using manufacturer's recommended procedures. Seal transitions in compliance with manufacturer's instructions.
2. Where joints change direction and must be weather tight, vulcanize or chemically bond flexible components; seal metal components with compatible sealants finished flush with adjacent surfaces.

- E. Remove protective covers and touchup damaged finishes when the results are satisfactory to the Design Consultant, otherwise replace damaged components.

END OF SECTION

DIVISION 08

OPENINGS

SECTION 08 11 13 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Flush steel doors.
 - 2. Steel door and frames, including sidelights.
 - 3. Vision panel frames in steel doors.
- B. Work furnished but installed in other Sections: Division 04 for building-in of anchors and grouting of frames in masonry.
- C. Work installed but furnished in other Sections:
 - 1. Division 07 for metal cladding on steel doors.
 - 2. Division 08 for finish hardware.
- D. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 08 for access panels and frames, and glazing vision panels in steel doors.
 - 3. Division 09 for finish painting the work of this Section.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Shop Drawings: Show the following.
 - 1. Door and frame elevations, materials, construction, gage, finish, anchoring for each wall condition, conditions of openings, vision panel and louver sizes and locations, and accessories.
 - 2. Location and size of reinforcement for finish hardware.
 - 3. Details of glazing.
 - 4. Details of conduit and preparations for power, signal, and control systems in doors and frames.
 - 5. Use same reference numbers for openings and details as shown on Contract Drawings.
- B. Schedule: Door schedule indicating opening identification symbol, door and frame types, sizes, including thickness, swing, label requirements, [louvers, vision and transom panels, and undercuts.
- C. Data: Manufacturer or fabricator Product Data for doors, frames and shop primer.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.4 QUALITY ASSURANCE

A. Regulatory requirements:

1. Fire-rated doors shall be listed by a nationally recognized testing and certification agency acceptable to authorities having jurisdiction. The listed doors shall meet or exceed the requirements of UL10B, NFPA 252 and NFPA 80. Doors shall carry either a UL or ITS (Intertek Testing Services-Warnock Hersey) label.
2. Comply with CBC requirements. Provide tested products that have passed as an assembly in compliance with CBC Standard 7-2 positive pressure smoke testing requirements.
3. Comply with ASTM E 2074, Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure on Side-Hinged and Pivoted Swinging Door Assemblies.

1.5 HANDLING

A. Procedure: In accordance with SDI recommendations.

B. Delivery:

1. Inspect doors, frames and accessories delivered to the site for damage. Unload and store, as specified, with a minimum of handling.
2. Unless frames are packaged head to toe, provide temporary steel spreaders securely fastened to the bottom of each frame.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. One of the following, or equal:

1. CECO.
2. Curries Co.
3. Door Components, Inc.
4. Los Angeles Fireproof Door Co.
5. Security Metal Products.
6. Steelcraft Manufacturing Co.
7. Stiles Hollow Metal.
8. Or equal.

2.2 PERFORMANCE REQUIREMENTS

A. Acoustical requirements: TBD.

2.3 MATERIALS

A. Coated steel sheets: ASTM A 653, QC classification, with a G60 or A60 zinc coating, mill-phosphatized.

B. Uncoated steel sheets:

1. Hot-rolled steel sheets and strips: Commercial quality, Class 1 carbon steel, pickled and oiled, complying with ASTM A 366, A 568 and A 620.
2. Cold-rolled steel sheets: Commercial quality, Class 1 carbon steel, complying with ASTM A 366 and A 568.

- C. Inserts, bolts and fasteners: Manufacturer standard units, except hot-dip galvanize all items in exterior walls.
- D. Acoustical seals: TBD.
- E. Paints:
 - 1. Shop primer: Rust-inhibitive enamel or paint, either air-drying or baking, suitable as a base for specified finish paints complying with ANSI A224.1, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames", and compatible with finish paint system specified in Section 09 90 00.
 - 2. For touchup of damaged galvanized surfaces: SSPC Paint No. 20, Type II (Organic) zinc-rich primer by Tnemec, Porter International, Valspar Corp., Ameron Protective Coatings or DuPont Co.
- F. Door filler: In compliance with SDI 100, except use UL listed materials in fire-rated doors.
- G. Astragals: 1.314-inch by 12-gage full-height.

2.4 FABRICATION - GENERAL

- A. Do not begin fabrication until the fabricator has received the hardware schedule approved by the Design Consultant and submitted by the hardware supplier.
- B. Fabricate work to required profiles by roll-forming, brake-forming and welding to produce hollow metal work with straight and square edges, with surfaces free from warp, wave, buckle, oil-canning and other defects.
- C. Fabricate without grind marks, hollow or other out-of-plane areas, holes, burned-out spots, weld build-up and other defacing work. Fill to close cracks and to preserve shapes. Tightly fit loose stops, to hairline joints.
- D. Comply with SDI 100 and SDI 117, Manufacturing Tolerances Standard Steel Doors and Frames, except for the following:
 - 1. 0.005-inch in 3-inch span anywhere on the exposed surfaces. Fill depressions with Bondo or other automotive type filler. Sand bumps down, flush with adjacent surfaces.
- E. Conform to AWS standards for welding. Face weld frames with exposed welds ground flush and smooth with parent metal. Welded joints shall be invisible after assembly is painted.
- F. Fabricate doors, frames and sidelights at the following locations from coated steel, assemblies in exterior walls, toilet rooms. Elsewhere, fabricate doors and frames from coated or uncoated steel.
- G. Finish hardware preparation:
 - 1. Prepare doors to receive finish hardware, including cutouts, reinforcement as specified below, mortising, drilling, and tapping in compliance with templates provided by hardware supplier.
 - 2. Reinforce doors to receive hardware; provide internal reinforcement of sufficient size to avoid the use of through bolts that are not permitted. Drilling and tapping for surface-applied hardware may be done at Project site.
 - 3. Provide 16-gage (0.053-inch) stainless steel reinforcement for pull plates and bars. Provide internal reinforcement for closers on all door frames. Thru bolts (Chicago fasteners) are not permitted.
 - 4. Locate finish hardware as accepted on final shop drawings.
- H. Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames. Surface-applied (adhesively-applied) stops are not allowed.
- I. Provide minimum 26-gage (0.0179-inch) steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

- J. Steel members shall be pre-straightened, free of wind or twist. Factory-align to a diagonal tolerance of plus or minus 1/16-inch.

2.5 FLUSH DOORS

- A. Standard: Complying with SDI 100, Recommended Specifications Standard Steel Doors and Frames, except as specified.
- B. Steel doors:
 - 1. SDI Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless), 18-gage (0.042-inch) for doors up to 3 feet wide, and Level 3 and Physical Performance Level A (Extra Heavy Duty), model 2 (Seamless), 16-gage (0.053-inch) for doors wider than 3 feet. Provide doors with seamless welded edges ground to be invisible from adjacent surfaces; do not use Bondo or similar material to close gap between face sheets at door edge.
 - 2. Close the top of out-swinging exterior doors with an inverted flush channel.
 - 3. Close openings for vision panels with an inverted flush channel.
 - 4. Provide exterior doors with a U factor of 0.24 BTU/hr. by square foot by degree F when tested in compliance with ASTM C 236.
- C. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire performance rating where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.

2.6 FRAMES

- A. General:
 - 1. Fabricate frames to the dimensions and profiles indicated in compliance with SDI 100, Recommended Specifications Standard Steel Doors and Frames, except as noted.
 - 2. Reinforce and miter corners, interlock and/or weld internally. Weld faces continuously and grind smooth.

2.7 VISION PANELS IN DOORS

- A. Make cutouts for vision panels square and parallel with door edges.
- B. Provide integrally-formed glass stops on security side of doors and removable glass stops on opposite side.
 - 1. Size rabbet to fit glass thickness indicated.
 - 2. Miter glass stop corners; square, butt joints are unacceptable.
 - 3. Attach removable glass stops securely in place with countersunk oval head machine screws spaced equally at not more than 12 inches o.c. and 2 inches from corners.

2.8 SIDELIGHT FRAMES

- A. Fabricate as specified for door frames.

2.9 SHOP PRIMING

- A. After assembly, clean and prepare steel surfaces by removing mill scale, rust, oil, grease, dirt, and other foreign materials before painting. For coated steel, comply with ASTM D 2092 and the primer manufacturer's instructions.
 - 1. Grind welds and fabrication marks flush and smooth with parent metal.
 - 2. Fill depressions with metal filler before applying the shop primer.

3. Apply one or more coats of epoxy mineral filler to conceal spot welds.
 4. Where zinc coating is damaged, touchup with zinc-rich primer.
- B. Acid-etch galvanized surfaces before pretreating.
- C. Apply shop primer, within time limits recommended by pretreatment manufacturer, to provide a smooth coat of even consistency and to produce a dry film thickness of not less than 1-1/2 mils.
- D. Assemblies with visible spot welds before or after application of finish paint will be unacceptable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, and will provide a solid anchoring surface for frames.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLING FRAMES

- A. Set frames accurately in their scheduled locations, plumb, straight, square and rigid.
1. Comply with these Specifications, the Drawings; ANSI/SDI A250.11, Recommended Erection Instructions for Steel Frames, the approved shop drawings and UL tested procedures for fire-rated openings. When in conflict, the most restrictive provision applies.
 2. Brace frames to prevent their displacement during erection of adjacent walls.
 3. Coordinate the installation of built-in anchors for wall and partition construction with related trades. Refer to Division 04 for frames in CMU walls.
 4. Provide 2 anchors at head of frames exceeding 42 inches in width for frames mounted in steel stud walls.
 5. Provide 3/8-inch by 2-inch vertical steel struts extending from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry, continuous boxed studs, or to other structural support at each jamb.
 - a. Bend top of struts to provide flush contact for securing to supporting construction above.
 - b. Provide adjustable wedged or bolted anchorage to frame jamb members in compliance with UL 63.
- B. Frame anchors: 18-gage (0.0478-inch) galvanized steel.
1. Stud partitions: Insert "nail-on" type with notched clip to engage stud, welded to back of frames. Provide at least 4 anchors for each jamb for frames up to 90 inches high; 5 anchors up to 96 inches high; one additional anchor each 24 inches or fraction thereof over 96 inches. Attach jamb anchors to studs with a minimum of four 3/8-inch diameter nails (2 per side).
- C. Provide UL-tested adjustable floor clips for all frames. Anchor clips to floor with powder-driven pins or bolts in expansion shields.
- D. Leave frame spreader bars intact, wherever possible, until frames are set perfectly square and plumb and all anchors are securely attached and grouted where required.
- E. Installation tolerances: Adjust door frames for squareness, alignment, twist, and plumb 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 at floor.

3.3 HANGING DOORS

- A. Install finish hardware in compliance with its manufacturer's templates and instructions.
- B. Hang doors in compliance with their manufacturer's instructions, and adjust to the clearances specified in SDI 100, except as specified below, as indicated on the Drawings, or as required by UL listing for fire-rated doors.
- C. Do not install doors warped, bowed, dented or otherwise damaged.
- D. Adjust hardware so that doors operate freely for their entire travel, but not loosely, without sticking or hinge binding, with hardware adjusted and functioning properly.
- E. Fit doors accurately in frames, within clearances specified below. Shim as necessary.
 1. Non-fire-rated standard steel doors:
 - a. Jambs and head: 1/8 inch plus or minus 1/16 inch.
 - b. Between edges of pairs of doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between bottom of door and top of threshold: Maximum 3/8 inch.
 - d. Between bottom of door and top of finish floor (no threshold): Maximum 3/4 inch.
 2. Fire-rated doors: Install doors with clearances complying with NFPA 80.
 3. Smoke-control doors: Install doors according to NFPA 105.
- F. Glazing:
 1. Comply with installation requirements in Section 08 80 00 and with standard steel door and frame manufacturer's instructions.
 2. Secure stops with countersunk flat- or oval-head machine screws spaced equally and symmetrically not more than 8 inches o.c., and not more than 2 inches from each corner.

3.4 TOUCHUP

- A. Clean damaged primer, sand smooth, re-clean and spot-prime with paint compatible with the primer and the scheduled finish coats.
- B. Before application of primer, touchup galvanized surfaces with zinc-rich coating where zinc coating is removed or damaged.

END OF SECTION

SECTION 08 12 15 - KD STEEL DOOR FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior Knock Down (KD) hollow metal door frames, including frames for sidelites, and trim.
2. Anchors, fasteners and accessories.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Other Sections of Division 08 for the following.
 - a. Unit (welded) steel door frames.
 - b. Glass and glazing.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Schedule: Show opening identification symbol, frame types and label requirements.
- B. Samples: Of selected color(s) on base metal, not less than 4 inches square.
- C. Shop drawings:
1. Frame elevations, types, materials, construction, finish, anchoring, conditions of openings, and accessories.
 2. Indicate location and size of reinforcement for finish hardware.
 3. Use same reference numbers for openings and details as Contract Drawings.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content.
 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 4. Credit MR 6, Rapidly Renewable Materials.
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 6. Credit EQ 4.1, Low Emitting Materials, Paints.
- E. Maintenance material: Provide aerosol touchup paint to repair minor damage of factory-finished frames.

1.4 QUALITY ASSURANCE

- A. Provide fire-resistive frames bearing the label of a testing agency acceptable to authorities having jurisdiction for the fire resistance indicated.

1.5 HANDLING

- A. Storage: Indoors, off the floor.
- B. Protection: Keep frames in their shipping cartons as long as possible to avoid damaging them.

1.6 MAINTENANCE

- A. Provide 2 cans of aerosol paint for City's maintenance.

PART 2 - PRODUCTS

2.1 TYPES/MANUFACTURERS

- A. Prefinished C Series frames by Timely, Division of SDS Industries, models TA28 aluminum casings (basis of design,) or equal.

2.2 MATERIALS

- A. Frames:
 - 1. Form frame from 16-gage minimum cold-rolled sheet steel complying with ASTM A 366.
 - 2. Prepare frames for die-formed, heat-treated clips to assure tight casing fit. Mechanically fasten clips for a secure and aligned installation.
 - 3. Provide holes on perimeter of frame for fasteners.
 - 4. Provide oval alignment slots to allow visual alignment of the frame in the rough opening.
 - 5. Provide standard 22-gage prefinished casing with standard corner brackets for tight, flush miter.
- B. Glass and glazing materials: As specified in Section 08 80 00.
- C. Trim: TA-32.

2.3 FABRICATION

- A. Fabricate frames to require profiles by roll forming and brake forming to produce assemblies with straight and square edges.
- B. Fit and fabricate frames with surfaces free from warp, wave, buckle, oil canning and other defects.
- C. Verify hardware requirements for each opening to provide proper reinforcement, preparation and anchorage.
- D. Locate hardware as specified in Section 08 11 13.
- E. Provide reinforcement for closers on all frames.
- F. Provide 14-gage hinge reinforcement plates applied to the frames.
- G. Prepare frame for strikes.
- H. Factory-finish frames as follows:
 - 1. Chemically clean and bonderize.
 - 2. Prime.
 - 3. Apply 2 coats of "Alumatone" paint of the colors TBD.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- C. Correct detrimental conditions before proceeding with installation.
- D. Glazing of sidelites is specified in Section 08 80 00.

3.2 INSTALLING FRAMES

- A. Install frames over finished walls and anchor as indicated on approved shop drawings and in accordance with their manufacturer's instructions, with drywall screws that will be concealed after completion of frame installation, to steel studs. For fire resistive frames, space fasteners at 11 inches o.c.
- B. Use a prefit template door, or the actual door for the opening, to assure proper alignment and door clearances.
- C. Align parts with proper clearances to assure proper fit, tight, flush miters, and desired performances. Adjust frames for squareness, alignment, twist, and plumb 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 at floor.

3.3 TOUCHUP

- A. Touchup damaged finish when the results are satisfactory to the Design Consultant, otherwise return the damaged component to the shop for refinishing.

END OF SECTION

SECTION 08 14 33 - STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes factory-painted sliding stile and rail wood doors.
- B. Work installed but furnished in other Sections: Division 08 for finish hardware.
- C. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 06 for wood frames.
 - 3. Division 08 for glass and glazing.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Shop drawings: Show door elevations and details showing door construction. Dimension hardware location.
- B. Data: Manufacturer product data for the finish system, and acoustical performance requirements.
- C. Samples: Minimum 12-inch wood frame sample, finished as specified.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit MR 7, Certified Wood.
 - 6. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 7. Credit EQ 4.1, Low Emitting Materials, Paints.
 - 8. Credit EQ 4.1, Low Emitting Materials, Composite Wood.

1.4 QUALITY ASSURANCE

- A. All stile and rail wood doors for the Project shall be made by the same manufacturer.

1.5 HANDLING

- A. Procedure: In accordance with WI Bulletin No. 416-R.
- B. Marking: Mark each door on top and bottom rail with opening number used on Shop Drawings.
- C. Storage:
 - 1. Store doors in an assigned space having controlled temperature and humidity as recommended by WI.
 - 2. Store doors flat on factory pallets or 3 full 2 by 4s, one centered and the other two 12 inches from each end.

3. Protect doors from construction activity with plywood and store away from direct sunlight.

D. Handling: Do not drag doors across one another.

1.6 JOB CONDITIONS

- A. Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period.
- B. Comply with referenced WI quality standard including Technical Bulletin 419 for moisture content and relative humidity.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stile and rail: Structural composite lumber.
 1. Grade: Custom.
 2. Face:
 - a. Medium density overlay (MDO).
 - b. Close grained Maple, Birch or other close-grain hardwood; no horizontal joints
- B. Glass and glazing: As specified in Section 08 80 00.

2.2 PERFORMANCE REQUIREMENTS

- A. Acoustical ratings: TBD.

2.3 DOOR CONSTRUCTION

- A. General:
 1. Construct doors in accordance with the referenced WDMA standard to profiles and dimensions indicated and as follows.
 2. Join stile and rail with fully glued mortise and tenon construction.
 3. Finish faces true, with stile and rail intersections and other copes well fitted, with stickings clean cut and smooth.
 4. Sand doors smooth, ready for finishing.

2.4 FACTORY-MACHINING/FINISHING

- A. Factory-machine doors by manufacturer or qualified distributor for locks and hardware requiring routing or mortising. Refer to Article 3.2 below for door clearances.
- B. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 1. Finish faces, all four edges, edges of cutouts, and mortises.

2. Finish doors at factory where indicated in schedules or on Drawings as factory finished.
 - a. Colors: TBD.
 - b. Sheen: TBD.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine frames, adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLING FINISH HARDWARE/HANGING DOORS

- A. Install finish hardware in compliance with its manufacturer's instructions and the requirements of Section 08 71 00.
 1. Fit accurately to doors.
 2. Locate as specified for steel doors in Section 08 11 14.
- B. Condition doors to average prevailing humidity in installation area prior to hanging.
- C. Bevel door stile 1/8 inch in 2 inches. Accurately fit doors to frames with clearances not exceeding 1/8 inch at lock.
- D. Install doors to operate freely for their entire travel, but not loosely, without sticking or binding, with all hardware adjusted and functioning properly.

3.3 REPLACING DAMAGED DOORS

- A. Replace doors showing chips, scratches, glue stains, excessive warp or other damage that cannot be satisfactorily repaired, as determined by the Design Consultant, with acceptable doors.

END OF SECTION

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Factory-painted, flush, hinged wood doors.
 - 2. Factory-painted sliding wood barn doors.
 - 3. Pocket doors.
 - 4. Vision panel frames in wood doors.
- B. Work installed but furnished in other Sections: Division 08 for finish hardware.
- C. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 06 for wood trim.
 - 3. Division 08 for glazing vision panels in wood doors.
 - 4. Division 09 for finish painting wood doors schedule to receive an opaque finish.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Shop Drawings:
 - 1. Door schedule indicating opening identifying number, door type, grade, size, thickness, swing, label requirements, and undercuts.
 - 2. Door elevations indicating hand of each door, and type of construction, and conditions at cutouts for vision panels.
 - 3. Prefitting and premachining requirements, including dimensions and locations of mortises and holes for hardware.
 - 4. Rating for fire-rated doors.
 - 5. Use same reference numbers for openings and details as Contract Drawings.
- B. Certificate: Manufacturer's certificate showing door compliance with these Specifications and the AWI.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit MR 7, Certified Wood.
 - 6. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 7. Credit EQ 4.1, Low Emitting Materials, Paints.
 - 8. Credit EQ 4.1, Low Emitting Materials, Composite Wood.
- D. Warranty: Warranty form from the door manufacturer.

1.4 QUALITY ASSURANCE

A. Regulatory requirements:

1. Fire rated doors shall be listed by a nationally recognized testing and certification agency acceptable to authorities having jurisdiction. The listed doors shall meet or exceed the requirements of UL10B, NFPA 252 and NFPA 80. Doors requiring fire-rating shall carry either a UL or ITS (Intertek Testing Services-Warnock Hersey) label.
2. Comply with CBC requirements. Provide tested products that have passed as an assembly in compliance with CBC Standard 7-2 positive pressure smoke testing requirements.
3. Comply with ASTM E 2074, Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure on Side-Hinged and Pivoted Swinging Door Assemblies.

B. Uniformity: the same manufacturer shall make all wood doors for the Project.

1.5 HANDLING

A. Procedure: In accordance with WI Bulletin No. 416-R and Recommended Handling and Finishing Instructions for Wood Fire Doors.

B. Marking: Mark each door on top and bottom rail with opening number used on shop drawings.

C. Delivery:

1. Deliver doors factory-wrapped in polyethylene bags, unitized and palletized. Shrink-wrap each pallet and provide corner guards for protection.
2. Mark each door with architectural opening number in distribution and installation.
3. Do not deliver doors to the Project until proper storage space is available.

D. Storage:

1. Store doors in an assigned space having controlled temperature and humidity as recommended by WI.
2. Store doors flat on factory pallets.
3. Protect doors from construction activity and store away from direct sunlight.

E. Handling:

1. Handle doors with clean hands.
2. Do not drag doors across one another.
3. When provided, maintain factory packaging or other means of protection of doors until Substantial Completion.

1.6 JOB CONDITIONS

A. Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of construction period.

B. Comply with referenced WI quality standard including Technical Bulletin 419 for moisture content and relative humidity.

1.7 WARRANTY

A. Special warranty:

1. Furnish to the City the door manufacturer written warranty against doors delaminating, telegraphing core through face veneer and against non-conformance with tolerance limitations of referenced quality standards for life of the installation.
2. Include reinstallation that may be required due to repair or replacement of defective doors, during the warranty period, when defect was not apparent prior to hanging.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. One of the following, or equal:

1. Algoma Hardwoods, Inc.
2. Buell Door Co.
3. Eggers Industries.
4. Weyerhaeuser Co., Los Angeles, Ca.
5. Or equal.

2.2 DOORS

A. Flush wood doors - general: The following complying with AWS "Extra Heavy Duty" classification.

B. Non-rated doors:

1. Grade: Custom.
2. Face:
 - a. Medium density overlay (MDO).
 - b. Close grained Maple, Birch or other close-grain hardwood; no horizontal joints.

C. Labeled, flush, fire-rated doors complying with Code as follows. Provide concealed (built-in blockings) for all hardware; thru bolting (Chicago fasteners) are not acceptable.

1. Grade: Custom.
2. Face: As scheduled and specified for non-rated doors above.
3. Fire seals: Category A[**incorporated – concealed or visible**] [**Category B surface applied seal**].
4. Fire ratings: As scheduled.
5. Acoustical ratings: TBD.

2.3 ACCESSORIES

A. Vision panel frame: The following, or equal low profile, factory-primed, UL listed and labeled where installed in fire-rate doors.

1. Model FGS-75 by Anemostat Door Products.
2. Model VLF by Air Louvers, Inc.
3. Or equal.

- B. Metal edge and astragal: 10-gage stainless steel, type 304, with No. 4 finish.
 - 1. Equip pairs of labeled doors with overlapping full height astragal and metal edges to meet label requirements; apply astragal on inactive leaf pre-drilled for screws and pre-machined for specified hardware.
- C. Metal frames for light openings: 18-gage, cold rolled steel sheet, factory-primed for paint finish.
- D. Miscellaneous: For fire-rated wood doors provide beads and clips approved for such use.
- E. Acoustic seals: TBD.

2.4 FACTORY-MACHINING/FINISHING

- A. Factory-machine doors by manufacturer or qualified distributor for cutouts, hinges, louvers, vision panels, locks and all hardware requiring routing or mortising.
 - 1. When machining labeled doors comply with UL 10C and use caution to avoid voiding the manufacturer warranty.
 - 2. Refer to Article 3.2 below for door clearances.
- B. Prepare doors to receive finish hardware as follows:
 - 1. Pilot drill screw and bolt holes.
 - 2. Rout-out hinge locations.
 - 3. Bore accurately for locks and latches.
 - 4. Locate hardware where indicated on the Drawings.

2.5 FACTORY-MACHINING/FINISHING

- A. Factory-machine doors by manufacturer or qualified distributor for locks and hardware requiring routing or mortising. Refer to Article 3.2 below for door clearances.
- B. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises.
 - 2. Finish doors at factory where indicated in schedules or on Drawings as factory finished.
 - a. Colors: TBD.
 - b. Sheen: TBD.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine frames, adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLING FINISH HARDWARE/HANGING DOORS

- A. Install finish hardware in compliance with its manufacturer's instructions and the requirements of Section 08 71 00. Fit accurately to doors.
- B. Condition doors to average prevailing humidity in installation area prior to hanging.
- C. Install vision panels square and parallel with door edges, with flush, hairline joints and fasten securely with concealed fasteners unless otherwise acceptable to the Design Consultant.
- D. Factory-fit doors to suit frame opening sizes indicated, with uniform clearances and bevels. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for labeled doors.
 - 1. Trim non-fire rated doors by cutting equally at both edges.
 - 2. Trim door height by cutting bottom edge, maximum 3/4-inch; trim fire rated doors at bottom edges only, in accordance with fire rating requirements
- E. Hang doors to operate freely for their entire travel, but not loosely, without sticking or hinge binding, with all hardware adjusted and functioning properly.

3.3 REPLACING DAMAGED DOORS

- A. Replace doors showing chips, scratches, unbonded face veneers, glue stains, excessive warp or other damage that cannot be satisfactorily repaired, as determined by the Design Consultant, with acceptable doors.

END OF SECTION

SECTION 08 31 16 - ACCESS DOORS & PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access panels not provided by other trades, but required for access to concealed equipment and assemblies.
- B. Work installed but not supplied under this Section: Access panels furnished by other trades.
- C. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for the following:
 - a. Finish painting access panels.
 - b. Access panels in acoustical ceilings.
 - 3. Other Divisions for furnishing access panels to be installed under this Section.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Field verification: Verify actual locations of supports by field measurements and indicate measurements on Shop Drawings. Coordinate tolerances of other trades that may affect the work of this Section prior to start of Shop Drawings.
- B. Pre-installation Meeting:
 - 1. Prior to start of work, arrange for Project site meeting of all parties associated with work of this Section, trades whose work affect the work of this Section, and trades whose work will be affected by the work of this Section.
 - 2. Meeting shall be attended by the Contractor, firm installing the access doors (if more than one firm, than each one shall attend), trade responsible for substrates and supports to which access doors are installed, and access door manufacturer representatives.
 - 3. Resolve conflicts and issue minutes of the meeting to all present and the Design Consultant within 5 days of the meeting.
- C. Sequencing:
 - 1. Coordinate installation and cooperate with mechanical and electrical trades.
 - 2. Coordinate stud layout and other support locations to provide a firm support for the panel frame.

1.4 SUBMITTALS

- A. Data: The following manufacturer product data.
 - 1. For each type of door and frame indicated, including compliance with Code requirements for those in fire-resistive assemblies.
 - 2. Include construction details relative to materials, individual components and profiles, finishes, and fire ratings for access doors and frames.

3. Supplement with shop drawings as follows:
 - a. Submit dimensioned plan and elevation of each access panels in areas accessible to the public. Panel location is subject to relocation within 10 feet of location proposed by the Contractor, as requested by the Design Consultant, at no cost to the City.
 - b. Show special installation conditions.

B. Shop drawings:

1. Show fabrication and installation details of customized doors and frames.
2. Include plans, elevations, sections, details, and attachments to other Work. Superimpose plan location on piping layout shop drawings.

C. Coordination drawings: Reflected ceiling plans drawn to scale, coordinating penetrations and ceiling-mounted items with concealed framing, suspension systems, piping, ductwork, and other construction. Show the following.

1. Method of attaching door frames to surrounding construction.
2. Ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim.
3. Unless otherwise accepted by the Design Consultant, no access panels will be allowed in hard ceilings (plaster and gypsum board) in public, and semi-public areas.

D. Samples: Samples for each door face material, at least 3 by 5 inches, in specified finish.

E. Schedule: Complete schedule of access panels, including types, general locations, sizes, construction details, latching or locking provisions, and other data pertinent to installation.

F. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
6. Credit EQ 4.1, Low Emitting Materials, Paints.

G. Closeout: Keys properly tagged.

1.5 QUALITY ASSURANCE

- A. All access panels for the Project shall be made by the same manufacturer.
- B. In fire-resistive construction, provide fire-resistive assemblies bearing the label of a testing agency acceptable to the Building Department for the fire resistance indicated.

PART 2 - PRODUCTS

2.1 ACCESS PANELS

A. Manufacturers:

1. Babcock/Davis.
2. Bilco.
3. Nystrom (basis of design).
4. Elmdor Manufacturing Co.

5. JL Industries.
6. Karp Associates, Inc.
7. Inrico/Milcor.
8. Williams Brothers Corp.
9. Or equal.

B. Models:

1. In interior plaster and gypsum board surfaces, except as specified below for toilet room walls: Nystrom Type NW.
 - a. Material: Commercial grade cold-rolled steel with 16-gage (0.053 inch) frame and 14-gage (0.067 inch) door.
 - b. Trim: 22-gage (0.0299 inch) steel drywall bead.
2. In exterior plaster surfaces: Nystrom Type RP where the door is plastered; Type NP where door is painted.
 - a. Material: Commercial grade cold-rolled steel with 16-gage (0.053 inch) frame and 14-gage (0.067 inch) door.
 - b. Trim: 22-gage (0.0299 inch) steel plaster bead with expanded metal lath.
3. Toilet rooms walls: Nystrom Type NT.
 - a. Material: Stainless steel, 16-gage (0.053 inch) frame and 14-gage (0.067 inch) door.
 - b. Trim: 22-gage (0.0299 inch) stainless steel drywall bead.
4. In fire-resistive assemblies: Nystrom Type IW or IP as required by surrounding material.
 - a. Material: Commercial grade cold-rolled steel with 16-gage (0.053 inch) frame and 20-gage (0.032 inch) door.
 - b. Insulation: 2-inch thick fire-resistive insulation sandwiched between the faces.
 - c. Trim: 22-gage (0.0299 inch) steel drywall bead or plaster casing bead, as required by job conditions.
5. Size: Unless otherwise indicated on the Drawings, provide minimum size to be 12-inch square opening for hand access; minimum 18-inch square for valve and actuator access; and 24-inch square for equipment access.
6. Where door cannot swing open, provide lift off type with safety wire or chain; Similar to Karp Type DSC-212.
7. In elevator shaft(s), provide self-closing, self-locking access door operable from the inside without a key.

- C. Provide trimless, prime-coated units, except where stainless steel is specified, equipped with flush, key-operated cam lock.

2.2 MATERIALS

A. General:

1. Provide sheet metal selected for its surface flatness, smoothness and absence of surface blemishes where exposed to view.
2. Do not use materials where exposed surfaces exhibit pitting, seam marks, roller marks, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled metal sheet, stains, discoloration or other imperfections.

- B. Galvanized steel sheet: ASTM A 653 CQ (commercial quality), or ASTM A 653 LQ (lock-forming quality), coating designation G90, mill-phosphatized, stretcher-leveled.
- C. Steel sheet: Commercial quality cold-rolled carbon steel sheet, stretcher-leveled, complying with the following requirements at the fabricator's option.
 - 1. Electrolytic zinc-coated steel sheet: ASTM A 591, with Class C zinc coating; chemically treated in mill with phosphate solution and light chromate rinse.
 - 2. Cold-rolled steel sheet: ASTM A 1008.
- D. Stainless steel sheet: ASTM A 167, Type 302 or 304, stretcher-leveled.
- E. Hardware:
 - 1. Hinges: Concealed spring hinges or concealed continuous piano hinge set to open 175-degree. For fire-resistive units, provide self-closing mechanism.
 - 2. Locking device: Flush, screwdriver-operated cam lock of number required to hold door in flush, smooth plane when closed.
 - a. In public areas, provide keyed-alike cylinder lock on all access panels. Furnish 2 keys per lock.
 - b. For recessed panel, provide access sleeves for each locking device. Provide plastic grommets installed in holes cut through finish.
 - c. For locks on panels 24 inches in any dimension, provide interior latch mechanism to allow door to be opened from the inside without a key.

2.3 FABRICATION

- A. Fabricate to profiles indicated without exposed cut edges.
- B. Produce flat, flush surfaces without cracking and grain separation at bends.
- C. Continuously weld exposed joints and seams; grind, fill, and dress welds to produce smooth flush exposed surfaces in which welds are invisible after final finishing is completed.
- D. Provide exterior access panels with weatherproof extruded door gasket.
- E. Finish:
 - 1. When installed in ceramic tile surfaces, provide stainless steel panels finished with a NAAMM No. 4 (brushed) finish.
 - 2. When installed in an exterior wall or soffit, fabricate assemblies from commercial quality carbon steel sheets complying with ASTM A 653 CQ, hot-dip galvanized to comply with ASTM A 924, G90, or hot-dip galvanize after fabrication to provide an equivalent zinc coating weight.
 - 3. Elsewhere provide access panels with a baked-on rust-inhibitive primer.
- F. Identification: Mark inside surface of access doors with colored dot in accordance with the following color code.
 - 1. Domestic Cold Water: Yellow.
 - 2. Domestic Hot Water and Return: Yellow.
 - 3. Fire Protection: Red.
 - 4. Waste and Vent: Green.
 - 5. Interior Rainwater Leaders: Green.
 - 6. Natural Gas: Yellow.
 - 7. Condensate: Green.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are properly framed, within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- C. Correct detrimental conditions proceeding with installation.

3.2 INSTALLATION

- A. Install plumb, level, and square with adjacent construction.
- B. Attach assemblies securely to supports.
- C. When installed in ceramic tile surfaces, coordinate panel location with the tilework so that the panel will align and fit within the tile module with no tile cutting, or a minimum of cutting.

3.3 FIELD QUALITY CONTROL

- A. Adjust hardware for proper function so panels operate freely, but not loosely, without sticking or hinge binding.

END OF SECTION

SECTION 08 32 00 – MULTI-PANEL SLIDING GLASS DOORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes exterior aluminum-framed multi-panel sliding glass door system complete with hardware at the exterior south elevation of the Community Room
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Other Sections of Division 08 for the following.
 - a. Aluminum storefronts and their entrances.
 - b. Aluminum windows.
 - c. Glass and glazing.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Deferred approval: The work of this Section requires deferred approval (delegated design), including comprehensive engineering analysis by a qualified professional engineer using performance requirements and design criteria indicated.
- B. Pre-installation meeting:
 - 1. Prior to start of installation, arrange a pre-installation meeting between the door manufacturer's authorized representative, the Contractor, the installer, the glazier, and the Design Consultant to review the Drawings and Specifications, the door, glass and sealants manufacturers' data, and conditions of opening to receive the work of this Section, as well as other conditions that would affect the quality of this work.
 - 2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
 - 3. Review all typical and atypical details to verify the method(s) of installation that the Contractor intends to follow, as well as corrective actions that are required.
 - 4. Special conditions not specifically referenced or addressed by the Project Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified, reviewed and discussed.
 - 5. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions to determine what actions need to be taken to assure an installation that will meet the requirements of the Contract Documents, and will be acceptable to the assembly/material manufacturer to issue the warranties specified.
 - 6. Record meeting minutes and distribute electronic copy to attendees and others concerned, within 7 days after the meeting.

1.4 SUBMITTALS

- A. Data: Manufacturer product data for door, including the following.
 - 1. Construction details and fabrication methods.
 - 2. Profiles and dimensions of individual components.

3. Data on hardware, accessories, and finishes.
- B. Shop drawings: Large scale, dimensioned shop drawings: Include information not fully detailed in manufacturer's standard product data and the following.
 1. Layout and installation details, including anchors.
 2. Elevations of units at 3/4-inch scale.
 3. Full-size section details of typical composite members, including reinforcement.
 4. Hardware including operators.
 5. Glazing details.
 6. Accessories.
- C. Samples: 12-inch long sections of door frame with specified finish. Where finish involves normal color variations, include sample sets showing the full range of variations expected.
- D. Certification:
 1. Certification by a recognized independent testing laboratory or agency showing that each type, grade, and size of unit complies with performance requirements indicated.
 2. Where reports are not available, engage a recognized independent testing laboratory or agency to perform tests specified. Provide certified test results showing that unit complies with performance requirements indicated.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 1. Credit MR 4.1 & 4.2, Recycled Content.
 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 4. Credit MR 6, Rapidly Renewable Materials.
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 6. Credit EQ 4.1, Low Emitting Materials, Paints.
- F. Closeout: Recommendations for maintenance and cleaning of surfaces.

1.5 QUALITY ASSURANCE

- A. Installer qualifications: Firm who has completed installation of sliding glass doors similar in design and extent to those required for the Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Standards: Requirements for doors, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA 101 and applicable general recommendations published by AAMA.
- C. Single source responsibility: Provide all sliding aluminum doors from one source and produced by a single manufacturer.
- D. Labeling: Permanently attached AAMA/NWWDA 101/I.S.2.

1.6 HANDLING

- A. Transport, store and handle assemblies to prevent damage. Store off the floor in a protected location.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fleetwood Aluminum Products (basis of design).
- B. Arcadia, Inc.
- C. Or equal.

2.2 MODEL

- A. Fleetwood "Norwood" series 3070-EX.

2.3 PERFORMANCE REQUIREMENTS

- A. General: Provide assembly that complies with performance requirements specified, as demonstrated by testing manufacturer's corresponding stock systems according to test methods indicated.
- B. Design criteria:
 - 1. Comply with structural performance, air infiltration, and water penetration requirements indicated in AAMA/NWWDA 101/I.S.2, to the minimum standard of an SGD-C30 rating.
 - 2. Refer to the Structural Drawings for design wind velocity at the Project site.
 - 3. Comply with ADA requirements.
- C. Forced-entry resistance: Provide units that comply with Code.

2.4 MATERIALS/COMPONENTS

- A. Aluminum: Alloy and temper recommended by the manufacturer for strength and application of required finish, complying with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.
- B. Hardware:
 - 1. Rollers: Adjustable stainless steel with ball bearings and tandem carriage.
 - 2. Roller track: 24-gage stainless steel designed to seat securely in the sill.
 - 3. Locking mechanism: Heavy duty stainless steel hook bolt.
- C. Fasteners: Aluminum, non-magnetic stainless steel, epoxy adhesive, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum members, trim, hardware, anchors, and other components of units.
 - 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125-inch thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
 - 2. Exposed fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
 - a. Provide Phillips flat-head machine screws for exposed fasteners.

- D. Anchors, clips, and accessories: Fabricate of aluminum, non-magnetic stainless steel, hot-dip zinc-coated steel or iron, complying with the requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.
- E. Compression weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
- F. Sliding weatherstripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.2.
- G. Glass and glazing materials: As indicated and specified in Section 08 80 00.
- H. Sealants and backup rods:
 - 1. Within assemblies: Manufacturer's standard non-drying, non-skinning sealant complying with AAMA 809.2.
 - 2. Between assemblies and adjacent materials: As specified in Section 07 92 00.
 - 3. Glazing sealants: Refer to Section 08 80 00.
- I. Glazing gaskets: Manufacturer standard black gaskets.
- J. Hardware: Manufacturer standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.
- K. Insect screens:
 - 1. Design door and hardware to accommodate screen in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screen on outside of door assembly and provide for each operable panel.
 - 2. Aluminum wire fabric screen, charcoal gray 18-by-16 mesh of 0.011-inch diameter, coated aluminum wire.
 - 3. Extruded-aluminum or aluminum tubular framing sections not less than 0.050-inch wall thickness.

2.5 FABRICATION

- A. Doors:
 - 1. Fabricate frame and sash square, without rack, and with flush, hairline joints.
 - 2. Equip ventilators with weatherstripping to prevent water and air infiltration.
- B. Screens:
 - 1. Assemble aluminum framing sections with flush, hairline, mitered, reinforced corners.
 - 2. Insert screen in frame groove and stretch taut. Lock in place with continuous spline.
 - 3. Finish: Match aluminum door members.
- C. Finish:
 - 1. Sight-exposed aluminum surfaces: Finish as specified in Section 08 43 23.
 - 2. Steel brackets: Prime with rust-inhibitive primer.
- D. Glazing: Factory-glaze doors. Comply with glass manufacturer's recommendations and requirements of Section 08 80 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Do not install components that are bowed, dented, abraded, broken or otherwise defective.
- B. Install doors level, plumb, square and with tight fitting joints. Attach to supporting construction with non-staining and non-corrosive shims, anchors, fasteners and spacers.
- C. Install sills in a full bed of sealant.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with the requirements specified under "Dissimilar Materials" in the Appendix to AAMA 101.
- E. Provide all accessories such as fasteners, sealants and concealed anchorage needed for a complete, weatherproof installation.

3.3 ADJUSTING

- A. Adjust operating components to provide a tight fit at contact points and weatherstripping for smooth operation and weathertight closure.
- B. Weatherstrips shall not bind or prevent sash or ventilator from closing easily and tight with weathertight contact between metal.
- C. Lubricate hardware and moving parts.

3.4 FIELD QUALITY CONTROL & CLEANING

- A. Clean aluminum surfaces immediately after installing sliding aluminum-framed glass doors. Avoid damaging finish.
- B. Remove protective coating and excess glazing and sealants, dirt, and other substances.
- C. Clean glass immediately after installing doors. Comply with manufacturer's recommendations for final cleaning and maintenance. Remove nonpermanent labels from glass surfaces.
- D. Remove and replace glass broken, chipped, cracked, abraded, or damaged during the construction period.

END OF SECTION

SECTION 08 33 23 - OVERHEAD COILING DOOR

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes interior motorized overhead coiling door complete with hardware, operators and accessories.
- B. Related Requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for access flooring substrate.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer product data, including specifications, installation diagrams, and installation instructions.
- B. Seismic Qualification Certificate: For overhead coiling door, accessories, and components, from manufacturer.
- C. Shop drawings:
 - 1. Submit for special components and installation conditions not fully dimensioned or detailed on manufacturer's data sheets.
 - 2. Show attachment details to support and interface with adjacent construction.
 - 3. Show location of replaceable fusible link.
 - 4. Include wiring diagrams for power, signal and controls.
- D. Samples: Submit door manufacturer's standard size samples for each type of exposed finish
- E. Installer certificates: Signed by manufacturer certifying that installer complies with specified requirements.
- F. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.
- G. Closeout submittals: Operating and maintenance instructions for the door.

1.4 QUALITY ASSURANCE

- A. Installer qualifications: Manufacturer authorized representative trained and approved for both installation and maintenance of unit required for this Project.

B. Fire-test-response characteristics:

1. Provide assembly complying with NFPA 80 that is identical to assembly tested for fire-test-response characteristics per UL 10b and NFPA 252, and that is listed and labeled for fire ratings indicated by UL, FMG, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction.
2. For unit exceeding sizes of tested assemblies, provide certification by a testing agency, acceptable to authorities having jurisdiction, that door complies with standard construction requirements of tested and labeled fire-rated door assembly except for size.

1.5 HANDLING

- A. Protect materials from damage during shipping and storage.

1.6 WARRANTY

Door manufacturer shall warrant assembly against defects in workmanship and materials for 2 years from date of Substantial Completion

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Cookson Co.
B. Cornell Iron Works.
C. Overhead Door Corp.
D. Pacific Rolling Door Co.
E. Lawrence Roll-Up Doors, Inc. (basis of design.)
F. Or equal.

2.2 MODEL/TYPE

- A. Lawrence Model IL, insulated, fire-rated assembly, complying with the following:
1. Minimum number of operating cycles: 20,000.
 2. Fire-rating: As indicated on the Drawings.
 3. Gear drive assembly: Inline, UL listed.

2.3 MATERIALS

A. Basic materials:

1. Sheet steel: ASTM A 653, Grade 33, galvanized.
2. Structural shapes and plates: ASTM A 36.
3. Insulation: Mineral wool with minimum R5.

B. Components:

1. Curtain: Interlocking galvanized steel type 33 flat slats with mineral wool insulation covered with 24-gage galvanized steel backslats.
2. Endlocks: Heavy malleable iron castings.
3. Bottom bar: Two 2-inch by 2-inch by 1/8-inch steel angles.

4. Guides: 11-gage minimum steel U-channel guides and steel wall angles bolted together, with 3/8-inch fasteners spaced not more than 24 inches apart.
5. Barrel: 6-5/8-inch steel pipe and solid steel shaft with sealed precision bearing and torsion springs designed for 20,000 operating cycles.
6. Brackets: 3/18-inch steel plates with sealed precision bearing on operator side and external tension adjustment wheel.
7. Hood: 24-gage galvanized steel with integral flame baffle.
8. Operation: "Easy Reset" motor operator with an internal release and governor, designed for automatic closing without loss of spring tension, and reset by reconnecting fusible link cable and reopening door.
9. Locks: Slide type on coil side of bottom bar.
10. Finishes: Corrosion-inhibiting primer, minimum 0.2 mils pr side thermosetting polyester top coat, minimum 0.6 mils thickness each side, color TBD from manufacturer's standard palette.

C. Operation:

1. Fusible link activated at 165 degrees F.
2. "Easy Reset" motor with internal release and governor, designed for automatic closing without loss of spring tension, and reset by reconnecting fusible link cable and reopening door.
3. Average closing speed: 9 to 12 inches per second, but not less than 6 inches nor more than 24 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that opening is within allowable tolerances, plumb, level, clean, will provide solid anchoring surfaces.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Mounting: As indicated on the Drawings.
- B. Install door and its operating equipment in compliance with requirements of authorities having jurisdiction and in accordance with the door manufacturer's instructions, plumb, in true alignment, free of springing, forcing, racking or distortion.
- C. Provide necessary hardware, jamb and head stops, anchors, inserts, hanger, equipment supports and other accessories required for a complete installation.
- D. Attach door guide assemblies to walls for a rigid installation of the door curtain and operating equipment.

3.3 FIELD QUALITY CONTROL/DEMONSTRATION

- A. Touchup: Touchup damaged finish to match adjacent undamaged surfaces, when the results are satisfactory to the Design Consultant, otherwise return the damaged component to the shop for refinishing.
- B. Demonstration:
 1. Test and adjust controls and safeties.
 2. Replace damaged and malfunctioning controls and equipment.

3. Train City's maintenance personnel on procedures and schedules related to troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
4. Review data in the maintenance manuals.

END OF SECTION

SECTION 08 43 13 – EXTERIOR GLASS ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following exterior glass assemblies.
 - 1. Hinged storefront framing and doors at Library and Community Room.
 - 2. Aluminum window wall system with structural silicone.
 - 3. Mullion covers, subframes, reinforcement and anchors, and sealants for the work of this Section.
 - 4. Glass and glazing for the work of this Section.
 - 5. Custom
- B. Work installed but furnished in other Sections: Division 08 for finish hardware on doors.
- C. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 08 for skylights and windows, and for glazing requirements for the work of this Section.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. The work of this Section requires deferred approval and delegated design, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.4 SUBMITTALS

- A. Data:
 - 1. List of manufacturers' Product Data for manufactured and fabricated products and components proposed for use, including product data for self-drilling fasteners.
 - 2. Manufacturer product data for self-drilling fasteners.
- B. Shop Drawings:
 - 1. Large scale dimensioned Shop Drawings for the work of this Section showing the following:
 - a. Elevations.
 - b. Detail sections of typical composite members.
 - c. Interface with adjacent materials/assemblies, including method of bridging gaps between frame of glazed assemblies and the adjacent materials. Unless otherwise indicated on the Drawings, single line of sealant to prevent air and water infiltration may be rejected by the Design Consultant; flexible, self-adhered flashings are preferred.
 - d. Hardware mounting heights.

- e. Hardware schedule and indicate operating hardware types, quantities, and locations.
- f. Expansion provisions.
- g. Glazing details.
- h. Relative layout of adjacent beams, columns, and slabs, all correctly dimensioned.
- i. Wiring diagram for doors that are electrically-operated and doors that interface with the fire alarm and the security systems.
- j. Identify shop and field sealants by product name and locate on shop drawings.
- k. Identify welds, both shop and field, by AWS welding symbols.

C. Layout drawings:

- 1. Submit drawings for fasteners and anchors to be embedded in concrete showing type of fixing, location, setting-out dimensions and acceptable setting tolerances.
- 2. Provide complete floor plans, elevations (if required) and full size details of the embedded anchorage for review along with a fully coordinated set of structural calculations.
- 3. Details of each type of embedded anchor and/or fixing shall be included within this submittal.
- 4. Draw details full size with complete notes.
- 5. Identify areas of the building to which the work of this Section is attached with embedded anchorage and areas of the building to which the work of this Section will be attached without the use of embedded anchorage.
- 6. Joinery.
- 7. Anchorage.
- 8. Expansion provisions.
- 9. Glazing.
- 10. Identify samples gage, alloy, color and finish.
- 11. Flashing and drainage.
- 12. Structural-sealant joints construction, with specified finish and color.
- 13. Include 12-inch long samples of glazing gaskets.

D. Calculations: Prepare calculations in compliance with current design rules of AA, AISC, AISI, and ACI. Include analysis for wind and dead load on framing members, anchors, and concrete inserts.

- 1. Show section property computations for framing members. Show vertical and horizontal loads on curbs and other supports. Existing test reports will be acceptable substitute for calculations. Calculations shall be signed and sealed by a California-licensed professional engineer.
- 2. Do not increase allowable stresses or decrease applied loads for design wind loads, or wind loads in combination with other loads, where not permitted by Code, or if resultant allowable stress after increase is greater than or equal to yield stress.

E. Certified test results: Certified test results showing that assemblies have been tested by a recognized testing laboratory or agency and comply with specified performance characteristics.

F. Samples:

- 1. Cutaway Sample: Samples of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch lengths of full-size components and showing details of the following.
 - a. Joinery.
 - b. Anchorage.

- c. Expansion provisions.
 - d. Glazing.
 - e. Identify samples gage, alloy, color and finish.
 - f. Flashing and drainage.
- 2. Structural-sealant joints construction, with specified finish and color.
- 3. Glazing gaskets: 12-inch long samples.
- G. Certification: Certified test results showing that entrance and storefront systems identical to those specified have been tested by a recognized testing laboratory or agency and comply with specified performance requirements.
- H. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 QUALITY ASSURANCE

- A. Fabricator/installer qualifications: Firms with a minimum of 5 years of successful experience fabricating and erecting work similar to that required for this Project.
- B. Engineering responsibility:
 - 1. Engineer, fabricate, assemble and erect the work of this Section to meet or exceed the specified design and performance criteria, and to provide watertight, structurally sound, self-draining assemblies conforming to governing codes and regulations.
 - 2. The assemblies shown on the Drawings and specified herein are intended to define design intent and minimum performance requirements. Do not change indicated profiles without the Design Consultant's written consent.
 - 3. Fasteners and connections are shown schematically. A California-licensed civil or structural engineer employed by the Contractor shall determine final types and sizes.
 - a. In no case shall the fasteners or connections conflict with or require revision of the finish profiles of the assemblies specified herein or the supporting work.
 - b. Connections to the supports shall not impose eccentric loading, or induce twisting or warping.
 - c. Connections to the structural frame shall be able to accommodate misalignment of the steel structure within limits allowed by the AISC tolerances.

1.6 HANDLING

- A. Procedure: In accordance with "Care and Handling of Architectural Aluminum from Shop to Site" published by AAMA.

1.7 SPECIAL WARRANTY

- A. Special assembly warranty: Manufacturer standard form in which manufacturer agrees to repair or replace components of glazed aluminum assemblies that do not comply with requirements or that deteriorate as defined in this Section within specified warranty period. Repair or replace, when repairs are acceptable to the City, defective materials and workmanship during the warranty period at no cost to the City.

1. Failures include, but are not limited to, the following:
 - a. Penetration of water into the building thru glazed aluminum assemblies.
 - b. Air infiltration exceeding specified limits.
 - c. Structural failure of components resulting from forces within specified limits.
 - d. Discoloration or fading, excessive non-uniformity, pitting, cracking, peeling, or crazing of finish or corrosion.
 - e. Failure to fulfill other specified performance requirements.
 - f. Failure of operating parts to function normally.
2. Warranty period: 10 years from Substantial Completion, except 20 years for finish.

NOTE: The terms below used in conjunction with finish warranty above are defined as follows.

- a. "Excessive fading": A change in appearance which is perceptible and objectionable as determined by the Design Consultant when viewed visually in comparison with the original color range standards.
- b. "Excessive non-uniformity": Non-uniform fading during the period of the guarantee to the extent that adjacent parts have a color difference greater than the original acceptable color range.
- c. "Will not pit or otherwise corrode": There shall be no pitting or other type of corrosion discernible from a distance of 10-foot, resulting from the natural elements in the atmosphere at the Project site.

B. Sealants: Refer to Section 07 92 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Kawneer Co., Inc.
- B. US Aluminum/CRL.
- C. Or equal.

2.2 SYSTEMS

- A. Fixed aluminum-framed storefront with one-inch glass, clear anodized finish.
- B. CRL system BG600 Aluminum-supported butt glazed window wall with 2-sided structural silicone support (basis of design.)
- C. Aluminum-framed doors: Wide stile with aluminum retainers on 4 edges.

2.3 DESIGN CRITERIA

- A. General: Work of this Section requires deferred submittal (design/build). The Contractor is required to design, within the dimensional parameters indicated, and engineer the assemblies to withstand the loads, and thermal (for exterior assemblies), seismic, thermal and structural movements without failure, based on testing manufacturer standard units in assemblies similar to those indicated for this Project.
- B. Structural loads:
 1. Wind loads: As indicated on Drawings.
 2. Seismic Loads: As indicated on Drawings.

C. Thermal movement (exterior assemblies only):

1. Base movements for a minimum material temperature increase of 100 degrees F and decrease of 50 degrees F relative to time of installation.
2. For thermal design, the design winter surface temperature shall be plus 30 degrees F.
3. The design summer surface temperature shall be at least 180 degrees F.
4. Components including adhesive and sealants shall be capable of withstanding without failure design winter temperature to design summer temperature with simultaneous specified loads.
5. Assume a building interior temperature range of 50 to 80 degrees F.

2.4 PERFORMANCE REQUIREMENTS

A. Performance: Systems shall withstand the effects of the following without exceeding performance criteria and without failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Movements of supporting structure including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
2. Dimensional tolerances of building frame and other adjacent construction.
3. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Glazing-to-glazing contact.
 - e. Noise or vibration created by wind and by thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
 - h. Failure of operating units.
4. Deflection of framing members:
 - a. Deflection normal to wall plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed $L/175$ of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - b. Deflection parallel to glazing plane: Limited to $L/360$ of clear span or 1/8 inch, whichever is smaller, but in no case by an amount which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than 1/8 inch and clearance between members and operable units directly below them to less than 1/16 inch.

B. Structural-test performance: Provide assemblies in exterior walls, including anchorage, capable of withstanding wind-load design pressures indicated on the Structural Drawings, acting inward and outward; provide interior assemblies, including anchorage, capable of withstanding a lateral pressure of not less than 5 psf. Demonstrate structural adequacy of assemblies by testing 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, shall 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 fewer than 10 seconds.
- C. Live loads: Provide assemblies, including anchorage, that accommodate the supporting structure deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
- D. Movements of the structural-support: Provide assemblies that accommodate structural movements including, but not limited to, sway and deflection.
- E. Story drift: Provide assemblies that accommodate design displacement of adjacent stories indicated.
 1. Design displacement: As indicated on Drawings.
 2. Test performance: Meet criteria for passing, based on building occupancy type, when tested according to AAMA 501.4 at design displacement and 1.5 times design displacement.
- F. Air infiltration: Provide aluminum-framed assemblies with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq.-foot (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 psf.
- G. Water penetration under static pressure: Provide aluminum-framed assemblies 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 psf.
 1. Water penetration under dynamic pressure: Provide assemblies that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 psf.
 - a. Maximum water leakage: No uncontrolled water penetrating assemblies or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.
- H. Thermal movements: Provide assemblies that allow for thermal movements resulting from the specified maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Test performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
- I. Condensation resistance: Provide assemblies with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.
- J. Sound transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:
 1. Sound transmission class (STC): Minimum [26] [30] [35] STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
 - a. Outdoor-indoor transmission class (OITC): Minimum [26] [30] [34] OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

- K. Structural sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - 1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
- L. Load transfer: Framing members shall not transfer stresses, including those caused by thermal and structural movement, to glazing units.
- M. Glazing: Physically and thermally isolate glazing from framing members.
- N. Dimensional tolerances: Provide assemblies that accommodate dimensional tolerances of building frame and other adjacent construction.
- O. Performance requirements for doors: Resistance to corner racking shall be tested by the "Dual Moment Load" test as follows.
 - 1. Test section shall consist of a standard top door corner assembly. Side rail section shall be 24 inches long; top rail section shall be 12 inches long.
 - 2. Anchor "top rail" positively to test bench so that corner protrudes 3-inches beyond the bench edge.
 - 3. Anchor a lever arm positively to "side rail" at a point 19 inches from the inside edge of "top rail." Attach weight support pad at a point 19 inches from inner edge of "side rail".
 - 4. Test section shall withstand a load of 170 lbs. on the lever arm before reaching the point of a 1/18-inch gap at the stile/rail, joint or a 3-degree rotation in the stile. Further failure, defined as a rotation of the lever arm in excess of 45, shall not be reached before 270 lbs.

2.5 MATERIALS/COMPONENTS

- A. Aluminum:
 - 1. Extrusions: 6063-T5 alloys. Provide a minimum nominal wall thickness of 1/8-inch for structural members and 1/16-inch for non-structural members.
 - a. Standard commercial tolerances listed in AA "Aluminum Standards and Data" apply to finished, fabricated and assembled materials, except
 - b. Provide stricter tolerances where required to assure proper functioning of glass and glazing materials.
 - 2. Sheet: 3003-H14 alloys. Provide a minimum nominal thickness of 3/16-inch. Standard commercial tolerances listed in AA "Aluminum Standards and Data" apply to finished, fabricated and assembled materials.
 - 3. Surface flatness and edges: For exposed work provide materials that are cold-rolled, cold-finished, cold-drawn, extruded, stretcher-leveled, machine cut and otherwise produced to the highest commercial standard for flatness with edges and corners sharp and true to angle or curvature as required.
- B. Steel mullion reinforcement, if required by wind loading and other considerations: Proprietary bent steel plate or structural steel shape complying with the following.
 - 1. Hot-rolled sections: ASTM A 36.
 - 2. Structural tube framing: ASTM A 500, Grade B.

- C. Galvanized steel: As specified in Section 05 50 00.
- D. Fasteners:
 - 1. General: Aluminum, non-magnetic stainless steel or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
 - 2. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125-inch thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
 - 3. Exposed fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For the application of hardware, use fasteners that match the finish of member or hardware being fastened.
 - a. Provide Phillips flat-head machine screws for exposed fasteners.
 - 4. Welding electrodes: As recommended by AWS for the type of metal to be welded and the conditions of use.
- E. Brackets: Where feasible, provide high-strength aluminum brackets and reinforcements; otherwise provide non-magnetic stainless steel or steel complying with ASTM A 386.
- F. Shims:
 - 1. At static connections use high impact polystyrene solid shims. Horseshoe shims are allowed at static connections only.
 - 2. At dynamic anchor conditions, use Nylatron isolating slip pads with hard round holes
- G. Weatherstripping:
 - 1. Compression weatherstripping: Manufacturer's standard replaceable compressible weatherstripping gaskets of molded neoprene complying with ASTM D 2000 or molded PVC complying with ASTM D 2287.
 - 2. Sliding weatherstripping: Manufacturer's standard replaceable weatherstripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing, complying with AAMA 701.
- H. Glass and glazing materials: As indicated on the Drawings and specified in Section 08 80 00.
- I. Sealants and backup rods:
 - 1. Glazing sealants: Refer to Section 08 80 00.
 - 2. Within assemblies: Manufacturer standard non-drying, non-skinning sealant complying with AAMA 809.
 - 3. Between assemblies and adjacent materials: As specified in Section 07 92 00.
- J. Paint:
 - 1. For finish on exposed surfaces: Clear anodized AAMA 611, AA-M12C22A41, Class I.
 - 2. For concealed ferrous metal surfaces: Tneme-Zinc 90-93 by Tnemec, Zinc-Lock 308 by Porter International, or MZ-4 Epoxy Zinc-Rich Primer by Valspar Corp.
 - 3. Bituminous paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.
- K. Isolation tape:
 - 1. Tremco 440.
 - 2. 3M EC1202.

3. Tremco Presstite 579.6.
- L. Foam insulation: Closed-cell polyurethane. Use in mullions and closure pieces that cannot be insulated during or after assembly.
- M. Finish:
 1. Finish exposed surfaces of assemblies with a clear anodized coating complying with AA M12C22A41.
 2. Shop primer for ferrous metal: Manufacturer or fabricator standard, fast-curing, lead-free, universal rust-inhibitive alkyd primer complying with performance requirements of FS TT-P645.
 3. Shop primer for concealed aluminum surfaces: Alkyd barium metaborate made by one of the manufacturers listed in Section 09900, or bituminous paint.
 4. Galvanizing repair paint: SSPC Paint No. 20, Type II (Organic), by Tnemec, Porter International, Valspar Corp., Ameron Protective Coatings, or DuPont Co.
 5. Bituminous paint: Cold-applied asphalt mastic complying with SSPC Paint 12, but containing no asbestos fibers.

2.6 FABRICATION

- A. Furnish shop drawings, inserts and similar items to other trades, at appropriate times as required for proper sequence of construction.
 1. Verify dimensions of the supporting structure and other elements that precede this work before fabrication of the required components.
 2. Provide erection tolerances corresponding with specified tolerances for other work wherever field measurements cannot be obtained.
- B. Maintain the visual design concept shown, including member sizes, profiles and alignment of components.
- C. Fabricate and assemble components with proper and acceptable provision for noiseless thermal expansion and contraction, fabrication and erection tolerances, adjoining building component tolerances, and dynamic movements.
- D. Fabricate and assemble components with minimum perimeter clearances and shim spacing, but enable installation and dynamic movement of perimeter seals.
- E. Removable members such as glass stops, fillers or closures shall be extruded, and securely engaged into adjacent components. Fabricate extrusions to eliminate edge projection, bowing, and misalignment at joints.
- F. Design and construct expansion joints so that they will be, and remain, permanently watertight, and will accommodate weather and building dynamics.
- G. For surfaces exposed to view employ only materials which are free from alloy defects, die marks, scratches, streaks and other surface blemishes.
- H. When using aluminum sheets, use material light enough to permit workability but heavy enough to accurately retain the brake shape or contour without oil-canning when fastened to backing or blocking.
- I. Complete the fabrication and assembly of the components in the shop to the greatest extent possible to minimize field cutting, splicing, fastening, sealing and finishing.
 1. Maintain provisions for expansion and movement.
 2. Disassemble only as necessary for shipment and erection.
 3. Provide secure attachment and support at joints, with hairline, flush fit between contacting members.
- J. Complete the cutting, fitting, forming, drilling and grinding of metal before cleaning and applying specified finish. Remove arrises from cut edges and ease edges and corners to a radius of approximately 1/64-inch minimum, 1/32-inch maximum.

K. Welding:

1. Comply with industry standards for assembly and fabrication using system and rods for exposed metals that will provide texture match with materials being joined.
2. Grind exposed welds smooth and flush with parent metal using clean grinding wheels of a type that will not result in stains or discoloration.

L. Hardware:

1. Cut, reinforce, drill and tap doors and frames at the factory to receive hardware.
2. Provide hardware reinforcement of stainless steel or hot-dip galvanized steel secured by welding or stainless steel screws.

M. Door fabrication:

1. Make proper allowance for clearances at jambs, meeting stile of pairs, head and threshold thickness and clearance.
2. Equip meeting stiles on pairs of doors with an adjustable astragal.
3. Close the top of out-swinging doors with a plate or inverted channel.

N. Finishing:

1. Finish surfaces as follows to be within the color range represented by approved samples.
2. Finish aluminum surfaces with an anodized, batch process, Architectural Class I, clear coating complying with AAMA 607.1 and these Specifications.
 - a. Anodic thickness: 0.0007-inch minimum.
 - b. Anodic film color: Clear (transparent).
 - c. Seal anodized surfaces with hot deionized water at 210-degree F with a pH between 6.0 and 6.4.
3. Prime concealed aluminum surfaces in contact with masonry, concrete or steel with rust-inhibitive primer or with bituminous paint.
4. Prime steel parts of anchors, anchor inserts, reinforcement and supports with rust-inhibitive primer. After field welding, remove weld slag and touch-up abraded primer.
5. Provide minimum dry film thickness of 30 mils for bituminous paint and one mil for all other primers.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- C. Examine wall flashings, water and weather barriers, and other built-in components to ensure a coordinated, weathertight installation.
- D. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

A. General:

1. Do not install defective components, including warped, bowed, dented, abraded and broken members, and glass with damaged edges.
2. Remove and replace members that have been damaged during installation or thereafter before final acceptance.
3. Do not cut, trim, or weld components during erection in a manner that would damage the finish, decrease their strength, or result in a visual imperfection or a failure in performance of the work.
4. Return components that require alteration to the shop for refabrication or replacement.
5. Install components level, plumb, true to line and with uniform tight joints and reveals. Attach to structure with non-staining and non-corrosive shims, anchors, fasteners and spacers.
6. Provide all accessories such as fastenings, sealants and concealed anchorage needed for a complete weatherproof installation.
7. Protect unpainted aluminum surfaces that will be in contact with cementitious and dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

B. Erection tolerances:

1. Provide adjustment within the assemblies to accommodate job variations.
2. Install the work of this Section within the following tolerances:
 - a. Deviation from established vertical, horizontal, or designed position shall not exceed 1/8-inch in 12 feet of length of any member, or 1/4-inch in any total run in any line.
 - b. Maximum offset from true alignment between 2 consecutive members placed end-to-end shall not exceed 1/16-inch.
 - c. Maximum offset between glass framing members at corners of glazing pocket must not exceed 1/32-inch.

C. Assembly and anchorage:

1. Anchor components securely by bolting, welding or other permanent mechanical attachments system that will comply with specified requirements and permit movements that are intended or necessary.
2. Install slip-joint linings where required to ensure movement without damage of the components.
3. Provide tape separator or asphalt paint between contact surfaces of dissimilar materials where there is a possibility of corrosive or electrolytic action, but in all cases between dissimilar metals and where aluminum will contact with cementitious materials.
4. Remove weld slag and apply primer over welds. Touchup shop applied paint damaged by welding or other causes.

D. Glazing:

1. Glaze assemblies as specified in Section 08 80 00.
2. Carefully match joints of glazing beads.

E. Hanging doors:

1. Install finish hardware on doors in compliance with its manufacturer's instructions.
2. Hang doors with minimum clearance to frame and threshold to meet the performance criteria specified.
3. Hang doors and adjust hardware so doors operate freely for their entire travel, without sticking or binding, and with minimum clearance to frame to comply with performance criteria specified.

3.3 SEALANTS

- A. The requirements of Section 07 92 00 apply to sealants used in this work. Seal all joints between the work of this Section and adjacent construction to be weathertight.

3.4 FIELD QUALITY CONTROL

- A. Field water tests may be performed on completed glazed portions of the storefronts at the City's option in compliance with ASTM E 1105.
1. Provide hose and sufficient personnel to conduct the tests.
 2. In the event that such testing should result in uncontrolled leakage, eliminate the causes of such leakage at no additional cost to the City.
- B. Touchup: Touchup damaged finish when results are satisfactory to the Design Consultant, otherwise return the damaged component to the shop for refinishing.

3.5 ADJUSTING

- A. Adjust door hardware for smooth operation according to hardware manufacturers' instructions.
- B. 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

SECTION 08 55 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Exterior fixed and operable aluminum-framed windows.
 - 2. Glass and glazing for the work of this Section.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Other Sections of Division 08 for the following.
 - a. Sliding aluminum door assembly.
 - b. Aluminum storefronts and entrances.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC).

1.3 SUBMITTALS

- A. Data:
 - 1. Product data for each type of window required, including the following.
 - 2. Construction details and fabrication methods.
 - 3. Profiles and dimensions of individual components.
 - 4. Data on hardware, accessories, and finishes.
 - 5. Recommendations for maintenance and cleaning of exterior surfaces.
- B. Shop drawings: For each type of window required, include information not fully detailed in manufacturer's standard product data and the following.
 - 1. Layout and installation details, including anchors.
 - 2. Elevations of continuous work at 1/4-inch scale and typical window unit elevations at 3/4-inch scale.
 - 3. Full-size section details of typical composite members, including reinforcement.
 - 4. Interface with adjacent materials/assemblies, including method of bridging gaps between frame of glazed assemblies and the adjacent materials. Unless otherwise indicated on the Drawings, single line of sealant to prevent air and water infiltration may be rejected by the Design Consultant; flexible, self-adhered flashings are preferred.
 - 5. Hardware including operators.
 - 6. Glazing details.
 - 7. Accessories.
- C. Samples:
 - 1. Specified finish on 12-inch long sections of window members.
 - 2. Where finishes involve normal color variations, include sample sets showing the full range of variations expected.

D. Certification:

1. By a recognized independent testing laboratory or agency showing that each type, grade, and size of unit complies with performance requirements indicated.
2. Where reports are not available, engage a recognized independent testing laboratory or agency to perform tests specified. Provide certified test results showing that each type, grade, and size of unit complies with performance requirements indicated.

E. LEED: LEED certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 5.1, Regional Materials, Manufactured Locally.
2. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
3. Credit MR 6, Rapidly Renewable Materials.
4. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
5. Credit EQ 4.1, Low Emitting Materials, Paints.

1.4 QUALITY ASSURANCE

- A. Installer qualifications: Firm who has successfully completed installation of aluminum windows similar in design and extent to those required for the Project for a minimum of 3 years.
- B. Standards: Requirements for aluminum windows, terminology and standards of performance, and fabrication workmanship are those specified and recommended in AAMA 101 and applicable general recommendations published by AAMA.
- C. Single-source responsibility: Provide aluminum windows from one source and produced by a single manufacturer.

1.5 HANDLING

- A. Storage: Off the floor in a protected location.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Fleetwood (Basis of design.)
- B. Metal Windows Corporation.
- C. Or equal.

2.2 TYPES

- A. Series: TBD.
- B. Fixed and operable windows, including casement, hopper, awning and sliding assemblies.
 1. Flush, inside glazing with horizontal aluminum mullions.
 2. Butt-jointed insulating glazing in concealed channels.
- C. System performance requirements:
 1. General: Provide windows that comply with performance requirements specified, as demonstrated by testing manufacturer's corresponding stock systems according to test methods indicated.

2. Design requirements:
 - a. Comply with structural performance, air infiltration, and water penetration requirements indicated in AAMA/NWWDA 101.
 - b. Comply with Code for design wind velocity at the Project site.
3. Forced-entry resistance: Provide units that comply with requirements for Performance Level 10 when tested in compliance with ASTM F 588, unless more restrictive requirements are mandated by Code.

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by the manufacturer for strength and application of required finish, complying with ASTM B 221 for extrusions and ASTM B 209 for sheet or plate.
- B. Fasteners: Aluminum, non-magnetic stainless steel, epoxy adhesive, or other materials warranted by the manufacturer to be non-corrosive and compatible with aluminum window members, trim, hardware, anchors, and other components of window units.
 1. Reinforcement: Where fasteners screw-anchor into aluminum is less than 0.125-inch thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads or provide standard non-corrosive pressed-in splined grommet nuts.
 2. Exposed fasteners: Except where unavoidable for application of hardware, do not use exposed fasteners. For hardware, use fasteners that match the finish of the member or hardware being fastened, as appropriate.
- C. Anchors, clips, and window accessories: Aluminum, non-magnetic stainless steel, or hot-dip zinc-coated steel or iron complying with the requirements of ASTM B 633; provide sufficient strength to comply with design criteria.
- D. Compression type glazing strips and weatherstripping: One of the following.
 1. Molded EPDM or neoprene gaskets complying with AAMA SG-1 or with ASTM D 2000 Designation 2BC415 - 3BC620.
 2. Molded PVC gaskets complying with ASTM D 2287.
 3. Molded expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.
- E. Sliding type weatherstripping:
 1. Woven pile weatherstripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric.
 2. Comply with AAMA 701.2.
 3. Provide stripping with integral centerline barrier fin of semi-rigid plastic sheet of polypropylene.
- F. Replaceable weather seals: Comply with AAMA 701/702.
- G. Glass and glazing materials: As indicated on the Drawings and specified in Section 08 80 00.
- H. Sealants and backup rods:
 1. Within assemblies: Manufacturer's standard non-drying, non-skinning sealant complying with AAMA 809.2.
 2. Between assemblies and adjacent materials: As specified in Section 07 92 00.
 3. Glazing sealants: Refer to Section 08 80 00.
- I. Insect screens:
 1. Design windows and hardware to accommodate screen in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Locate screens on outside of windows and provide for each operable panel.

2. Aluminum wire fabric screen, charcoal gray 18-by-16 mesh of 0.011-inch diameter, coated aluminum wire.
 3. Extruded-aluminum or aluminum tubular framing sections not less than 0.050-inch wall thickness.
- J. Hardware: Manufacturer's standard hardware fabricated from aluminum, stainless steel, or other corrosion-resistant material compatible with aluminum and of sufficient strength to perform the function for which it is intended.
- K. Sill cap/track: Extruded-aluminum track with natural anodized finish of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
- L. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- M. Roller assemblies: Low-friction design.
- N. Pole operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate windows without reaching more than 60 inches above floor; one pole operator and pole hanger per room that has operable windows more than 72 inches above floor.

2.4 CONSTRUCTION

- A. General:
1. Fabricate windows to comply with indicated standards.
 2. Fabricate frame and sash square, without rack, and with flush, hairline joints.
 3. Equip ventilators with weatherstripping to prevent water and air infiltration.
 4. Sash members shall be contained within frame members, so that total sight line of sash and frame does not exceed the frame sight line.
- B. Provide units that are reglazable without dismantling sash or ventilator framing.
- C. Provide subframes with anchors, where shown, of profile and dimensions indicated but not less than 0.062-inch extruded aluminum.
- D. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window.
- E. Provide mullion, sills and cover plates, matching window units, complete with anchors for support to structure and installation of the windows.
- F. Allow for erection tolerances and provide for movement of window due to thermal movement and building deflections.
- G. Screens:
1. Assemble aluminum framing sections with flush, hairline, mitered, reinforced corners.
 2. Insert screen in frame groove and stretch taut. Lock in place with continuous spline.
 3. Finish: Match aluminum window members.
- H. Finish:
1. Sight-exposed aluminum surfaces: Finish as specified in Section 08 43 00.
 2. Steel brackets: Hot-dip galvanize and coat with rust-inhibitive primer.
- I. Glazing:
1. Factory glaze windows.
 2. Comply with the glass manufacturer recommendations and the requirements of Section 08 80 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.
- C. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- D. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Do not install components that are bowed, dented, abraded, broken or otherwise defective.
- B. Install windows level, plumb, square and with tight fitting joints. Attach to supporting construction with nonstaining and non-corrosive shims, anchors, fasteners and spacers as shown on approved shop drawings.
- C. Set sill members in a bed of compound or with joint fillers or gaskets to provide weathertight construction.
 - 1. Refer to Section 07 92 00 for compounds, fillers, and gaskets to be installed concurrently with windows.
 - 2. Coordinate installation with wall flashings and other components of the work.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with the requirements specified under "Dissimilar Materials" in the Appendix to AAMA 101.
- E. Provide all accessories such as fasteners, sealants and concealed anchorage needed for a complete weatherproof installation.
- F. Adjust ventilators to assure smooth operation.
 - 1. Units shall be weathertight when closed.
 - 2. Lubricate hardware and moving parts as required.
 - 3. Weatherstrips shall not bind or prevent sash or ventilator from closing easily and tight with weathertight contact between metal.

3.3 DEMONSTRATIONS

- A. Manufacturer shall provide window maintenance instructions and minimum of one on-site visit to assure proper operation of units.

END OF SECTION

SECTION 08 60 00 - ALUMINUM-FRAMED SKYLIGHT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Curb-mounted, sloped skylight framing and glazing.
2. Flashings at perimeter of skylight.
3. Closure pieces, clips and angles.
4. Gaskets and sealants for the work of this Section.
5. Supplementary parts and components, such as inserts, clips, fasteners, anchors and other miscellaneous supports required for a complete, weatherproof installation.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 07 for the following:
 - a. Tubular skylights.
 - b. Flashings other than for skylight.
 - c. Sealants other than specified herein.
3. Division 08 for the following:
 - a. Tubular skylights.
 - b. All other glass and glazing.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC),.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Deferred approval: The work of this Section requires deferred approval and delegated design, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Pre-installation meeting:

1. Prior to start of installation, arrange a pre-installation meeting between the glass and skylight system manufacturers authorized representatives, the Contractor, the installer, the glazier, and the Design Consultant to review the Drawings and Specifications, the glass and sealants manufacturers' data, and conditions of framing to be glazed, as well as other conditions that would affect the quality of this work.
2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
3. Review all typical and atypical details to verify the method(s) of installation that the Contractor intends to follow, as well as corrective actions that are required.
4. Special conditions not specifically referenced or addressed by the Project Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified, reviewed and discussed.

5. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions to determine what actions need to be taken to assure an installation that will meet the requirements of the Contract Documents, and will be acceptable to the assembly/material manufacturer to issue the warranties specified.
6. Record meeting minutes and distribute electronic copy to attendees and others concerned, within 7 days after the meeting.

1.4 SUBMITTALS

- A. Data: Manufacturer product data for the skylight assembly.
- B. Shop drawings:
 1. Large scale, dimensioned shop and erection drawings for skylight.
 2. Show joinery techniques, provision for horizontal and vertical expansion, glass and metal thicknesses, and framing member profiles. Identify all materials including metal alloys, glass types, fasteners, and glazing materials.
 3. Identify shop and field sealants by product name and locate on shop drawings. Show relative layout of adjacent beams, columns, and slabs, correctly dimensioned.
 4. Show interface with adjacent and abutting materials.
 5. Dimension position of glass edge relative to metal daylight.
 6. Identify shop and field welds by AWS Welding Symbols, A2.0.
- C. Samples:
 1. Twelve-inch samples of production-run aluminum extrusions with the specified finish, and a corner assembly showing typical skylight construction.
 2. Twelve-inch long samples of gaskets.
- D. Cutaway sample: Of framing intersection, made from 12-inch long lengths of full-size components and showing details of the following.
 1. Primary members.
 2. Joinery.
 3. Anchorage.
 4. Expansion provisions.
 5. Glazing.
 6. Flashing and drainage.
 7. Structural-sealant joints.
- E. Structural calculations: Prepare and submit structural calculations for the skylight.
 1. Prepare calculations in compliance with current design rules of AA, AISC, AISI, and ACI. Include analysis for wind, seismic, live and dead loads on framing members, anchors, and concrete inserts.
 2. Show section property computations for framing members.
 3. Show vertical and horizontal loads on curbs and other supports.
 4. Existing test reports will be acceptable substitute for calculations.
 5. Calculations shall be signed and stamped by a California-licensed professional engineer.
 6. Do not increase allowable stresses or decrease applied loads for design wind load, seismic load, or those loads in combination with other loads, where not permitted by Code, or if resultant allowable stress after increase is greater than or equal to yield stress.

- F. Building Department approval: Submit reviewed shop drawings, calculations and any other supporting data required by the Building Department for its review and approval. Pay applicable fees resulting therefrom.
- G. Preconstruction test reports: Indicate and interpret test results for compliance with requirements.
- H. Product test reports: From a qualified testing agency indicating skylight comply with requirements, based on comprehensive testing of current products.
- I. Sealant compatibility and adhesion test reports: From sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with sealants; include sealant manufacturer's interpretation of test results for sealant performance and recommendations for primers and substrate preparation needed for adhesion.
- J. Field test reports: Indicate and interpret test results for compliance with requirements.
- K. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.
- L. Closeout: Furnish the City a comprehensive plan for replacement of broken glass. Include a local source.

1.5 QUALITY ASSURANCE

- A. Fabricator/installer qualifications: Single firm which can show a minimum of 5 years of successful experience in fabricating and erecting skylight similar to that required for this Project.
- B. Engineering responsibility:
 - 1. Engineer, fabricate, assemble and erect the skylight to meet or exceed the criteria specified, and to provide watertight, structurally sound, self-draining assembly conforming to governing codes and regulations.
 - 2. Fasteners and connections are shown schematically. A California-licensed professional engineer employed by the Contractor shall determine final types and sizes.
 - a. In no case shall the fasteners or connections conflict with or require revision of the finish profiles of the skylight or the supporting work.
 - b. Connections to the structural frame shall not impose eccentric loading, or induce twisting or warping.
 - c. Connections to the structural frame shall be able to accommodate actual and potential misalignment of the steel structure within limits allowed by the AISC tolerances.
- C. Professional engineer qualifications:
 - 1. Professional engineer legally qualified to practice in California and experienced in providing engineering services of the kind indicated.
 - 2. Engineering services are defined as those performed for installations of skylight that are similar to those indicated for the Project in material, design, and extent.

- D. Testing agency qualifications: Independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- E. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum".

1.6 HANDLING

- A. Procedure: "Care and Handling of Architectural Aluminum from Shop to Site" published by AAMA.

1.7 WARRANTY

- A. Warrant skylight against defective materials and workmanship for 5 years after Substantial Completion.
- B. Written warranty, executed by manufacturer agreeing to repair or replace components of assemblies that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Structural failure.
 - 2. Sealant failure.
 - 3. Failure of system to meet performance requirements.
 - 4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 5. Water leakage; defined as uncontrolled water appearing on normally exposed interior surfaces of skylight from sources other than condensation. Water controlled by flashing and gutters and drained back to the exterior and that cannot damage adjacent materials or finishes is not water leakage.
- C. Repair or replace defective materials and workmanship during the warranty period at no cost to the City.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Bristolite.
- B. Metcoe Skylight Specialties, Inc.
- C. O'Keeffe's, Inc.
- D. Velux.
- E. Wasco Skylights.
- F. Or equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated design: Skylight requires deferred approval, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Performance - General: Skylight shall withstand the effects of the following without failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - 1. Structural loads.
 - 2. Thermal movements.
 - 3. Movements of supporting structure.

4. Dimensional tolerances of support system and other adjacent construction.
 5. Failure includes, but is not limited to, the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Glazing-to-glazing contact.
 - e. Noise or vibration created by wind and by thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
- C. Structural loads:
1. Wind: As indicated on Drawings.
 2. Seismic: As indicated on Drawings.
- D. Deflection of framing members: At design wind pressure, as follows:
1. Deflection normal to glazing plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding $L/175$ of the glass edge length for each individual glazing lite 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 amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
- E. Lateral bracing of framing members: Compression flanges of flexural members are laterally braced by cross members with minimum depth equal to 50 percent of flexural member that is braced. Glazing does not provide lateral support.
- F. Structural-test performance: Provide skylight tested according to ASTM E 330, as follows:
1. When tested at positive and negative wind-load design pressures, assemblies shall not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, shall 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.
- G. Air infiltration: Provide skylight with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. foot of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/square foot
- H. Water penetration under static pressure: Provide skylight 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/ square foot
- I. Water penetration under dynamic pressure: Provide skylight that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/ square foot.
1. Maximum water leakage: No uncontrolled water penetrating skylight, or water appearing on systems' normally exposed interior surfaces, from sources other than condensation. Water leakage does not include water controlled by flashing and

gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

- J. Thermal movements: Provide skylight that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature change (range): As specified in Section 08 14 13.
- K. Condensation resistance: Provide skylight with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

2.3 MATERIALS

- A. Framing members: Extruded aluminum alloy ASTM B 221, 6063-T5 or 6061-T6.
 - 1. Extrusions: ASTM B 221.
 - 2. Sheet and plate: ASTM B 209.
 - 3. Bars, rods, and wire: ASTM B 211.
- B. Concealed flashing: Stainless steel or other corrosion-resistant, non-staining, non-bleeding flashing; compatible with adjacent materials. Do not use galvanized steel.
- C. Exposed flashing and closures: Aluminum sheet 0.060-inch thick.
- D. Fasteners and accessories: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding fasteners and accessories; compatible with adjacent materials.
 - 1. Movement joints: Provide slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
 - 2. Aluminum retaining cap fasteners: ASTM A 193, Series 300 stainless-steel screws; type as recommended by manufacturer.
 - 3. Connections to Supporting Structure: ASTM A 307, zinc-coated steel fasteners.
 - 4. Anchor bolts: ASTM A 307, Grade A, zinc-coated steel anchor bolts.
 - 5. Concrete or masonry inserts: Zinc-coated cast-iron, malleable-iron, or steel inserts; hot-dip galvanized according to ASTM A 123.
- E. Exterior caps: Extruded aluminum alloy 6063-T5. Minimum thickness 0.120-inch.
- F. Aluminum flashings: Alloy and temper selected by the fabricator. Minimum thickness 20-gage.
- G. Fasteners: Finish fasteners exposed to view to match aluminum framing systems.
 - 1. Exposed to view: 302/304 series stainless steel.
 - 2. Used for bolting aluminum extrusions and their connecting members: 2024-T4 aluminum or stainless steel.
 - 3. Used for the attachment of the skylight to the supporting curbs: Cadmium-plated or hot-dip galvanized steel.
- H. Security bars: TBD.
- I. Welding electrodes: As recommended by AWS and the aluminum manufacturer for the conditions of use and the alloys being welded.
- J. Glass and glazing materials: As indicated on the Drawings and specified in Section 08800.
- K. Framing system gaskets and joint fillers: Manufacturer's standard permanent gaskets and joint fillers for sliding, compression, and nonmoving joints.

L. Paint:

1. For finish on exposed surfaces: As specified in Section 08 43 13
2. For concealed ferrous metal surfaces: Tneme-Zinc 90-93 by Tnemec, Zinc-Lock 308 by Porter International, or MZ-4 Epoxy Zinc-Rich Primer by Valspar Corp.
3. Bituminous paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.

M. Sealants and backer rods:

1. Within assembly: Manufacturer's standard non-drying, non-skinning sealant complying with AAMA 809.2.
2. Between assembly and adjacent materials: As specified in Section 07 92 00.

2.4 GLAZING MATERIALS

A. Glass: As scheduled and specified in Section 08 80 00.

B. Glazing gaskets:

1. Manufacturer's standard pressure-glazing gaskets of elastomer type and hardness selected by skylight and gasket manufacturers to comply with requirements.
2. Provide gasket assemblies with corners sealed with sealant recommended by gasket manufacturer.

C. Spacers, edge blocks, and setting blocks:

1. Manufacturer standard permanent nonmigrating type of elastomer type and hardness selected to comply with requirements.
2. For structural silicone glazing, provide bond-breaking spacer gaskets and bonding setting blocks compatible with silicone sealants.

2.5 FABRICATION

A. General:

1. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
2. Fabricate components to drain water passing joints and to drain condensation and moisture occurring or migrating within skylight system to the exterior.
3. Fabricate components to ensure that glazing is thermally and physically isolated from framing members.
4. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
5. Fit and secure joints with screw and spline, internal reinforcement, or welding.
6. Reinforce members to retain fastener threads.
7. Where fasteners are exposed to view from interior, countersink bolt or screw heads and finish to match framing.
8. Weld components before finishing and in concealed locations to greatest extent practicable to minimize distortion.

B. Maintain the visual design concepts shown, including member sizes, profiles and alignment of components.

C. Fabricate and assemble this work with proper and acceptable provision for noiseless thermal movements, fabrication and erection tolerances, adjoining building component tolerances and dynamic movements.

- D. Removable members such as glass stops, fillers or closures shall be extruded, and securely engaged into adjacent components. Fabricate extrusions to eliminate edge projection, bowing, or misalignment at joints.
- E. Design and construct moving joints so that they will be, and remain, permanently watertight, and will accommodate weather and building dynamics.
- F. For surfaces exposed to view employ only materials free from alloy defects, die marks, scratches, streaks and other surface blemishes.
- G. Complete the fabrication and assembly of the components in the shop to the greatest extent possible to minimize field cutting, splicing, fastening, sealing and finishing.
 - 1. Maintain provisions for anticipated movement.
 - 2. Disassemble only as necessary for shipment and erection.
 - 3. Provide secure attachment and support at joints, with hairline, flush fit between contacting members.
- H. Complete the cutting, fitting, forming, drilling and grinding of metal before cleaning and applying specified finish. Remove arrises from cut edges and ease edges and corners to a radius of approximately 1/64-inch minimum, 1/32-inch maximum.
- I. Welding:
 - 1. Comply with industry standards for assembly and fabrication using system and rods for exposed metals that will provide texture match with materials being joined.
 - 2. Grind exposed welds smooth and flush with parent metal using clean grinding wheels of a type that will not result in stains or discoloration.
- J. Finishing: Finish surfaces as follows to be within the color range represented by approved samples.
 - 1. Finish aluminum surfaces exposed to view as specified in Section 08 43 13
 - 2. Prime concealed aluminum surfaces in contact with masonry, concrete or steel with a compatible primer or bituminous paint.
 - 3. Paint steel parts of anchors, anchor inserts, reinforcement and supports with primer specified. After field welding, remove weld slag and touchup primed surface with same primer.
 - 4. Provide minimum DFT of 2 mils for primer and 30 mils for bituminous paint.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that opening is within allowable tolerances, level, clean, will provide a solid anchoring surface.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. General:
 - 1. Do not install defective components including warped, bowed, dented, abraded and broken members. Remove and replace members that have been damaged during installation or thereafter before the time of final acceptance.
 - 2. Do not cut, trim, or weld components during erection, in any manner that would damage the finish, decrease the strength, or result in a visual imperfection or a failure in performance of the work.

3. Return components that require alteration to the shop for refabrication, if possible, or for replacement by new parts.
 4. Install components level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
 5. Protect unpainted aluminum surfaces that will be in contact with cementitious and dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- B. Assembly and anchorage:
1. Anchor components securely in place by bolting, welding or other permanent mechanical attachment system, which will comply with performance requirements and permit movements intended or necessary.
 2. Install slip-joint linings where required to ensure movement as intended or necessary.
 3. Remove weld slag and apply primer over welds as specified above.
- C. Erection tolerances:
1. Provide adjustment within the assembly to accommodate job variations.
 2. Install the work of this Section within the following tolerances.
 3. Variation from plane: Limit variation from plane or location shown to 1/8-inch in 10 feet; 1/4-inch over total length.
 - a. Alignment: Where surfaces abut in line and at corners and where surfaces are separated by less than 3-inches, limit offset from true alignment to less than 1/32-inch; otherwise, limit offset from true alignment to 1/8-inch.
 - b. Maximum offset between glass framing members at corners of glazing pocket must not exceed 1/32-inch.
- D. Glazing: Glaze skylight as specified in Section 08 80 00.
- 3.3 SEALANTS
- A. Structural silicone sealant glazing:
1. Prepare surfaces that will contact sealant and install sealant according to sealant manufacturer's written instructions.
 2. Preparation includes, but is not limited to, cleaning and priming.
 3. Mechanically fasten glazing in place until sealant cures.
 4. Clean excess sealant from surfaces before sealant cures.
- B. Seal joints between skylight and adjacent construction to be weathertight.
- C. Comply with the requirements of Section 07 92 00.
- 3.4 FIELD QUALITY CONTROL
- A. Tests:
1. Perform field water test in compliance with ASTM E 1105, on the completed skylight. Should such testing result in leakage, eliminate the causes of such leakage at no additional cost to the City.
 2. Remedial measures must maintain standards of quality and durability and are subject to the Design Consultant's approval.

3. Provide powered scaffold, hose and sufficient personnel to operate scaffold and hose.
 4. Perform one test on each skylight assembly after completion, with repeat tests if failures occur.
- B. Touchup: Touchup damaged finish as specified in Section 08 43 13, when the results are satisfactory to the Design Consultant, otherwise return the damaged component to the shop for refinishing.

END OF SECTION

SECTION 08 62 15 - TUBULAR SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes tubular skylights consisting of skylight dome, reflective tube, and diffuser assembly in existing and new construction.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 07 for conventional skylights and for membrane roofing for flashing skylight base.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. The work of this Section requires deferred approval and delegated design, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.4 SUBMITTALS

- A. Data: Manufacturer product data sheets on each product to be used, including.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings: Show attachment to supports and a section thru the unit detailing flashing to roof.
- C. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.5 HANDLING

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

1.6 WARRANTY

- A. Skylight manufacturer's standard 10-year warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Solatube International, Inc. (basis of design.)
- B. Velux Skylights.
- C. Or equal.

2.2 MODELS

- A. General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16. If components made and assembled by one manufacturer.
- B. "Brighten Up" series, Model 290 DS, 14 inch with Natural Effect lens.
 - 1. Outer dome glazing: Type DA, 0.125 inch minimum thick injection-molded acrylic classified as CC2 material, UV-inhibiting, impact-modified acrylic blend.
 - 2. Raybender 3000: Variable prism optic molded into outer dome.
 - 3. Light track reflector: 0.015 inch aluminum sheet, with "Spectralight Infinity" finish.
 - 4. Flashing base: One piece, 0.028 inch seamless corrosion-resistant sheet steel, meeting ASTM A 653 or ASTM A 463, providing support for dome and top of tube.
 - 5. Flashing insulator: Type 1 thermal insulation.
 - 6. Dome edge protection band: Type PB for fire-rated roofs, 0.028 inch aluminized steel.
 - 7. Tube ring: 0.090 inch injection-molded high-impact acrylic.
 - 8. Reflective extension tube: TBD.
 - 9. Ceiling ring: 0.110 injection-molded impact-resistant acrylic.
 - 10. Dual-glazed diffuser assembly: TBD.
- C. "SolaMaster" series, Model 330 DS-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. Glazing: Type DA, 0.143 inch minimum thick injection-molded acrylic classified as CC2 material, UV-inhibiting, impact-modified acrylic blend.
 - 3. Light track reflector: 0.015 inch aluminum sheet, with "Spectralight Infinity" finish.
 - 4. Diffuser assembly: Classic Vslon.
 - 5. Flashing base: One piece, 0.028 inch seamless corrosion-resistant sheet steel, meeting ASTM A 653 or ASTM A 463, providing support for dome and top of tube.
 - 6. Flashing insulator: Type 1 thermal insulation.
 - 7. Dome edge protection band: Type PB for fire-rated roofs, with furred height less than 8 inches, 0.039-inch galvanized steel.
 - 8. Tube ring: 0.090 inch injection-molded high-impact acrylic.

9. Reflective extension tube:
 - a. Interior finish: Spectralight infinity high reflectance specular finish on exposed reflective surface.
 - 1) For visible spectrum greater than 99 percent.
 - 2) Total solar spectrum reflectance: less than 80.2 percent.
 - 3) Color: A and B as defined by CIEL shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.
 10. Ceiling ring: 0.110 injection-molded impact-resistant acrylic.
 11. Dual-glazed diffuser assembly: Ceiling-mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube 23.8 inches by 23.8 inches square frame to fit standard suspended ceiling grids or hard ceilings.
- D. Lens types: TBD.

2.3 PERFORMANCE

- A. Completed assemblies shall be capable of meeting the following performance requirements:
1. Air infiltration test: None at 6.24 psf pressure differential when tested in accordance with ASTM E283.
 2. Water resistance test: No leakage at 6.00 psf pressure differential with water rate of 5 gallons/hours/square foot when tested in accordance with ASTM E331.
 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 one percent of its span at either a maximum Positive or Negative Load of 35 psf for the 21-inch unit. 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.
 4. Fire resistance:
 - a. Class 'B' Burning Brand – The burning brand shall self-extinguish without transferring the fire to the dome Per CBC Class 'B' Burning Brand Test. See ASTM E 108 and UL 790.
 - b. Self-ignition temperature: Greater than 650 degrees F Per CBC. See ASTM D-1929.
 - c. Smoke density: Rating no greater than 75 Per: U.B.C. Standard 26-5. (See ASTM D-2843-70) or no greater than 450 Per UBC 8-1 (See ASTM Standard E 84) in way intended for use.
 - d. Rate of burn - minimum burning rate: 2.5 inches/minute Classification CC-2: CBC and ASTM D 635.

2.4 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: As specified in Section 07 92 00 and compatible with roofing membrane.
- C. Security bars: 0.375-inch diameter stainless steel bar across opening.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, and will provide a solid anchoring surface.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Install skylights plumb, in accordance with the approved shop drawings and the skylight manufacturer's instructions. Attach securely to supports.
- B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Design Consultant. Correct if needed before proceeding with installation of subsequent units. Installations must be watertight.

3.3 PROTECTION

- A. Protect installed skylights until completion of Project.
- B. Touchup, repair or replace damaged components before Substantial Completion.

END OF SECTION

SECTION 08 7100 - DOOR HARDWARE

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Door hardware.
- B. Thresholds, weather seals and smoke seals.
- C. Electrified door hardware.
- D. Scope of Work in this Section: Provide door hardware necessary to complete work. Hardware items not specifically specified or identified are to be provided of type and quality suitable to the service required and comparable to other hardware, and at no additional cost to Owner.

1.2 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Provide templates to:
 - 1. Section 081113 for door and frame preparation.
 - 2. Section 081400 for door preparation.
 - 3. Section 084413 for door and frame preparation.

1.3 RELATED WORK

- A. Division 3-Concrete – Core Drilling for Stop Anchors
- B. Section 081113-Hollow Metal Doors and Frames.
- C. Section 081400-Wood Doors.
- D. Section 084113-Aluminum Entrances and Storefronts.
- E. Section 087113-Automatic Swing Door Operators
- F. Section 099000-Painting
- G. Division 26-Electrical
- H. Division 28-Security

1.4 REFERENCES

- A. Steel Door Institute (SDI) standards as specified.
- B. Architectural Woodwork Institute (AWI) as specified.
- C. California Building Code (CBC).
- D. California Referenced Standards Code (CRSC).
- E. Americans with Disabilities Act (ADA) of 1990 criteria as specified.
- F. Underwriters Laboratories Inc. standards as specified.

- G. National Fire Protection (NFPA) standards as specified.

1.5 QUALITY ASSURANCE

- A. Hardware Supplier: Provide hardware from company specializing in supplying institutional door hardware with five years experience and approved by specified hardware manufacturers as a factory direct supplier.
- B. Hardware Supplier Personnel: Employ an Architectural Hardware Consultant (AHC) or equivalent to prepare submittal required by this section.

1.6 REGULATORY REQUIREMENTS

- A. Conform to CBC "Means of Egress" requirements.
- B. Conform to UL10C requirements applicable to positive pressure fire rated doors and frames. Provide all necessary hardware for complete fire labeled opening including ball-bearing hinges, latching hardware, non-flaming fluid closers, smoke seals and intumescent hot seals.
- C. Conform to CRSC Standard 12-7-4 requirements applicable to fire rated doors and frames.
- D. Conform to applicable requirements of the Americans with Disabilities Act of 1990 regarding accessibility requirements for door and entrance hardware.
- E. Conform to applicable requirements of California Building Code regarding exiting and accessibility requirements for door and entrance hardware.
- F. All hardware shall meet the requirements of CBC Sections 1133B.2.4, 1133B.2.5, 1133B.2.5.1, and 1133B.2.5.2.

1.7 SUBMITTALS

- A. Submit schedule and product data under provisions of Section 01 30 00.
- B. Provide five (5) copies of vertical format hardware schedule showing each application including door index, headings, hardware sets, door number and location, door and frame size and material, door and hardware handing, degrees of opening, quantity required, part numbers and finish of each item. Also provide date of jobsite visit to inspect existing conditions.
 - 1. Projects with multiple buildings and/or multiple floor levels must be submitted so each building and/or floor level is not mixed with another starting with Building A, 1st floor etc.
 - 2. Architect's review of such schedule does not relieve the Contractor of providing hardware required for the work, whether or not such hardware was inadvertently omitted from this Section.
- C. Accompanying the schedules, provide two (2) manufacturer's brochures of each item scheduled, indicating function, finish, dimensions, and related features. No hardware schedule will be accepted for review without submission of such brochure package.
- D. Submit manufacturer's certificate of warranty with submittal; otherwise material will be rejected.
- E. When alternate manufacturers are proposed by contractor, provide two (2) brochures of proposed items two weeks prior of bid date.
- F. Submit only manufacturers specified as approved or alternate.
- G. Provide samples indicating hardware design and finish when required by Architect.

1.8 COORDINATION

- A. Coordinate work of this Section with other directly affected Sections involving manufacturers of any internal reinforcement for door hardware.
- B. In particular, coordinate door preparation in accordance with applicable regulatory and trade standards specified.
- C. Review details and conditions prior to ordering hardware. When a door hand is changed during construction, coordinate and change hardware as necessary at no cost to the Owner.
- D. 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 as the same operation and quality as type specified, subject to Architect's approval.
- E. Where doors are thicker than 1-3/4", provide hardware specially fabricated, as required, to be suitable for thicker door.
- F. Prior to submittal, carefully inspect existing conditions to verify finish hardware required to complete Work, including sizes, quantities, existing hardware scheduled for re-use, and sill condition material. If conflict between the specified/scheduled hardware and existing conditions, submit request for direction from Architect. Include date of jobsite visit in the submittal.
 - 1. Submittals prepared without thorough jobsite visit by qualified hardware expert will be rejected as non-compliant.
 - 2. Contractor attests that the submitted schedule is applicable to project conditions, and that the material meets specified performance level and design intent.
- G. Pre-installation training: Provide on-site training by hardware factory personnel on the proper installation of the locks, panic hardware, and door closers prior to any such hardware's installation.
- H. Coordinate work with security system (City of Santa Monica Information Systems Department).

1.9 OPERATIONS AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Division 1.
- B. Include data on operating hardware. Lubrication requirements and inspection procedures related to preventive maintenance.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Division 1.
- B. Store and protect products under provisions of Division 1.
- C. Package hardware items individually; label and identify packages with door opening code to match hardware schedule.

1.11 MAINTENANCE MATERIALS

- A. Provide special wrenches and tools applicable to each different or special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

1.12 WARRANTY

- A. Provide two year guarantee against defects on hardware, including electrical components, five years warranty for cylindrical locks, mortise locks and exit devices and ten year warranty for surface, floor concealed closers and continuous hinges.
- B. Submit guarantee on form provided in Documents.
- C. Submit manufacturer's certificate of warranty with submittal, otherwise material will be rejected.

PART 2 -PRODUCTS

2.1 DOOR HARDWARE CRITERIA

A. Manufacturers

<u>Item</u>	<u>Specified Manufacturer</u>	<u>Approved Alternates</u>
Hinges:	(MCK)-McKinney	Stanley, Bommer, Hager
Continuous Hinges:	(MAR)-Markar	McKinney, Pemko, Select, ABH
Track Hardware:	(KNC)-K.N. Crowder	Hafele
Floor Closers and Pivots:	(RIX)-Rixson	None
Push/Pull Plates:	(TRM)-Trimco	Rockwood
Pulls:	(ROC)-Rockwood	Tice Industries
Metal Door Flush Bolts:	(DCI)-Door Controls	Ives
Wood Door Flush Bolts:	(DCI)-Door Controls	None
Surface Bolts:	(TRM)-Trimco	Rockwood, Ives
Locks and Latchsets:	(SCH)-Schlage	CITY STANDARD
Holdback Deadlatches:	(ACC)-Accurate Lock	None
N.S. Deadlocks:	(ARC)-Adams Rite	None
Vertical Rod Locks:	(SAR)-Sargent	None
Cylinders:	(SCH)-Schlage Primus XP	CITY STANDARD
Exit Devices:	(VON)-Von Duprin	CITY STANDARD
Coordinators:	(DCI)-Door Controls	Ives
Surface Closers:	(LCN)-LCN	CITY STANDARD
Magnetic Holders:	(RIX)-Rixson	Norton, LCN
Wall Stops:	(TRM)-Trimco	Rockwood, Ives
Floor Stops:	(TRM)-Trimco	Rockwood
Overhead Stops:	(RIX)-Rixson	Glynn Johnson, ABH
Kick & Mop Plates:	(TRM)-Trimco	Rockwood, Ives, Tice
Lock Trim Protectors:	(ROC)-Rockwood	Tice
Edge Guard/Astragals:	(MAR)-Markar	Pemko, McKinney, Select
Mortise Edge Guards:	(ROC)-Rockwood	Tice, Trimco
Seals & Sweeps:	(PEM)-Pemko	Zero, National Guard
Seals & Sweeps:	(ZER)-Zero	None
Adhesive Seals x 3M Tape:	(ZER)-Zero	None
Auto Door Bottoms:	(ZER)-Zero	None
Sound Seals:	(ZER)-Zero	Nonel
Z-Brackets:	(TIC)-Tice Industries	Or Equal
Thresholds:	(PEM)-Pemko	Zero, National Guard
Thresholds:	(ZER)-Zero	National Guard, Pemko
Coat Hooks:	(BOB)-Bobrick	Or Equal
Silencers:	(TRM)-Trimco	Ives, Rockwood

Alarm Contacts: (GES)-G.E. Security None

2.2 HINGES

- A. Unless noted otherwise, provide steel hinges, with finish as shown in schedule. Provide non-ferrous hinges at exterior doors and where specified.
- B. Provide hinges in accordance with following schedule:
 - 1. Doors up to 4 feet high: 2 hinges.
 - 2. Doors 4 feet to 7 feet 5 inches high: 3 hinges minimum.
 - 3. Doors greater than 7 feet 5 inches high: 4 hinges.
 - 4. Doors up to 3 feet wide, standard weight: 4-1/2" x 4-1/2" hinges.
 - 5. Doors over 3'0" wide to under 4'0" wide, standard weight: 5" x 4-1/2".
 - 6. Doors 4'0" wide, heavy weight: 5" x 4-1/2".
 - 7. Provide heavy-weight hinges where specified.
 - 8. At doors weighing 150 lbs. or more, furnish 5" high hinges.
 - 9. At doors in aluminum frames: standard weight 4-1/2" x 4-1/2" hinges, or continuous hinges as scheduled.
- C. Unless otherwise noted or required, provide full mortise hinges with non-rising loose pins.
- D. Provide set screw (NRP) type at key lockable outswing doors to prevent pin removal when door is in closed position. Provide security stud at key lockable exterior outswing doors.
- E. Where necessary to maintain door clearance at jamb trim, frame conditions, door reveals and similar conditions, provide wide throw hinges as approved by the Architect.
- F. Continuous Hinges
 - 1. To be barrel-type of 14 gauge 304 stainless steel, 14 gauge 1012 cold-rolled steel or 6063-T5 aluminum material with 0.25" diameter stainless steel Teflon-coated pin. Gear types are prohibited.
 - 2. Hinge guard models to be furnished with Adjusta-screw fasteners.
 - 3. Provide stainless steel hinges with self-lubricating fiber-reinforced polymer bearings ("MB" option) for noise-free operation and resistance to dust and dirt accumulation.
 - 4. Provide stainless steel hinges with welded ends at outswing doors; provide aluminum hinges with hospital tips at outswing doors.
 - 5. Where necessary to maintain door clearance at jamb trim, frame conditions, door reveals and similar conditions, provide wide throw hinges as approved by the Architect. Provide wide throw hinges as required for doors swinging 180° into a room to avoid conflict between the door closer cover and the wall or frame.
 - 6. Provide with factory cut-outs for mortise hardware that must penetrate the hinge (e.g. concealed auto door bottoms, concealed power transfer, etc.) where they occur.
- G. Provide mortar guard frame box by hinge manufacturer for electric hinges where not provided by frame manufacturer.

2.3 KEYING

- A. Provide Medeco M³ 32-Series large format interchangeable core cylinders with temporary construction cores.
- B. Key cylinders to be furnished with temporary brass construction cores. Provide 30 construction masterkeys and 2 construction control keys.
- C. All permanent cores and keys will be provided by the Owner.

- D. Upon completion of the project, the Contractor shall remove the construction cores and return the construction cores for credit. The Owner shall be responsible for the installation of the permanent cores.
- E. Provide cylinder collars and spacers to match key cylinder finish for each locking device. Provide collar and spacers to ensure a tight, secure fit of the key cylinder to the locking device with no gaps or spaces.

2.4 LOCKSETS, LATCHSET AND STRIKES

- A. Unless noted otherwise in schedule, locksets, latchsets, cylinders and component parts shall be the products of single manufacturer.
- B. Provide strikes at locks with curved lip strike of sufficient length to protect trim and jamb. Each strike will include wrought strike box (similar to Tice Industries No. 1502). At outswing doors with overlapping astragals installed on the pull side, provide a flat strike with 7/8" lip-to-center dimension.
- C. Mortise Locks:
 - 1. Lock Body shall include quick reversibility mechanism without removing lock body cover.
 - 2. Provide cast or forged levers only. Roses, where specified, shall be wrought. Escutcheons, where specified, shall be cast or forged.
- D. Unless noted otherwise, provide 2-3/4 inch backset.
- E. Lock Throw: Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.
- F. Auto Flush Bolts: Minimum 1/2" throw latch bolts, fully automatic extending into top strike and dust proof strike at sill. Provide longer rods as necessary for doors exceeding 7'0" in height. Where auto flush bolts are specified as top bolts only with bottom fire bolt at wood pairs rated above 20-minutes, provide bottom auto flush bolt and dust proof strike (DCI 82 or approved equal) in lieu of specified bottom fire bolt. Provide type of auto flush bolt required by door material (metal or wood), regardless of type specified.

2.5 PANIC EXIT DEVICES

- A. Where specified, provide panic exit device with required UL labels. Where panic device is required on fire rated doors, provide UL label with supplementary marking on door and hardware indicating compliant fire exit hardware.
- B. Provide modern push-pad type, reversible exit devices. Provide exit device manufacturer's shims as required to clear glass lite frames.
- C. Push-pad shall be mounted at a height of not less than 30 inches (762mm) nor more than 44 inches (1118mm) above floor. The unlatching force shall not exceed 15 pounds (66.72N) when applied in the direction of travel per CBC 1133B.2.5.
- D. Exit Devices shall comply with CRSC Standard 12-10-3 and CBC 1008.1.9.
- E. Provide exit devices levers of design to match lock levers.

2.6 DOOR CLOSERS

- A. Surface mounted closers to be full rack and pinion type with cast shell.
 - 1. Provide drop brackets, mortise shoes, and long arms as required.

2. Provide non-handed door closers with multi-sized springs, with separate adjustable valves for latch, sweep speed, and backcheck.
3. Template and adjust closers per manufacturer's recommendations and to meet accessibility requirements. When used in conjunction with an overhead stop, provide special templates and brackets as required.
4. Where regular arm closers are specified at doors that must swing past 120°, revise closer to LCN 4040T-Series (top jamb) x 4040TJ-18 plate and provide minimum 4-1/2" wide hinges.
5. Where used in conjunction with an overhead stop, provide special template, special arms, back plates, and other items as needed to allow the closer to be installed without conflicting with the overhead stop.
6. Provide 5th and 6th hole spacers for parallel arm mount arms, sized appropriately for gap to frame.

2.7 MAGNETIC HOLDERS

- A. Provide magnetic holders with tri-volts coils only.
- B. Provide assemblies consisting of an armature contact plate with adjustable mounting pivot.
- C. Use extensions as necessary to align door at parallel with wall.

2.8 PROTECTIVE PLATES AND EDGE GUARDS

- A. Provide plates as scheduled, with all edges heavy beveled (not pencil beveled). Provide plates in scheduled thickness. Where armor plates are specified at rated doors, provide with stamped or engraved U.L. listing (not a U.L. sticker).
- B. Provide mop plates as scheduled.
- C. Edge guards:
 1. Provide with cut-outs for mortised door hardware.
 2. Provide with bevel to match door bevel.
 3. Mortise versions: provide inside dimension for exact door thickness.
 4. Surface versions: provide outside dimension for exact door thickness.
 5. Provide with countersunk fasteners in edge of door only; at surface versions, provide fasteners and threaded studs that allow the edge guard plumbness to be adjusted on the door.
 6. Edge guards installed at leading edge of door unless specified otherwise.

2.9 PUSH/PULL PLATES

- A. Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation; through-bolted for matched pairs, but not for single units.

2.10 STOPS

- A. Provide a floor or wall stop at every door.
- B. Provide carpet risers for floor stops where required.
- C. Where specified floor or wall stop would present a pedestrian hazard or cannot be used, furnish Rixson model overhead concealed stop.
- D. Template overhead stops for maximum available swing.

2.11 SILENCERS

- A. Provide silencers at hollow metal or wood door frames that are without seals in quantities as follows:
 - 1. Single Doors: 3 silencers
 - 2. Pairs: 4 silencers

2.12 SEALS

- A. Provide seals complete with retainers, fasteners and trim.
- B. Provide UL listed seals at rated openings.
- C. Provide UL listed intumescent hot seal at fire rated wood doors when doors are not being furnish with intumescent hot seal.
- D. Unless noted otherwise, furnish fastener-applied silicone or neoprene seals at door jamb and head conditions. Use of vinyl seal prohibited.
- E. Where flat bar head seals are specified to accommodate hardware mounted to the underside of the frame stop, furnish factory-cut as required for frame stops narrower than the standard seal width.
- F. Where specified, furnish solid neoprene seals complying with MilSpec R6855, Class II, Grade 40.
- G. Provide automatic door bottoms with an integral magnet to assist in an even dropping of the door bottom seal when the door closes. Provide automatic door bottoms with special door edge mounting plates that allow the automatic door bottoms to be removed for servicing without demounting the door.
- H. Z-brackets: At doors with adjustable stop-mounted seals that prevent other hardware items from being mounted directly to the frame stop (e.g., parallel arm closers, rim panic strikes, coordinators, etc.), provide custom profile Z-brackets to allow mounting of the hardware without cutting or penetrating the frame seals. Provide Z-brackets of minimum 9 gauge thickness steel, prime-coated for painting. Provide Z-brackets of width to allow hardware item to be securely fastened to the bracket, width no more than the hardware item surface. Where coordinators must be installed on Z-brackets, provide Z-bracket of full width across frame head. Provide Z-brackets with countersunk fasteners to attach to the frame stop or rabbet (varies depending upon frame profile).
- I. At doors in aluminum frames, omit seals. Seals will be provided by aluminum frame section.
- J. Provide adhesive seals with genuine 3M adhesive tape for best adhesion.
- K. Overlapping astragals: Install on secure (outside) side of door. Provide with fastener hole pattern to avoid conflict with mortised hardware in the door.

2.13 THRESHOLDS

- A. General: Except as otherwise indicated furnish standard metal threshold unit of type, size and profile as shown or scheduled. Where required by fire code, furnish appropriate model thresholds at openings where combustible floor material extends through the door opening. Provide threshold as indicated in details. Provide with ¼-20 stainless steel fasteners with combo anchors, finished to match the threshold.
- B. Thresholds must comply with the requirements of ADA and ANSI-117.1 and CBC section 1133B.2.4.1.

- C. Where saddle thresholds are specified listing only threshold height, provide full saddle threshold assemblies (welded and drilled) of specified height, with depth from interior frame face to 3/8-inch past exterior frame face.

2.14 FINISHES

- A. Finishes are identified in Schedule at end of this Section.
- B. Where finish not shown, match finish of lockset.
- C. Provide fasteners matching in finish, base material and color.
- D. Provide anti-microbial lifetime coating where specified on lever handles, panic bars, door pulls and push/pull plates.

2.15 FASTENERS

- A. Fasteners: Provide hardware manufacture to conform to publish templates, generally prepared for machine screws installation.
- B. Install hardware with manufacturer supplied screws for each item.
- C. Provide screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.
- D. Provide concealed fasteners for hardware units which are exposed when door is closed, except to extent no standard units of type specified are available with concealed fasteners.
- E. Provide Zero #226 ¼-20 stainless steel machine screws and anchors for all thresholds.
- F. Provide countersunk screws for all kick, mop, and armor plates.

2.16 COAT HOOKS

- A. Omit coat hooks where specified at doors with half or full glass lites.
- B. Where coat hooks are specified at wheelchair accessible rooms, provide two coat hooks per door, installed at normal height and at wheelchair accessible height.

2.17 ELECTRICAL DRAWINGS

- A. Provide custom point-to-point wiring diagram for each electric hardware application.
- B. Provide custom electric hardware elevation riser diagram for each hardware application.

2.18 Z-BRACKETS

- A. Provide custom Z-brackets by Tice Industries (or approved equal) wherever stop-applied hardware cannot otherwise be mounted because of stop-applied frame seals and/or coordinators.
- B. Provide Z-brackets of custom dimensions to fit frame profile, frame seals, and hardware mounted to brackets, with minimal projection into door opening.
- C. Provide Z-brackets of dimensions to be able to securely mount to frame rabbet. Provide of aluminum material of sufficient thickness to withstand door and hardware action.

- D. Where intended for coordinator installation, provide full width and provide additional brackets as needed for surface closer installation over coordinator.

2.19 HARDWARE FOR DOORS THICKER THAN 1-3/4"

- A. At doors thicker than 1-3/4", provide all hardware with modifications and accessories necessary to meet the specified hardware intent, but suitable for the actual door thickness.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings, instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. A QUALIFIED MECHANIC skilled in the application of institutional grade builder's hardware shall install hardware.
- B. Install hardware in accordance with manufacturer's instructions and requirements of SDI, ANSI/NFPA 80, AWI, and BHMA. Select applicable standard based on door function, type and regulatory criteria.
- C. Install hardware in accordance with NFPA 80 in fire labeled doors.
- D. Where door is designated as receiving new hardware, package and label hardware by type and function, and deliver to Owner.
- E. Predrill pilot holes in wood for screws. Drill and tap for surface mounted hardware on metal. Set hinge leaf snug and flat in mortises, turn screws to flat seat [do not drive].
- F. Mount surface closers on side of door away from corridor, inside rooms or in stairs. Install regular or parallel rigid arm closers as required.
- G. Provide ADEQUATE BACKING in stud partitions for the attachment of all respective finish hardware.
- H. Floor mounted door stops are to be installed at maximum of four inches from the face of the wall or partition.
- I. Install thresholds in full bed of sealant at front and side edges.

3.3 INSTALL HARDWARE USING TEMPLATES PROVIDED BY HARDWARE ITEM MANUFACTURER

- A. Prior to finishing door, fit hardware to door, utilizing fasteners and templates as specified.
- B. Remove hardware, carefully label and store. Where door exists and is designated to receive new finish, remove existing hardware.
- C. Re-install after door finish is complete

3.4 UNLESS NOTED OTHERWISE OR SHOWN ON DRAWINGS, MOUNT HARDWARE IN

ACCORDANCE WITH THE FOLLOWING CRITERIA:

- A. Latchset and Lockset handle: 38 inches above finish floor. Verify manufacturer's template with door design.
- B. Glass locks: 40 inches above finish floor to center line. Verify manufacturer's template with door design. Coordinate with pulls to ensure easy access to key cylinder.
- C. Auxiliary Locks: 40 inches to center line.
- D. Panic Devices: 40 inches above floor; at storefront doors, aligned with center muntin on adjacent window wall. Verify manufacturer's template with door design.
- E. Push and Pull Plates: 44 inches to center line.
- F. Door Pulls: 44 inches above finish floor to center line. Coordinate with locks to ensure easy access to key cylinder.

3.5 ADJUST CLOSER OPERATING EFFORT CONFORM TO CALIFORNIA BUILDING CODE SECTION 1133B.2.5

- A. Exterior and Interior Doors: 5.0 pounds force. The operating force may be increased by the authority having jurisdiction, but not to exceed 15.0 pounds, in accordance with CBC.

3.6 ADJUST CLOSER DELAY AND OPERATING SPEEDS TO COMPLY WITH REQUIREMENTS OF CALIFORNIA BUILDING CODE AND THE AMERICANS WITH DISABILITIES ACT ARCHITECTURAL GUIDELINES, ARTICLE 4.13.10

- A. The sweep period of the door closers shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- B. Closer Certification: Provide written certification, signed by door closer representative, stating closers were inspected and installed in accordance with specified opening force and delay requirements.

3.7 CLEAN AND ADJUST

- A. At completion, all hardware shall be left clean and free from disfigurement. Contractor shall make a final adjustment to all door closers and other items of hardware. Where hardware is found defective, repair, replace, or otherwise correct as directed.
- B. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Adjust hardware so that moving parts operate freely, without bind, or excessive play. Hardware shall be free of paint, corrosion, or damage of any kind.

3.8 POST-INSTALLATION INSPECTION

- A. Provide written certification, signed by the hardware manufacturer representative, stating the locks, panics, and door closers were inspected and installed in accordance with specified operational requirements.

3.9 DOOR HARDWARE SCHEDULE

HW-1

M.O. Toilet

Each Door to Have: (WD/GLD x WDF)

NR

4	Hinges	TA386	630	MCK
1	Push/Pull Plate Set	1895-4FHT B4E-HVY CTSK x TRIMGUARD x 4-INCH WIDE PLATES	630	TRM
1	Holdback Deadlatch	H7804 x 7800ADA-CA x LASER-ENGRAVE HOLDBACK INSTRUCTIONS x OMIT DEADLATCH x STRIKE BOX	619	ACC
1	Cylinder	MORTISE I/C-X	619	SCH
1	Permanent Core	20-740XP	626	SCH
1	Closer	4041XP-DEL SRI SNB	*689	LCN
1	Kick Plate	KO050 9" x 2" LDW B4E-HVY CTSK	630	TRM
1	Mop Plate	KM050 4" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	1215CKU	626	TRM
1	Threshold	PER DETAILS OR STONE AS REQ'D	AL	PEM
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

* FACTORY-FINISH SNB NUTS TO MATCH DOOR FINISH.

FORWARD HOLDBACK DEADLATCH TO TRIMCO FOR MATING TO PUSH/PULL PLATE SET.

HW-2

S.O. Toilet

Each Door to Have: (WD/GLD x WDF)

NR

4	Hinges	TA314	630	MCK
1	Keyed Occupancy Privacy	L9496T 03A L583-363	630AM	SCH
1	Permanent Core	20-740XP	626	SCH
1	Closer	4041XP-DEL SRI SNB	*689	LCN
1	Kick Plate	KO050 9" x 2" LDW B4E-HVY CTSK	630	TRM
1	Mop Plate	KM050 4" x 1" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	1215CKU	626	TRM
1	Threshold	PER DETAILS OR STONE AS REQ'D	AL	PEM
1	Automatic Door Bottom	369A-Z49	TBD	ZER
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

* FACTORY-FINISH SNB NUTS TO MATCH DOOR FINISH.

HW-2A

S.O. Toilet

Each Door to Have: (WD/GLD x WDF)

NR

4	Hinges	TA386	630	MCK
1	Keyed Occupancy Privacy	L9496T 03A L583-363	630AM	SCH
1	Permanent Core	20-740XP	626	SCH
1	Closer	4041XP-DEL-EDA SNB x SRI	*689	LCN
1	Kick Plate	KO050 9" x 2" LDW B4E-HVY CTSK	630	TRM
1	Overhead Stop	2-SERIES	630	RIX
1	Threshold	PER DETAILS OR STONE AS REQ'D	AL	PEM
1	Automatic Door Bottom	369A-Z49	TBD	ZER
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

* FACTORY-FINISH SNB NUTS TO MATCH DOOR FINISH.

HW-3

Branch Manager

Each Door to Have: (WD/GLD x WDF)

NR

4	Hinges	TA714	652	MCK
1	Office Lock	L9056T 03A L583-363	630AM	SCH
1	Permanent Core	20-740XP	626	SCH
1	Kick Plate	KO050 9" x 2" LDW B4E-HVY CTSK	630	TRM
1	Floor Stop	1215CKU	626	TRM
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

* FACTORY-FINISH SNB NUTS TO MATCH DOOR FINISH.

HW-4

Group Study

Each Sliding Door to Have: (WD/GLD x WDF)

NR

1	Track Set	CFT-201-SS COMPLETE KIT	630	KNC
1	Sliding Door Lock	1076-RA-6204-SS-B-2-1/2" x LESS I/S T-TURN	630	FSB
1	Cylinder	MORTISE I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH

INSTALL DOOR OPEN TRACK STOP SO THAT DOOR PROTRUDES TO OPERATE TRIM.

HW-4A

Staff Lounge

Each [CR, REX, DPS] Door to Have: (WD/GLD x WDF)

NR

3	Hinges	TA786	652	MCK
1	Transfer Hinge	TA786-CC8	652	MCK
03A1	Electric Lockset	L9080TEU-RX 03A	630AM	SCH
1	Permanent Core	20-740XP	626	SCH
1	Closer	4041XP x 4040-18TJ x ST1630	*689	LCN
1	Kick Plate	KO050 9" x 2" LDW B4E-HVY CTSK	630	TRM
1	Overhead Stop	2-SERIES	630	RIX
1	Threshold Assembly	PER DETAILS	AL	PEM
1	Auto Door Bottom	369A-Z49	TBD	ZER
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER
1	Alarm Contact	1076D	TBD	GES

CONDUIT BY DIVISION 26.

CARD READER, LOW VOLTAGE POWER, AND WIRING BY DIVISION 28.

HW-4B

Workroom

Each Door to Have: (WD/GLD x HMF)

NR

1	Continuous Hinge	HG-305-MB-WEP	630	MAR
1	Office Lock	L9056T 03A	630AM	SCH
1	Permanent Core	20-740XP	626	SCH
1	Closer	4041XP x 4040-18TJ x ST1630	*689	LCN
1	Kick Plate	KO064 9" x WIDTH SNUG TO EDGE GUARDS B4E-HVY CTSK	630	TRM
1	Edge Guard	EG-308-AS (VERIFY BEVEL) CUT:HDWE	630	MAR
1	Overhead Holder-Stop	2-SERIES	630	RIX
1	Set Seals	488_-S x 3M TAPE x MITRED	TBD	ZER

HW-4C

Pantry

Each Door to Have: (WD x WDF)

NR

4	Hinges	TA314	630	MCK
1	Classroom Lock	L9070T 03A	630AM	SCH
1	Permanent Core	20-740XP	626	SCH
1	Kick Plate	KO064 10" x WIDTH SNUG TO EDGE GUARDS B4E-HVY CTSK	630	TRM
1	Mop Plate	KM050 10" x WIDTH SNUG TO EDGE GUARDS B4E-HVY CTSK	630	TRM
2	Mortise Edge Guards	302B FULL HEIGHT CUT:HDWE	630	ROC
1	Overhead Holder-Stop	2-SERIES	630	RIX
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

FORWARD MORTISE EDGE GUARDS TO WOOD DOOR MANUFACTURER FOR FACTORY INSTALLATION.

HW-4D

Storage

Each Door to Have: (WD x HMF)

NR

1	Continuous Hinge	HG-305-MB-WEP	630	MAR
1	Utility Lock	L9060T 03A	630AM	SCH
2	Permanent Cores	20-740XP	626	SCH
1	Armor Plate	KO064 34" x WIDTH SNUG TO EDGE GUARDS B4E-HVY CTSK	630	TRM
1	Overhead Holder-Stop	2-SERIES	630	RIX
1	Threshold Assembly	PER DETAILS	AL	PEM
1	Set Seals	488_-S x 3M TAPE x MITRED	TBD	ZER

HW-5

Janitor

Each Door to Have: (HMD x HMF)

NR

4	Hinges	TA386	630	MCK
1	Storeroom Lock	L9080T 03A	630	SCH
1	Permanent Core	20-740XP	626	SCH
1	Kick Plate	KO064 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Overhead Holder-Stop	2-SERIES	630	RIX
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

HW-5A

I.T.

Each [CR, REX, DPS] Door to Have: (HMD x HMF)

NR

3	Hinges	TA386	652	MCK
1	Transfer Hinge	TA386-CC8	652	MCK
1	Electric Lock	L9080TEU-RX 03A	630	SCH
1	Permanent Core	20-740XP	626	SCH
1	Kick Plate	KO050 10" x 2" LDW B4E-HVY CTSK	630	TRM
1	Overhead Stop	2-SERIES	630	RIX
1	Threshold	PER DETAILS	AL	PEM
1	Auto Door Bottom	369A-Z49	TBD	ZER
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER
1	Alarm Contact	1076D	TBD	GES

CONDUIT BY DIVISION 26.

CARD READER, LOW VOLTAGE POWER, AND WIRING BY DIVISION 28.

HW-6

Storage

Each Sliding Pocket Door to Have: (WD/GLD)

NR

1	Pocket Door Kit	CROWDERFRAME TYPE C	---	KNC
1	Door Catch/Stop	CDC-411 (DOOR OPEN POSITION)	---	KNC
1	Door Stop	C-100HD (DOOR CLOSED POSITION)	---	KNC
1	Mortised Guide Channel	C-914 (IN DOOR)	---	KNC
1	Floor-Mounted Guide	C-913	---	KNC
1	Sliding Door Lock	1076-RA-6204-SS-B-2-1/2" x L:I/S T-TURN	630	FSB
1	Cylinder	MORTISE I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH

INSTALL DOOR OPEN TRACK STOP/HOLDER SO THAT DOOR PROTRUDES SUFFICIENTLY FROM POCKET TO OPERATE TRIM.

HW-6A

Storage

Each Sliding Barn Door to Have: (WD)

NR

1	Track Set	CFT-201-SS COMPLETE KIT	630	KNC
1	Pull	RM3110-11" x MTG 1HD (OUTSIDE)	630	ROC
1	Flush Pull	1061 (INSIDE)	626	TRM
1	Sliding Door Lock	1877 x 4550 x LEVER MOUNTING HEIGHT 38" ABOVE FINISHED FLOOR	628	ARC
1	Cylinder	MORTISE I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH

INSTALL DOOR OPEN TRACK STOP SO THAT DOOR PROTRUDES SUFFICIENTLY TO OPERATE TRIM.

HW-6B

Book Return

Each Roll-up Door to Have:

NR

2	Cylinders or 1 Padlock	TYPE REQUIRED I/C-X	626	SCH
2	Permanent Core	20-740XP	626	SCH

BALANCE OF HARDWARE BY ROLL-UP DOOR SECTION.

HW-6C

Community Room

Each Sliding Door to Have:

NR

2	Cylinders	TYPE REQUIRED I/C-X	626	SCH
2	Permanent Core	20-740XP	626	SCH

BALANCE OF HARDWARE BY DOOR MANUFACTURER.

HW-6D

Roof

Each Roof Hatch to Have:

NR

1	Padlock	TYPE REQUIRED I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH
BALANCE OF HARDWARE BY DOOR MANUFACTURER.				

HW-7

Janitor

Each Pair to Have: (WD x WDF)

NR

8	Hinges	TA386	630	MCK
2	Manual Flush Bolts	790F (12" & 24" EXTENSIONS)	626	DCI
1	Dust Proof Strike	82	626	DCI
1	Storeroom Lock	L9080T 03A	630	SCH
1	Permanent Core	20-740XP	626	SCH
1	Astragal	355_S	TBD	PEM
2	Kick Plates	KO064 10" x 1" LDW B4E-HVY CTSK	630	TRM
2	Overhead Holder-Stops	2-SERIES	630	RIX
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

HW-7A

A/V Closet

Each Pair to Have: (WD x WDF)

NR

8	Hinges	TA786	652	MCK
2	Manual Flush Bolts	790F (12" & 24" EXTENSIONS)	626	DCI
1	Dust Proof Strike	82	626	DCI
1	Storeroom Lock	L9080T 03A	630	SCH
1	Permanent Core	20-740XP	626	SCH
1	Astragal	355_S	TBD	PEM
2	Overhead Holder-Stops	2-SERIES	630	RIX
1	Set Seals	188_-S x 3M TAPE x MITRED	TBD	ZER

HW-8

Electrical

Each Door to Have: (HMD x HMF)

NR

4	Hinges	TA386	630	MCK
1	Anti-Vandal Pull	1096HASP	630	TRM
1	Storeroom Lock	L9080T 03A LESS OUTSIDE TRIM	630	SCH
1	Permanent Core	20-740XP	626	SCH
1	Overhead Holder-Stop	1ADJ-SERIES	630	RIX
1	Threshold	PER DETAILS	AL	PEM
1	Door Sweep	PER DETAILS	AL	PEM
1	Set Seals	332CS	AL	PEM
1	Drip	PER DETAILS	AL	PEM

HW-8.1

Roof

Each [DPS] Door to Have: (HMD x HMF)

NR

3	Hinges	TA386	630	MCK
1	Storeroom Lock	L9080T 03A	630	SCH
1	Permanent Core	20-740XP	626	SCH
1	Closer (I/S Doors)	4041XP x 4040-18TJ x ST1630	689	LCN
1	Closer (O/S Doors)	4041XP-EDA	689	LCN
1	Overhead Holder-Stop	1ADJ-SERIES	630	RIX
1	Threshold	PER DETAILS	AL	PEM
1	Door Sweep	PER DETAILS	AL	PEM
1	Set Seals (I/S Doors)	332CS	AL	PEM
1	Set Seals (O/S Doors)	2891AS CSK SCREWS	AL	PEM
1	Drip	PER DETAILS	AL	PEM
1	Alarm Contact	1076D	TBD	GES

CONDUIT BY DIVISION 26.

LOW VOLTAGE WIRING BY DIVISION 28.

HW-8A

Emergency Exit

Each [DE, DPS] Door to Have: (HMD x HMF)

NR

3	Hinges	TA386	630	MCK
1	Transfer Hinge	TA386-CC8	630	MCK
1	Delayed Egress Panic	CX98XP-EO	630	VON
1	Cylinder (for Re-set)	MORTISE I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH
1	Closer	4041XP-EDA	689	LCN
1	Floor Stop	1200CK x 1268CK	626	TRM
1	Threshold	2727A x MITRED ENDS	AL	PEM
1	Door Sweep	210AV	AL	PEM
1	Set Seals	2891AS CSK SCREWS	AL	PEM
1	Drip	346C 4" GDW	AL	PEM
1	Door Position Switch	1076D	TBD	GES
1	Power Supply	PS904-FA	---	VON

120VAC POWER, WIRING, AND CONDUIT BY DIVISION 26.

LOW VOLTAGE WIRING AND FIRE ALARM CONNECTION BY DIVISION 28.

3" DIAMETER CORE DRILL BY DIVISION 3 REQUIRED FOR FLOOR STOP ANCHOR; ANCHOR MUST BE SET COMPLETELY FLUSH IN CONCRETE.

INSTALL RIM STRIKE AND CLOSER ON SEALS; DO NOT CUT SEALS; ADJUST PANIC BACKSET ¼" FOR STRIKE MOUNTED ON SEALS.

HW-8B

Community Room

Each [CR, REX, DPS] Door to Have: (AL/GLD x ALF)

NR

1	Floor Closer	SC-PH27-S-LFP (x SP/LO 1101 AS REQ'D)	626	RIX
2	Intermediate Pivots	M19	626	RIX
1	Full-Height Pull	RM3301 x 6HD MOUNTING	630	ROC
1	N.S. Panic Device	55NL-OP x RCB	630	VON
1	Cylinder	RIM I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH
1	Electric Strike	310-4-LBM NFS	630	FAC
1	Threshold Assembly	13 x PER DETAILS	AL	PEM
1	Door Sweep	29324_SB	CUST	PEM
1	Alarm Contact	1076D	TBD	GES

CONDUIT BY DIVISION 26.

CARD READER, LOW VOLTAGE POWER, REQUEST-TO-EXIT SENSOR, AND WIRING BY DIVISION 28.

FACTORY-ANODIZE DOOR SWEEP TO MATCH DOOR FINISH.

FRAME SEALS BY ALUMINUM STOREFRONT SECTION.

COORDINATE PULL BACKSET TO ALLOW EASY ACCESS TO OUTSIDE KEY CYLINDER; PROVIDE MID-POST IF RECOMMENDED BY PULL MANUFACTURER.

HW-8B.1

Staff Entrance

Each [D.E., CRx2, DPS] Door to Have: (AL/GLD x ALF)

NR

1	Floor Closer	SC-PH27-S-LFP (x SP/LO 1101 AS REQ'D)	626	RIX
2	Intermediate Pivots	M19	626	RIX
1	Full-Height Pull	RM3301 x 6HD MOUNTING	630	ROC
1	N.S. Panic Device	55NL-OP x RCB	630	VON
1	Cylinder	RIM I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH
1	Electric Strike	310-4-LBM NFS	630	FAC
1	Delayed Egress Mag Lock	1511S	628	SDC
1	Power Supply	602RF	---	SDC
1	Threshold Assembly	13 x PER DETAILS	AL	PEM
1	Door Sweep	29324_SB	CUST	PEM
1	Alarm Contact	1076D	TBD	GES

120VAC POWER AND CONDUIT BY DIVISION 26.

CARD READERS, LOW VOLTAGE POWER, FIRE ALARM CONNECTION, AND WIRING BY DIVISION 28.

FACTORY-ANODIZE DOOR SWEEP TO MATCH DOOR FINISH.

FRAME SEALS BY ALUMINUM STOREFRONT SECTION.

COORDINATE PULL BACKSET TO ALLOW EASY ACCESS TO OUTSIDE KEY CYLINDER; PROVIDE MID-POST IF RECOMMENDED BY PULL MANUFACTURER.

THEORY OF OPERATION: Door normally closed, locked against entrance, and delayed egress lock armed. Loss of power or activation of fire alarm system immediately unlocked delayed egress lock for immediate free egress. Attempted egress without using inside card reader initiates 15-second delayed egress. Use of outside card reader temporarily unlocks electric strike and magnetic lock for authorized entrance. Use of inside card reader temporarily unlocks magnetic lock for authorized egress. Security system can be set to leave door in unlocked state for free entrance or egress. Alarm contact monitors door position.

HW-8B.2

Community Room

Each [DPS] Door to Have: (AL/GLD x ALF)

NR

1	Floor Closer	SC-PH27-S-LFP (x SP/LO 1101 AS REQ'D)	626	RIX
2	Intermediate Pivots	M19	626	RIX
1	Full-Height Pull	RM3301 x 6HD MOUNTING	630	ROC
1	N.S. Panic Device	55NL-OP x RCB	630	VON
1	Cylinder	RIM I/C-X	626	SCH
1	Permanent Core	20-740XP	626	SCH
1	Threshold Assembly	13 x PER DETAILS	AL	PEM
1	Door Sweep	29324_SB	CUST	PEM
1	Alarm Contact	1076D	TBD	GES

CONDUIT BY DIVISION 26.

WIRING BY DIVISION 28.

FACTORY-ANODIZE DOOR SWEEP TO MATCH DOOR FINISH.

FRAME SEALS BY ALUMINUM STOREFRONT SECTION.

COORDINATE PULL BACKSET TO ALLOW EASY ACCESS TO OUTSIDE KEY CYLINDER; PROVIDE MID-POST IF RECOMMENDED BY PULL MANUFACTURER.

HW-9

Main Entry

Each [ADO, DPS] Pair to Have: (AL/GLD x ALF)

NR

2	Pivot Sets	147	626	RIX
2	Intermediate Pivots	M19	626	RIX
2	Transfer Pivots	EM19 x 8 WIRES	626	RIX
4	Full-Height Pulls	RM3301 x BTB MOUNTING x LEAVE BOTTOM 10" OF DOOR CLEAR	630	ROC
1	3-Point Lock	MS1850S (VERIFY BACKSET) x 4015 x 4085 x MS4043	628	ARC
2	Cylinders	MORTISE I/C-X	626	SCH
2	Permanent Cores	20-740XP	626	SCH
1	Threshold Assembly	13 x PER DETAILS	AL	PEM
2	Door Sweeps	29324_SB	CUST	PEM
2	Alarm Contacts	1076D	TBD	GES

120VAC POWER AND CONDUIT BY DIVISION 26.

AUTOMATIC DOOR OPERATORS AND CONTROLS BY SECTION 087113.

TRANSFER PIVOTS USED FOR CONCEALED WIRING OF RE-ACTIVATION SENSORS.

FACTORY-ANODIZE DOOR SWEEPS TO MATCH DOOR FINISH.

FRAME SEALS AND MEETING STILE ASTRAGALS BY ALUMINUM STOREFRONT SECTION.

COORDINATE PULL BACKSET TO ALLOW EASY ACCESS TO KEY CYLINDERS; PROVIDE MID-POST IF RECOMMENDED BY PULL MANUFACTURER.

END OF SECTION

SECTION 08 71 13 - AUTOMATIC SWING DOOR OPERATORS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. This Section includes the following types of automatic door operators:
 - 1. Exterior a, automatic swing door operators, low energy, with concealed mounting.
 - 2. Automatic door operators shall be configured for doors as follows:
 - a. Simultaneous pairs, out swing, in swing, or double egress.
 - b. Coordinated unequal leaf rated pairs, out swing or in swing.
 - c. Single doors, out swing or in swing.
- B. Related Sections:
 - 1. Division 8 Section "Doors and Frames" for entrances furnished separately in Division 8 Section.
 - 2. Division 8 Section "Aluminum-Framed Entrances and Storefronts" for entrances furnished separately in Division 8 Section.
 - 3. Division 8 Section "Door Hardware" for hardware to the extent not specified in this Section.
 - 4. Division 26 Sections for electrical connections including conduit and wiring for automatic door operators.

1.03 REFERENCES

General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

- A. Underwriters Laboratories (UL):
 - 1. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- B. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):
 - 1. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

- D. American Association of Automatic Door Manufacturers (AAADM):
 - E. National Fire Protection Association (NFPA):
 - 1. NFPA 101 – Life Safety Code.
 - 2. NFPA 70 – National Electric Code.
 - F. International Conference of Building Officials (ICBO):
 - 1. UBC 1997: Uniform Building Code
 - G. California Department of Forestry and Fire Protection, Office of the State Fire Marshall.
 - H. International Standards Organization (ISO):
 - 1. ISO 9001 - Standard for Manufacturing Quality Management Systems
 - I. National Association of Architectural Metal Manufacturers (NAAMM):
 - 1. Metal Finishes Manual for Architectural and Metal Products.
 - J. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 607.1 - Clear Anodic Finishes for Architectural Aluminum.
 - 2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.
- 1.04 DEFINITIONS
- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- 1.05 PERFORMANCE REQUIREMENTS
- A. Provide automatic door operators capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
 - B. Operating Range: Minus 30 deg F (29 deg C) to 130 deg F (54 deg C).
 - C. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) applied at 1" (25 mm) from the latch edge of the door.
 - D. Door Energy: The kinetic energy of a door in motion shall not exceed 1.25 lbs-ft (1.69 Nm).
 - E. Closing Time:
 - 1. Doors shall be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer.
 - 2. Doors shall be field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.

1.06 SUBMITTALS

- A. Submit listed submittals in accordance with Conditions of the Contract and Division 01 submittal procedures.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.
- C. Color Samples for selection of factory-applied color finishes.
- D. Closeout Submittals: Provide the following with project close-out documents.
 - 1. Owner's Manual.
 - 2. Warranties.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained for installation and maintenance of units required for this Project.

Authorized Dealers	
Brand	Dealer
Besam	Besam - Southern California Contact: Erik Huber 529 South State College Blvd. Fullerton, CA 92831 Phone: (714) 446-0358 Fax: (800) 285-8825
Horton Automatics	Capitol Door Service Contact: Doug Cutts 8733 Monroe Court Rancho Cucamonga, CA 91730 (888) 637-3667 FAX: (888) 637-1167
Record / KM Systems	Pasco Doors ATTN: Don Caffrey 949 N. Cataract Avenue, Suite M San Dimas, CA 91773 (949) 394-7311 FAX: (949) 599-1941
Stanley	Stanley Access Technologies Contact: Mike Swinnerton 14178 Albers Way Chino CA 91710 (909) 664-0157 FAX: (909) 364-9860

- B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001 and with company certificate issued by AAADM.
- C. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
 - 1. ANSI A156.19.
 - 2. NFPA 101.
 - 3. UL 325 Listed (Fire Door Operator)

4. ICBO (UBC Standard 10-1).
 5. California State Fire Marshall (CSFM) Listed.
- D. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.
- E. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic door assemblies and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
- F. Power Operated Door Standard: ANSI/BHMA A156.19.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- H. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.
- 1.08 PROJECT CONDITIONS
- A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
- C. Other trades: General Contractor Advise of any inadequate conditions or equipment.
- 1.09 COORDINATION
- A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, and remote activation devices.
- C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation.
1. Provide electrical interface control capability for card reader or keypad operation of automatic door operators on doors with electric locking.
 2. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.
- 1.10 WARRANTY
- A. Automatic door operators shall be free of defects in material and workmanship for a period of two (2) years from the date of substantial completion.

- B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
- C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

PART 2 - PRODUCTS

2.01 AUTOMATIC DOOR OPERATORS

- A. Manufacturers: Overhead Concealed: Besam SwingMaster, Horton 4100LE-Series, Record 8700-Series, Stanley MagicForce, (only KM 2200-Series at door weighing 350 lbs. or more.).

2.02 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Headers: 6063-T6.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Sheet and Plate: ASTM B 209.
- B. Sealants and Joint Fillers: Refer to Division 7 Section "Interior Joint Sealants".

2.03 COMPONENTS

- A. Header Case at Operators Concealed at Aluminum Storefront: Header case shall not exceed 6" (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.
- B. Door Arms: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors. Provide concealed arm assembly where door cut-out is not exposed from interior or exterior side when door is closed.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
- D. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

2.04 SWINGING DOOR OPERATORS

- A. Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- B. At doors weighing more than 350 lbs., provide only the KM Systems 2200-Series electro-hydraulic power operators.

- C. Electromechanical or Electrohydraulic Operators: Self-contained unit.
 - 1. Operator Type: Low energy; readily convertible to full energy; no tools required to change type.
 - 2. Mounting: Visible
 - 3. Features:
 - a. Adjustable opening and closing speeds.
 - b. Adjustable opening and closing force.
 - c. Adjustable back-check.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Reverse on obstruction.
 - f. Variable rate open/closed speed control.
 - g. Closed loop speed control with active braking and acceleration.
 - h. Variable obstruction recycle time delay.
 - i. Optional Switch to open/Switch to close operation.
 - j. When operators are provided in pairs, adjustable features are independently adjustable for each operator.
- D. Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.
- E. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.
- F. Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 120 VAC, 30 amps for doors with operators in pairs, 15 amps for single doors.

2.05 ELECTRICAL CONTROLS

- A. Safety Search Circuitry: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.
- B. Control Switch: Automatic door operators shall be equipped with a three position function switch to control the operation of the door. Control switch shall provide three modes of operation, Automatic, Off, and Hold-Open. Provide key switch (Camden CM170/3) on frame face, 44-inches above the finished floor .
- C. Safety Sensing: Provide BEA SuperScan II at each door equipped with an automatic door operator to sense when a person is in the doorway and signal the automatic door operator to re-activate until the doorway is clear. Concealed wiring through concealed power transfer (by Section 08 71 00) from door to frame. Provide BEA Bodyguard III (with Bodymount as required to achieve safety sensing) at each automatic operated door to sense when a person is in the path of door swing and prevent the automatic door operator from opening until the door swing path is clear.

- D. Fire Alarm Connection: At fire-rated doors, upon activation of the fire alarm, the automatic door operators' power-open and hold-open functions shall be disabled and the operator shall function as a normal door closer.
- E. Provide independent control of doors at pairs with coordinators for coordinated opening.
- F. Time Delay Relays: At fire-rated doors with electric strikes or electric panic hardware, provide time delay relay (ESI 530) to allow door to electrically unlatch prior to opening. Also, provide for coordinated opening and closing of leaves at pairs with flush bolts.
- G. Provide regulated, filtered low voltage power supply with fire alarm relay (SDC 602RF or equal) for electric strikes, where they occur, at automatic pairs. Coordinate with Section 08 71 00 to avoid redundant provision of this power supply.

2.06 ACTIVATION DEVICES

- A. Activation for Low Energy Doors:
 - 1. Push Plates: Provide Wikk Ingress'r stainless steel push plate switches at each side of the opening.
 - a. Interior and exterior push plates shall be wall mounted and hardwired to door operator controls.
 - b. Provide push plate switches of quantity and location per floor plans.

2.07 ALUMINUM FINISHES

- A. Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
- B. Class II, Clear Anodic Finish: AA-M10C22A31 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.40 mils minimum complying with AAMA 611-98, and the following:
 - 1. AAMA 607.1
 - 2. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

PART 3 - EXECUTION

3.01 INSPECTION

Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.

1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
 2. Set headers, arms and linkages level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.
- D. Sealants: Comply with requirements specified in Division 7 Section "Joint Sealants" to provide weather tight installation.
- 3.03 FIELD QUALITY CONTROL
Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.
- 3.04 ADJUSTING
Adjust door operators, controls, and hardware for smooth and safe operation, for weather-tight closure, and complying with requirements in ANSI/BHMA A156.19 by AAADM Certified Technician.
- 3.05 CLEANING AND PROTECTION
Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

END OF SECTION

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glazing for the Project except as noted below.
2. Mirrors.
3. Glazing accessories.
4. Glazing sealants.
5. Interior window film.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 07 for sealants other than required for the work of this Section.
3. Division 08 for glazing of tubular skylights, and for exterior and interior glass assembly framing.
4. Division 10 for glazing in fire extinguisher cabinets.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC).

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting:

1. Prior to start of installation, arrange a pre-installation meeting between the glass and framing system manufacturers authorized representatives, the Contractor, the glazier, and the Design Consultant to review the Drawings and Specifications, the glass and sealants manufacturers' data, and conditions of framing to be glazed, as well as other conditions that would affect the quality of this work.
2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
3. Review all typical and atypical details to verify the method(s) of installation that the Contractor intends to follow, as well as corrective actions that are required.
4. Special conditions not specifically referenced or addressed by the Project Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified, reviewed and discussed.
5. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions to determine what actions need to be taken to assure an installation that will meet the requirements of the Contract Documents, and will be acceptable to the assembly/material manufacturer to issue the warranties specified.
6. Record meeting minutes and distribute electronic copy to attendees and others concerned, within 7 days after the meeting.

1.4 SUBMITTALS

- A. Data: Manufacturer Product Data for glass, sealants, gaskets and glazing accessories.

- B. Samples:
1. Twenty-four-inch square labeled samples of each type of glass, with taped or ground edges.
 2. Coated glass samples shall show extremes of color range.
 3. Glass indicated or required to be "heat-treated" need not be when submitting samples.
- C. Certification: Glass manufacturer's certification as specified.
1. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements. Include wind pressure analysis, thermal stress analysis, including shading effects, and review of shop drawings stating that details are suitable for proposed glass products.
 2. Separate certifications are not required for glazing materials bearing the manufacturer's permanent label designating type and thickness of glass, provided labels represent a quality control program of a recognized certification agency or independent testing agency acceptable to authorities having jurisdiction.
- D. Glazing schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass type and thickness for each size opening and location.
- E. 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.
- F. Product test reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:
1. Coated float glass.
 2. Insulating glass.
 3. Glazing sealants.
 4. Glazing gaskets.
- G. Labels: Provide NFRC Rating Labels as required by 2005 California Energy Code. Reference 2005 compliance guide for information required.
- H. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content.
 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 4. Credit MR 6, Rapidly Renewable Materials.
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.5 QUALITY ASSURANCE

- A. Glazier qualifications: 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 Glazier Certification Program as Level 2 (Senior Glaziers) or Level 3 (Master Glaziers).
- B. Fabricator qualifications: When the glass manufacturer has a certification program, the fabricator shall have a current "Certified Fabricator" certificate from the glass manufacturer.
- C. Source limitations for clear glass: Obtain clear float glass from one primary glass manufacturer.
- D. Source limitations for coated glass: Obtain coated glass from one manufacturer for each type of coating and each type and class of float glass indicated.

- E. Source limitations for insulating glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
 - F. Source limitations for laminated glass: Obtain laminated-glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.
 - G. Source limitations for glazing accessories: Obtain glazing accessories from one source for each product and installation method indicated.
 - H. Fire-rated door assemblies: 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.
 - I. Fire-protection-rated glazing labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
 - J. Safety glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 - 1. Subject to compliance with the above, provide a permanent mark on safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
 - K. 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 inspecting and testing agency.
 - 1. Insulating Glass Certification Council.
 - 2. Associated Laboratories, Inc.
 - 3. National Accreditation and Management Institute.
 - L. Manufacturer certification: Submit manufacturer certification that.
 - 1. All materials to be used in the glazing system such as sealants, setting blocks, spacers, backing rods, metal finishes, etc. have been reviewed by the glass manufacturer.
 - 2. These materials are compatible with the glass supplied to the Project site.
 - 3. These materials will not cause deterioration, premature aging, and staining of adjacent materials.
 - M. Labeling:
 - 1. Submit a certificate stating that the glass furnished for the Project complies with the Specifications.
 - 2. Label each piece of heat-treated glass with a permanent logo etched in one corner to identify the fabricator.
- 1.6 HANDLING
- A. Storage: Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, run-off, and other causes.
- 1.7 PROJECT CONDITIONS
- A. Do not proceed with installation of bulk sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation.

1.8 SPECIAL WARRANTIES

- A. Refer to Section 08 43 13 for exterior glass.
- B. Warrant laminated glass for 5 years after Substantial Completion against delamination, deterioration of plastic sheet or laminating film, loss of transparency, color change or other forms of deterioration due to defective materials or lamination.
- C. Warrant insulating glass for 5 years after Substantial Completion against fogging and loss of transparency due to defective materials or sealant failure.
- D. Glass shall not experience spontaneous breakage.
 - 1. This Specification defines nickel sulfide stones as a glass material defect.
 - 2. Installed tempered glass which breaks due to nickel sulfide stones shall be included in the warranty.
- E. Replace defective materials and workmanship during the warranty period at no cost to the City.

PART 2 - PRODUCTS

2.1 PRIMARY GLASS MANUFACTURERS

- A. AGC Flat Glass North America Ltd.
- B. LOF Inc.
- C. Guardian Glass.
- D. PPG Industries.
- E. American St Gobain.
- F. Or equal.

2.2 CRITERIA AND PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass design: Glass thicknesses shown and heat treatment specified are minimum requirements based upon manufacturer's regularly published literature. The Design Consultant makes no representations as to the accuracy of the literature or the conclusions derived therefrom. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thickness and in strengths (annealed or heat-treated) required to meet or exceed the criteria specified below and ASTM E 1300.
- C. Delegated design: Design glass, including comprehensive engineering analysis according to the CBC, by a qualified professional engineer, using the following design criteria.
 - 1. Design wind pressures:
 - a. Positive: As indicated on Drawings, but not less than 20 psf.
 - b. Negative: 20 psf, unless otherwise indicated.
 - 2. Vertical glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration

3. load. Design glass for a probability of breakage not greater than 0.008.
 4. Skylight glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass to resist each of the following combinations of loads.
 - a. Outward design wind pressure minus the weight of the glass. Base design on glass type factors for short-duration load.
 - b. Live loads prescribed by Code.
 5. Probability of breakage for skylight glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 6. Maximum lateral deflection: For glass supported on all 4 edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or one-inch, whichever is less.
 7. Differential shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- D. Thermal movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
1. Temperature change: 100 deg F, ambient; 180 deg F, material surfaces.
 2. Thermal and optical performance properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 - a. For monolithic glass lites, properties are based on units with lites 6 mm thick. For laminated glass lites, properties are based on products of construction indicated.
 - c. For insulating glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch wide interspace.
 - d. Center of glass U values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq.-foot by hour by - degree F.
 - e. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
 - f. Solar optical properties: NFRC 300.

2.3 GLASS MATERIALS

A. General:

1. Float glass shall comply with ASTM C 1036; heat-treated glass shall comply with ASTM A 1048.
2. ASTM C 1172 Standard Specification for Laminated Architectural Flat Glass.
3. ASTM C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass
4. ASTM C 1503 Standard Specification for Silvered Flat Glass Mirror.
5. ASTM E 2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
6. ANSI Z97.1 American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications Method of Test.
7. US Consumer Product Safety Commission CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials:
8. Provide glass free from bubbles, smoke vanes, air holes, scratches and other defects.
9. Laminated glass shall comply with ASTM C 1172. Glass in the lamination shall be from the same manufacturer when heat-strengthened.

10. Fabricate tempered glass by horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
11. Comply with Code and the Drawings for glass in hazardous locations. Laminated glass subject to human impact shall comply with CPSC 16 CFR Part 1201.
12. Unless otherwise indicated or specified, overall thickness of each glass type and composite thickness of multiple layer glass types shall be consistent throughout the Project.
13. Provide insulating glass assemblies CBA rated by IGCC when tested in compliance with ASTM E 774, and permanently labeled with the appropriate certification label of IGCC, ALI or NCTL.

B. Glass types: Refer to the schedule at the end of this Section.

2.4 GLAZING MATERIALS

A. Laminating glass interlayer: One of the following.

1. Clear, with a proven record not to bubble, discolor, or loose physical and mechanical properties after laminating glass lites and during service life. For glass-to-glass, use 0.03-inch thick, clear, Polyvinyl butyral; "Saflex" by Monsanto Co., "Butacite" by EI du Pont de Nemours & Co., Inc., or equal.
2. Clear "SentryGlas" by DuPont, or equal..
3. Interlayer:
 - a. Thickness: 0.060 inch.
 - b. Young's Modulus: 43 kpsi, ASTM D 5026.
 - c. Tensile strength: 5.0 kpsi, ASTM D 638.
 - d. Elongation: 400 percent, ASTM D 638.
 - e. Flex modulus: 50 kpsi, ASTM D 790.
 - f. Heat deflection temperature at 0.46 MPa: 110 degrees F., ASTM D 648.

B. Setting block: Neoprene or, in the case of structural silicone glazing, dense extruded silicone; both with a hardness of 80 to 90 durometer Shore A with a minimum length of 4-inch or as required by GANA guidelines.

C. Side blocks: Neoprene or dense silicone with a harness of 65 ±5 durometer Shore A.

D. Spacer: Neoprene, silicone, or EPDM, 50 to 60 durometer hardness, compatible with sealants used.

E. Sealants:

1. For primary seal of insulating units: Manufacturer standard sealant.
2. For structural glazing specified in Section 08 43 13: High modulus (structural) silicone sealant, 2-component, non-acidic, neutral curing silicone which meets or exceeds Federal Specification TT-S-00227, Type II, Class B and ASTM C 920, Type M, NS, Class 12.5.
 - a. Color: Black or clear, as selected by the Design Consultant.
 - b. Acceptable products:
 - 1) Dow Corning "995" or "DC 995." DC 983 is not acceptable for use with painted substrate without incorporation of special substrate preparation requirements utilizing Scotch Brite pads, alcohol and barrier primer.
 - 2) Dow Corning "999" (Glass Mullion Glazing System only).
 - 3) General Electric "Ultra Glaze SSG 4400" and "Ultra Glaze 4000."
 - 4) Tremco "Proglaze SSG."
 - 5) Pecora "895" or 2-part "Fast Cure."
 - 6) Or equal.

- c. Painted surfaces in contact with structural silicone must be coated with a primer approved for use by the sealant manufacturer.
 - 3. For all other conditions: Medium and low modulus (weatherseal) silicone sealant, one-part, non acidic, neutral curing, Type S, Grade NS, Class 25, Use NT, capable of withstanding movements from plus 50 to minus 50 for medium modulus and plus 100 to minus 50 percent for low modulus based on original joint design.
 - a. Color: Match Design Consultant's paint color for sealant.
 - b. Acceptable products:
 - 1) Dow Corning "795" and "790."
 - 2) General Electric "Silpruf," "Silpruf LM."
 - 3) Or equal.
 - c. Only low modulus sealant, such as Dow "790," GE "Silpruf LM," or equal, shall be used when sealing to cementitious substrate.
 - F. Glazing gasket: Resilient, continuous neoprene, (except as specified below) extrusions, 40 to 60 Shore A durometer hardness, meeting the requirements of ASTM C 509 for cellular (closed-cell) material, and AAMA SG-1 for non-cellular (dense) material.
 - 1. Gaskets shall have a continuous mechanical engagement to framing members and factory molded corners.
 - 2. Gasket corners, whether molded or not, shall be bedded in elastomeric sealant compatible with glazing gaskets.
 - 3. When in direct contact with silicone sealants, gaskets, spacers and setting blocks shall be heat cured silicone rubber based material chemically compatible with the silicone sealant and with sufficient hardness for the specific purpose intended. Compatibility testing by the silicone sealant supplier/manufacturer shall be required.
 - 4. Design interior and exterior gasket profiles to produce a glass edge pressure of 12 psf unless otherwise recommended by the glass manufacturer.
 - G. Compressible filler rod:
 - 1. Closed-cell or waterproof jacketed rod stock of synthetic rubber or plastic foam compatible with sealants used, flexible and resilient, with 5 to 10 psi compressive strength at 25 percent deflection.
 - 2. Do not use vinyl foam stock.
 - H. Mirror adhesive: Mirror Mastic by Palmer, Ultra/Bond by C. Gunther Co. or 7HR4 Mirror Tac by Pecora Corp., or equal. Use Super Set Mirro-Mastic, or equal on plywood, particleboard, gypsum board and hardboard; use Qwikset, or equal for copper-backed mirrors, for mirror-to-mirror and mirror to non-porous backing.
 - I. Mirror backing and cut edge sealer: Primary Mirror Backing by Sommer & Maca, Mirro-Bac by Palmer or Seal-Kwik by C. Gunther Co., or equal.
 - J. Mirror moldings: Clear, anodized aluminum "J" moldings:
 - 1. D636BA, clear, anodized aluminum "J" molding by CR Lawrence Co., (basis of design), or equal by JW Goss Co., A. Geo Diack, or Arch Aluminum and Glass Company, Inc.
- 2.5 INTERIOR WINDOW FILM
- A. Manufacturer and materials: As indicated on the Drawings.

2.6 FABRICATION

A. Cutting:

1. Obtain sizes from shop drawings or by field measurement. Cut glass to fit each opening with at least the minimum edge clearance and bite on glass recommended by glass manufacturer.
2. When glass will be precut to sizes obtained from shop drawings, take field measurements of each opening before glazing to verify adequate bite on glass and minimum edge clearance.
3. Glaze openings, which do not fall within tolerances for which precut glass has been sized only with glass specially cut to fit such openings.
4. Do not nip glass edges. Edges may be wheel cut or sawed and seamed at manufacturer's option.

B. Edge quality:

1. Do not cut, seam, nip, or abrade tempered and heat strengthened glass after tempering.
2. Provide flat ground edges with arised corners where glass edge is not covered by a metal stop.

C. Laminated glass:

1. Factory-laminate using manufacturer standard heat-plus-pressure process.
2. Exercise caution to exclude dirt and other foreign materials from lamination and to eliminate all voids.
3. Arrange each layer of laminate in the order indicated, and label exterior (or interior) face of each completed unit so that there will be no error in the placement during installation.
4. Conceal processed and coated glass in the lamination.
5. Factory-cut units to proper size; do no cutting at Project site.

D. Glass in sloped glazing conditions (15 degrees or more from vertical) shall be laminated with both lites heat-strengthened. Fully tempered glass is not allowed, whether monolithic, laminated, or as the inboard lite of an insulated glass unit.

E. Insulating glass:

1. Provide black aluminum spacers with bent (not mitered or spliced) corners; only one seam is allowed in each spacer of each unit.
2. The date of the manufacture of the unit shall be discretely identified on the spacer (top of unit, left or right corner).

F. Identification: Identify tempered glass with a manufacturer-installed, removable paper designation as required by CBC section 2406.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Verify that openings and frames to be glazed are within allowable tolerances, plumb, level and square.

- C. Inspect framing joint intersections to insure that the offset in the joinery will not impose undue edge pressure on the glass in compliance with GANA, Glazing Manual, and Sealant Manual, guidelines.
- D. Correct other detrimental conditions before proceeding with glazing.

3.2 STANDARDS AND PERFORMANCE

- A. Watertight and airtight installation is required for each piece of glass installed in an exterior wall or skylight.
- B. Each installation must withstand normal temperature changes, wind loading, and impact from normal operation for doors and windows, without failure of any kind including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in the Work.
- C. Installed glass shall be free from rattle.
- D. Protect glass from damage at all times during handling, installation and operation of the building until Substantial Completion.
- E. Comply with combined recommendations of glass manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are specified.
- F. Except as recommended otherwise by the manufacturers of the glass and glazing materials, comply with GANA Glazing Manual and the following:
 - 1. Provide minimum nominal glass bite of 0.375-inch on monolithic lites; 1/2-inch on insulated glass units.
 - 2. Where joint movement will result in variable glass bite, increase nominal bit to provide 0.375-inch minimum bite and 0.25-inch minimum edge clearance.
- G. Inspect each piece of glass immediately before installation, and eliminate those with edge damage or face imperfections.
- H. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.

3.3 PREPARATION FOR GLAZING

- A. Immediately before glazing, clean the glazing channel and other framing members to receive glass.
 - 1. Remove coatings not firmly bonded to the substrate.
 - 2. Verify that framing is satisfactory to receive the glass.
- B. Apply primer or sealer to joint surfaces when recommended by sealant manufacturer.

3.4 GLASS INSTALLATION

- A. Structural glazing: Comply with the sealant manufacturer's instructions and the following ASTM standards.
 - 1. C 794: Sealant compatibility and adhesion to each substrate to be encountered on the Project.
 - 2. C 1087: Sealant compatibility with backing.
 - 3. C 1087: Sealant compatibility and lack of adhesion to bond breaker.
 - 4. C 1184: Structural Glazing Specifications.
 - 5. C 1401: Guide for Structural Glazing.

- B. Erect each pane of glass square, plumb, and with uniform clearances between panel and rebates.
- C. Follow glass manufacturer's instructions and GANA Standards. Provide minimum nominal glass bite of 0.375-inch on monolithic lites, and 1/2-inch on insulating glass units. Maintain minimum bed clearance between glass and frame.
- D. Do not nip glass. Do not install glass with edge damage.
- E. Install glass with required glass markings right side up so they can be read from the exterior.
- F. Setting blocks:
 - 1. Minimum length of 4 inches or as required by GANA guidelines; minimum width shall correspond to the glass thickness and retaining member but, in no case less than the glass thickness at point of contact.
 - 2. Locate at quarter points, or in accordance with GANA glazing guidelines.
 - 3. Secure against migration.
 - 4. Shims used in conjunction with setting blocks must be of the same material, hardness, length and width as the setting blocks.
- G. Side blocks:
 - 1. Locate side blocks where required within the upper half of each jamb for each light.
 - 2. Install block with 1/8-inch clearance between block and glass bearing surface.
 - 3. Block shall be sufficient length to prevent point loading on the glass.
 - 4. Side blocks are not required where an individual glass light is continuously sealed with silicone at 2 or more edges, when the sealant is installed immediately following the setting of the glass.
- H. Provide spacers inside and out unless continuous gaskets are used. Use glass manufacturer recommended size and spacing.
- I. Prevent exudation of sealant or compound by forming voids or installing filler rods in the channel at the heel of jambs and head (do not leave voids in the sill channels, except as needed for drainage and weep holes) depending on light size, thickness and type of glass, and complying with manufacturer's recommendations.
- J. Sealant shall not be adhered to, or placed against, the edge of a laminated glass unit interlayer.
- K. Force sealants into channel to eliminate voids and to assure complete "wetting" or bond of sealant to glass and channel surfaces.
- L. Tool exposed surfaces of sealants to provide a substantial "wash away" from the glass.
- M. Install pressurized gaskets to protrude slightly out of the channel, so as to eliminate dirt and moisture pockets.
- N. Clean and trim excess glazing materials from the glass, stops and frames promptly after installation, and eliminate stains and discolorations.
- O. Where wedge shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when subjected to dynamic movement.
 - 1. Anchor gasket to stop with matching ribs, or with adhesive.
- P. Clean, prime and mask structural silicone joints the same day when silicone is applied.

3.5 MIRROR INSTALLATION

- A. Apply one additional coat of mirror backing to the back of the mirror, allow to dry, then apply mirror mastic in compliance with the mastic manufacturer's instructions.
- B. Fasten supporting angles securely to the studs; do not attach to gypsum board with toggle or Molly bolts.
- C. Set mirrors in supporting angles and press against substrate to ensure bond with mastic.]

- D. Leave open space of 1/8-inch or more between mirror and substrate. Do not seal ventilation space at edges of mirror.

3.6 INTERIOR WINDOW FILM INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Cut film edges neatly and square at a uniform distance of 1/8 inch to 1/16 inch of window sealant. Use new blade tips after 3 to 4 cuts.
- C. Spray film manufacturer's recommended slip solution on window glass and adhesive to facilitate proper positioning of film.
- D. Apply film to glass and lightly spray film with slip solution.
- E. Squeegee from top to bottom of window. Spray slip solution to film and squeegee a second time.
- F. Bump film edge with lint-free towel wrapped around edge of a 5-way tool.
- G. Upon completion of film application, allow 30 days for moisture from film installation to dry thoroughly, and to allow film to dry flat with no moisture dimples when viewed under normal viewing conditions.

3.7 CURING/PROTECTING/CLEANING

- A. Cure glazing sealants and compounds in compliance with their manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- B. Protect glass from breakage immediately upon installation. Do not apply markers of any type to glass.
- C. Before Substantial Completion, remove and replace glass that is broken, chipped, cracked, abraded, stained or damaged in other way, including natural causes, accidents and vandalism.
- D. Maintain glass in a clean condition during construction so that it will not be damaged by corrosive action and will not contribute (by wash-off) to the deterioration of glazing materials and other work.
- E. Remove remaining labels and wash and polish glass on both faces not more than 4 days prior to City's acceptance of the work in each area. Comply with GANA 01-0300 and the glass manufacturer's recommendations.

3.8 GLASS SCHEDULE

- A. PPG Industries Solarban 60, low E.
- B. Remainder of glass types: TBD

3.9 MIRRORS

- A. 1/4-inch "Silvering Quality" float glass with silver coating, copper protective coating and 2 mil thick protective paint; complying with CS 27.
- B. Grind and polish vertical edges (exposed); horizontal edges shall be clean cut.

END OF SECTION

SECTION 08 91 19 - EXTERIOR ALUMINUM WALL LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes prefinished exterior aluminum wall louvers.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 23 for interior louvers connected to ductwork.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC).

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Deferred approval: The work of this Section requires deferred approval (delegated design), including comprehensive engineering analysis by a qualified professional engineer using performance requirements and design criteria indicated.
- B. Pre-installation meeting:
 - 1. Prior to start of installation, arrange a pre-installation meeting between the glass and framing system manufacturers authorized representatives, the Contractor, the installer, the glazier, and the Design Consultant to review the Drawings and Specifications, the glass and sealants manufacturers' data, and conditions of framing to be glazed, as well as other conditions that would affect the quality of this work.
 - 2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
 - 3. Review all typical and atypical details to verify the method(s) of installation that the Contractor intends to follow, as well as corrective actions that are required.
 - 4. Special conditions not specifically referenced or addressed by the Project Drawings, manufacturer's typical details, or the Shop Drawings, shall also be identified, reviewed and discussed.
 - 5. Take photographs and notes of unresolved conditions, if any, along with sketches of the same unresolved conditions to determine what actions need to be taken to assure an installation that will meet the requirements of the Contract Documents, and will be acceptable to the assembly/material manufacturer to issue the warranties specified.
 - 6. Record meeting minutes and distribute electronic copy to attendees and others concerned, within 7 days after the meeting.

1.4 SUBMITTALS

- A. Data: Manufacturer Product Data and specifications, air performance and water penetration graphs (AMCA Certified Ratings), anchorage details and installation instructions, including specifications for finishing materials.
- B. Shop Drawings:
 - 1. Detail the fabrication and erection of louvers not shown in the manufacturer data.
 - 2. Include details of sections and connections.
 - 3. Show interface with adjacent materials, anchorage and accessories.

- C. Samples: 6-inch long finished Samples of each profile of aluminum extrusions with the specified finish.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 QUALITY ASSURANCE

A. Engineering:

- 1. The assemblies require deferred approval (design/build). The Contractor is responsible for the engineering, fabrication and installation of the louvers and their connections to the structure within the physical limitations indicated on the Drawings.
- 2. Drawings and calculations for the louvers shall be prepared by a California-licensed professional engineer and shall be submitted to authorities having jurisdiction for approval; Contractor shall pay fees incurred therefrom before start of installation.
- 3. Provide structural calculations prepared in compliance with referenced documents and these Specifications. Calculations shall be legible and shall incorporate sufficient cross references to shop drawings to make calculations readily understandable and reviewable. Test reports are not an acceptable substitute for calculations. Calculations shall include:
 - a. Analysis of framing members.
 - b. Analysis of anchors, including anchors embedded in concrete.
 - c. Section property computations for framing members.
 - d. Seal and signature of professional engineer.
- 4. Fasteners and connections are shown schematically.
 - a. Fasteners or connections shall not conflict with or require revision of the finish profiles of the louvers or the supporting work.
 - b. Connections to the structural frame shall not impose any eccentric loading, or induce twisting or warping.
 - c. Connections to the structural frame shall be able to accommodate misalignment of the structure within limits allowed by the AISC tolerances.

B. Welding:

- 1. Qualify procedures and personnel according to AWS D1.1, Structural Welding Code-Steel, and AWS D1.3, "Structural Welding Code-Sheet Steel".
- 2. Examine that welders to be employed in this work have satisfactorily passed AWS qualification tests.
- 3. If recertification of welders is required, retesting will be Contractor's responsibility.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Airolite Co., Inc.
- B. Construction Specialties, Inc.

- C. Industrial Louvers, Inc.
- D. Cesco Products, Greenheck.
- E. Or equal.

2.2 DESIGN CRITERIA & PERFORMANCE REQUIREMENTS

- A. Structural performance: Provide assemblies capable of withstanding the effects of wind, seismic and gravity loads, within limits and under conditions indicated, without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act on vertical projection of louvers.
 - 1. Wind loads: Provide assemblies, including anchorage, that accommodate the wind load indicated on the Structural Drawings, supporting structure deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
 - 2. Live loads: Provide assemblies, including anchorage, that accommodate the supporting structure deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
 - 3. Movements of the structural-support: Provide assemblies that accommodate structural movements including, but not limited to, sway and deflection.
 - 4. Seismic performance: The building is in Seismic Design Category (SDC) indicated on the Structural Drawings as defined by the CBC. Engineer, fabricate and Install assemblies requiring special bracing or mounting to meet the Seismic Design Category without failure or damage.
- B. Thermal movements:
 - 1. Provide louvers that allow for thermal movements resulting from the following change (range) in ambient and surface temperatures without buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 2. Base movements for a minimum material temperature increase of 100 degrees F and decrease of 50 degrees F relative to time of installation.
 - 3. For thermal design, the design winter surface temperature shall be plus 30 degrees F.
 - 4. The design summer surface temperature shall be at least 180 degrees F.
 - 5. Components including adhesive and sealants shall be capable of withstanding without failure design winter temperature to design summer temperature with simultaneous specified loads.
 - 6. Assume a building interior temperature range of 50 to 80 degrees F.
- C. Air performance, water-penetration, air-leakage, and wind-driven rain ratings: Provide louvers complying with performance requirements indicated, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

2.3 MATERIALS

- A. Aluminum blades and frame: 6063-T52 alloy.
- B. Steel reinforcement: ASTM A 36.
- C. Fasteners: Stainless steel or aluminum for aluminum-to-aluminum, galvanized steel for anchorage to supporting structure. Use Phillips flat-head machine screws for exposed fasteners.
- D. Welding electrodes: As recommended by the aluminum producer and AWS.
- E. Anchors and inserts:
 - 1. Non-ferrous metal or hot-dip galvanized anchors and inserts.

2. Use steel or lead expansion bolt devices for drilled-in-place anchors.
 3. Furnish inserts, as required, to be set into concrete and masonry.
- F. Birdscreen: 1/2-inch mesh, 0.063-inch diameter galvanized wire, crimped aluminum screen material.
- G. Paint:
1. For finish on exposed surfaces: As specified in Section 08 42 13.
 2. For concealed ferrous metal surfaces: Tneme-Zinc 90-93 by Tnemec, Zinc-Lock 308 by Porter International, or MZ-4 Epoxy Zinc-Rich Primer by Valspar Corp.
 3. Bituminous paint: Cold-applied asphalt mastic paint complying with SSPC-Paint 12, except containing no asbestos, and formulated for 30-mil thickness per coat.
- H. Sealants: As specified in Section 07 92 00.

2.4 FABRICATION

- A. Fabricate louvers with continuous horizontal, weather type blades; minimum blade thickness shall be 0.125-inch unless Contractor demonstrates that the following criteria can be met with a lesser thickness (but not less than 0.062-inch).
1. Limit mid span deflection of louver to $L/175$.
 2. Aerodynamic shudder or displacement shall not occur at design wind load plus design throughput of louver.
- B. Form blades and frames to the profiles, sizes and spacing indicated from minimum 0.08-inch aluminum extrusions. Overlap blades and "hook" both edges to prevent blow-through of water.
1. Provide concealed vertical stiffener assemblies of plates, angles, tees or shapes as required for rigidity, welded or fastened to the inside face of each blade.
 2. Form ends of blades flat against frame jamb for fastening.
- C. Frame louvers with mitered or coped and continuously welded or riveted and soldered joints.
1. Weld or rivet and solder blades to frames at each end, so that all joints will be watertight.
 2. Reinforce frames and blades as required for stiffness and to comply with the design criteria.
- D. Provide sill extensions and loose sills of same material as louvers, where indicated or required for drainage to exterior and to prevent water penetration to interior.
- E. Form frame to provide tolerances for installation, with sealants in joints between louvers and adjoining work.
- F. Finish louver assemblies, except bird screens, with a clear, anodized coating, as specified in Section 88 43 13.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- C. When areas behind louvers will be difficult to access after installation, clean free of debris and dust.

- D. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Place louvers plumb, level and in proper alignment with adjacent work.
- B. Anchor securely to adjacent construction as indicated on the approved shop drawings. Use concealed anchorages wherever possible.
- C. Form tight, flush joints with exposed connections accurately fitted together.
- D. Protect unpainted aluminum surfaces that will be in contact with cementitious and dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- E. Install removable bird screens in louver frames.
- F. Repair finish damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finish so that there is no evidence of corrective work or return damaged parts to the shop for refinishing.
- G. Seal joints between louvers and adjacent construction as specified in Section 07 92 00.

END OF SECTION

DIVISION 09

FINISHES

SECTION 09 00 10 - CLEANING EXISTING SURFACES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cleaning existing surfaces, including the existing building.

1.2 SUBMITTALS

- A. Data: List of proposed products and materials to be used for cleaning and restoration when specified, along with their manufacturer's product data, specifications and other data as necessary to demonstrate compliance with applicable regulations and the specified requirements for each item listed.
- B. Manufacturer's instructions: Manufacturer-prepared instructions concerning the proper surface preparation and application of cleaning products.

1.3 QUALITY ASSURANCE

- A. Qualifications: Firm(s) and individuals with a minimum of 5 consecutive years experience in cleaning finish materials on projects similar in material, design, complexity and extent to this Project, and whose work has resulted in applications with a successful record.
- B. Regulatory requirements: Materials used shall comply with authorities having jurisdiction for their intended use.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Materials selected by the Contractor, low in volatile organic compounds (VOCs), non-toxic, with a low flash point and are compliant with applicable regulations of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 PREPARATION

- A. Protection: Protect adjacent surfaces from water damage, staining and damage from the cleaning process by masking, covering them with impermeable coverings securely taped in place, or other appropriate form of protection, as required.

- B. Test application:
 - 1. Before cleaning each surface, including bulk purchase and delivery of products, prepare a small application in unobtrusive locations to demonstrate the final effect (visual, physical, and chemical) of planned cleaning, and to demonstrate compatibility of cleaning materials with surfaces to be cleaned, and restored where applicable.
 - 2. Proceed with work only after Design Consultant's review of test application.
- C. Surface preparation: Prepare surfaces to be cleaned and restored in accordance with the product manufacturer's application instructions, as applicable.

3.3 CLEANING

- A. Comply with manufacturers instructions for application of cleaning materials, using the manufacturer's recommended accessories and the following.
- B. Clean all exterior surfaces of the building and the building appendages with water under pressure. Adjust pressure to remove all grime, stains, soot, dust and foreign materials from surfaces being cleaned; paint may be removed during the water cleaning process, but substrate and material being cleaned, where no paint is present, must not be damaged.
- C. At the Contractor's option detergent may be used in the cleaning process as long as the detergent film is completely removed from the surface after cleaning, and that the detergent will not harm the surface being cleaned. Do not use abrasive, except with the Design Consultant's approval and after demonstration on a sample panel.

END OF SECTION

SECTION 09 05 16– PREPARATION OF CONCRETE SLABS FOR FINISH FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this Section is to be determined.

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes non-structural metal framing (NSMF) as follows:
 - 1. Interior steel studs and furring.
 - 2. Resilient sound clips.
 - 3. Resilient channels.
 - 4. Backing plates not provided by other trades for support of items attached to metal framing system.
- B. Work installed but furnished in other Sections:
 - 1. Access panels furnished by electrical and mechanical trades for access to their work.
 - 2. Backing plates furnished with fixtures and equipment attached to, or supported by metal framing system.
- C. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 05 for cold-formed steel framing (exterior walls).
 - 3. Division 09 for ceiling and soffit suspension systems.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org .

1.3 DEFINITIONS

- A. AHJ: Authorities Having Jurisdiction.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Pre-construction meeting: Prior to starting erection of the NSMF, arrange a preliminary meeting between trades associated with the work of this Section, the Contractor, and subcontractors whose work is supported by the NSMF; invite a representative of the Fire Marshall as appropriate.
 - 1. Review locations of access panels, and fire extinguisher cabinets; the latter with a representative of the Fire Marshall.
 - 2. Identify those locations on the slab. Use a removable marker where the slab is scheduled to remain exposed in the Work.
 - 3. Review installation methods, procedures, time schedule and conditions under which work will proceed, including stud manufacturer's instructions and coordination required with related work.
 - 4. Review and verify availability of materials and installer's experience.

B. Coordination:

1. Notify concerned trades of items required to be incorporated into work of other Sections. Certain components specified under this Section includes items which are closely integrated with doors, glazing assemblies and work specified in other Sections that require close coordination with the work of this Section.
2. Be responsible for coordination required to ensure correct installation procedures and results.
3. Verify actual locations of embeds and existing adjacent structural supports by field measurements before erection. Coordinate tolerances of other trades that may affect the work of this Section.

1.5 SUBMITTALS

- A. Data: Manufacturer Product Data consisting of a complete list of materials together with brochures and descriptive data of all items proposed for use.
- B. Load tables: Load and deflection tables properly annotated for anticipated use for all studs.
- C. Shop Drawings:
1. Large scale, dimensioned shop drawings for assemblies engineered by the Contractor.
 2. Indicate component details, framing layout, framed openings, location of resilient channels, [**location of resilient clips**,] anchorage to structure, seismic bracing, type, and location of fasteners and welds, and accessories required of Related requirements.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content.
 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 4. Credit MR 6, Rapidly Renewable Materials.
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.6 QUALITY ASSURANCE

- A. Fire resistance: Where a fire resistance classification is indicated, provide materials, accessories, and application procedures listed by UL, or tested according to ASTM E 119 for the type of construction shown, and acceptable to authorities having jurisdiction.
- B. Welding work qualifications:
1. Qualify welding procedures and welding operators in compliance with AWS "Qualification" requirements for AWS D1.3.
 2. Verify that welders to be employed in this work have satisfactorily passed AWS qualification tests.
 3. If recertification of welders is required, retesting will be Contractor's responsibility.
- C. Engineering responsibilities:
1. Delegated design is required for certain metal assemblies; they are not fully detailed on the Drawings which indicate desired profile and design intent.

2. It is the Contractor's responsibility to engineer, fabricate and install these assemblies to conform to the profiles indicated and other requirements of the Contract Documents, and to satisfy applicable Code. If required by AHJ, obtain their approval and pay fees incurred thereby before start of installation.
3. Limit metal framing systems deflection under loads specified below to the following:
 - a. L/240 where supporting gypsum board only.
 - b. L/360 where supporting ceramic tile.

1.7 HANDLING

- A. Store materials under cover, off the ground or floor, in a dry, ventilated space.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Unless otherwise indicated, NSMF requires deferred submittal (design/build). The Contractor is required to design, within the dimensional parameters indicated, and engineer the NSMF assemblies to withstand the following loads, applied perpendicular to walls at the point of largest deflection, within the specified deflection limits.
 1. At spaces and rooms opening to the outside: 15 psf.
 2. Elsewhere: 5 psf.

2.2 MANUFACTURERS

- A. General: One of the following systems of the size indicated and gage required to comply with criteria specified.
 1. Alabama Metal Industries Corp.
 2. Cemco.
 3. ClarkDietrich Building Systems.
 4. Marino Industries, Inc.
 5. Scafco Corp.
 6. Superior Steel Studs, Inc.
 7. Or equal.

2.3 STUDS, RUNNERS AND FURRING

- A. Studs:
 1. Shaftwalls: As specified above.
 2. For low (Pony) walls: Scafco Corp. "Pony Walls" assemblies, or equal.
 3. Elsewhere:
 - a. General: ASTM C 645, punched web, of the size, gage (thickness), and spacing indicated on the Drawings and specified, complying with the following, as applicable.
 - b. Protective coating: ASTM A 653, G40 zinc coating.
 - c. Bracing: Where the wall finish does not adequately brace both flanges of studs, bracing shall be added or allowable stresses shall be reduced in computing stud heights in compliance with Code.

- B. Top and bottom runner, and bridging:
1. As recommended by the manufacturer of each stud type and of same-gage as stud in same wall or partition, unless otherwise indicated on the Drawings. Provide unpunched, screwable tracks, gage to match studs, 1-1/2-inch flanges.
 2. For fire-rated partitions:
 - a. "MaxTrk" by ClarkDietrich Building Systems.
 - b. "Fire Trak" by Fire Trak Corp.
 - c. "Sliptrack Systems, Inc. "Slip-Trk"
 - d. "VertiTrack VTD VTX" by the Steel Network.
 - e. Runners by Blaze Frame, or other Code-compliant assemblies acceptable to the Design Consultant.
 - f. Or equal.
 3. Elsewhere: Use either "Slip Track 250" by ClarkDietrich Building Systems, or equal track matching the stud gage in same wall but with a 2-1/2 inch leg, or a deep leg 54 mils thick (16-gage) minimum slip connection to accommodate slab deflection.
- C. Furring channels:
1. For gypsum board:
 - a. Zee furring channels: 30 mils thick (20-gage) model ZFN3 by Dietrich Industries, Inc., or equal of depth to match insulation thickness, or equal.
 - b. All others (except resilient channels): 18 mils thick (25-gage) minimum, galvanized, hat-shaped.
 2. For lath/plaster: 3/4-inch size as specified hereafter for runner channels.
- D. Horizontal stiffener, runner channels and bridging: 54 mils thick (16-gage) channels fabricated of cold-rolled steel, ASTM A 366, with flanges not less than 7/16-inch wide. Minimum weights as follows:

Channel Size	Flange Width	Pounds/1000 linear foot
3/4-inch	7/16-inch	300
1-1/2-inch	7/16-inch	475
2-inch	19/32-inch	590

- E. Resilient channels: RC-1 by USG, R/FC-1 by Dale Industries, Resilient Channels by Scafo, or equal, fabricated from steel sheet complying with ASTM A 924 or ASTM A 568.
- F. Resilient sound clips: Super Soundproofing Co., "SSP Sound Isolation Clips," Acoustical Surfaces, Inc. "Noise STOP clips RSIC-1," or equal.

2.4 FASTENERS AND ACCESSORIES

- A. For low (Pony) walls: Use "Floor Anchor" stud reinforcement by Pinquist Tool & Die Co., Inc., or equal, at every stud.
- B. Screws: ASTM C 1002 for metal framing 18 mils thick (25-gage) and lighter, ASTM C 954 for heavier metal framing, 3/8-inch head diameter, corrosion-resistant pan head screws; length and gage required by Code, or recommended by the metal framing manufacturer when not prescribed by Code.
- C. Shot pins: 0.140-inch diameter low velocity powder-actuated drive pins equivalent to Ramset/Red Head No. 1508, or equal, with 7/8-inch minimum penetration into concrete.
- D. Furring channel clips: Manufacturer standard clips for attaching gypsum board furring channels to runner channels.

- E. Welding electrodes: ASTM A 233, as recommended by AWS for the conditions of use and the metals to be welded.
- F. Wire: ASTM A 641, galvanized, soft-annealed steel, minimum gage as follows.
 - 1. Furring channel to runner channel: 16 BW gage.
 - 2. Ties and splices in channels: 18 BW gage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION VERTICAL FRAMING

A. General:

- 1. Erect metal framing systems in compliance with their manufacturer's recommendations, the reference standards, the Drawings and these Specifications.
- 2. Use minimum 33 mils thick (20-gage) studs at the following locations:
 - a. Door openings.
 - b. Studs supporting backing plates, plumbing fixtures and wall-supported cabinets.
 - c. Elsewhere as indicated.
- 3. Do not attach metal framing to ducts, conduits or pipes. Do not allow metal framing and suspension wires to contact pipes.
- 4. Isolate framing from transfer of structural loading, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading.
- 5. Cut framing components squarely for a tight fit against abutting members. Erect framing plumb and level to provide solid backing for finish materials. Install all steel studs in a wall/partition so that their flanges point in the same direction.
- 6. Do not exceed a 1/8-inch in 10 feet deviation (non-cumulative) from true lines and levels, or 1/4-inch from true position. Perform necessary remedial work on framing to achieve specified tolerances.

B. Wall/partition framing:

- 1. Layout partitions [, soffits and ceiling breaks,] and permanently mark on slabs and soffits.
- 2. Align and securely anchor ceiling and floor tracks to building construction.
- 3. Space anchors within 6 inches of ends of each track segment and at 24 inches o.c. maximum. Do not drive fasteners closer than 2 inches to slab or curb edge.
- 4. Frame all openings in stud walls. Provide double studs, closer spacing, and additional reinforcement as detailed or required at door frames, borrowed light frames (interior windows), and recesses for equipment.
- 5. Frame both sides of control joints in gypsum board surfaces [, and Portland cement plaster surfaces] with separate studs and discontinuous runner; do not bridge the joint with system components or accessories.
- 6. Assemble corners using a minimum of 3 studs.

7. Install studs in single length, without joints, extending from floor to underside of floor or roof structure above, except where indicated on the Drawings to stop at or above suspended ceilings. Splicing studs is not permitted without the Design Consultant's approval.
 8. Where studs stop at or above suspended ceilings, unless otherwise indicated, brace every fourth stud (maximum) with opposite stud bracing at 45-degree angle securely anchored to the floor or roof above.
 9. Offset studs where required so that finished wall surface will be flush.
 10. Attaching studs to runner:
 - a. Attach studs to tracks by friction fit for single stud gypsum board partitions.
 - b. Attach the following studs to runner tracks with screws or with a crimping tool in compliance with the stud manufacturer's printed instructions, except where indicated to be welded.
 - 1) Studs with gypsum board on only one side.
 - 2) Studs supporting lath/plaster assemblies.
 - 3) Studs on each side of doors and windows.
 - 4) Studs supporting wall hung plumbing fixtures.
 - 5) Studs supporting wall hung urinal screens, toilet compartments, cabinets and equipment.
 - c. Attach corner studs, partition intersections, studs on each side of door jambs, and other openings in walls/partitions as specified in Paragraph "b" above.
 - d. Weld studs where indicated on the Drawings.
 11. Unless otherwise indicated, provide horizontal stiffeners consisting of 3/4-inch channels spaced at not more than 54 inches o.c. maximum in all partitions/walls supporting wall supported cabinets[and lath/plaster assemblies, and stone]. Tack-weld stiffeners to each stud.
 - a. Provide an additional 3/4-inch channel 6 inches above door head and extend 2 stud spaces beyond jamb studs.
 - b. Install channels in longest possible lengths; lap 12 inches and wire-tie at joints. Do not tie channels on opposite sides of staggered and double stud partitions together.
 12. Double gypsum board studs (face to face to form a tube) adjacent to doors and openings. Extend studs at door openings to slab or deck above and anchor securely to bottom track (as specified in subparagraph 11.b. above) and to top slab or deck with clip angles.
 - a. Locate additional studs not more than 2 inches from door and window frames, abutting partitions, partition corners, and other construction.
 - b. Install a section of track over door and window frames with a clip angle at each end and attach securely to the adjacent vertical studs.
 - c. Install cut-to-length studs at the location of vertical joints and at standard spacing over the door frame header extending to the ceiling track.
 13. Install studs 2 inches away from abutting concrete, steel columns or other structural elements. Extend the horizontal stiffeners and attach it to the structural element.
 14. Provide additional framing, as required, for attachment of electrical boxes, fire extinguisher cabinets and similar items located in stud walls.
- C. Resilient furring channels:
1. Install, with mounting flange down, at right angle to studs, starting within 2 inches of floor and 6 inches from ceiling.

2. Splice channels directly over studs and attach through both flange to studs.
 3. Space channels as indicated on the Drawings.
 4. Drive screws through channel attachment flange and studs at each intersection.
- D. Resilient sound clips: Install the resilient clips in accordance with their manufacturer's instructions, and the following at the spacing indicated.
1. Install clips level and aligned on each wall.
 2. Space bottom clips (and supported channel) no more than 3 inches from floor.
 3. Space top clips (and supported channel) no more than 6 inches from ceiling.
 4. Install furring channels securely in each clip.
- 3.3 FURRING
- A. Provide furring attached to metal framing to conceal utilities, furred soffits, and other furring as indicated.
 - B. Furring to receive gypsum board shall be screw-on channels directly attached to backing material, or applied over runner channels as applicable.
 - C. Space furring as indicated for studs.
- 3.4 WELDING
- A. Perform welding in compliance with AWS recommendations. Welders shall be qualified to weld lightgauge metal. Provide stitch plates where studs are burned-through.
- 3.5 BACKING PLATES
- A. Backing plates may be omitted if anchorage for wall-hung items is directly into steel studs of 43 mils thick (18-gage) or heavier, or items are furnished with equal mounting devices.
 - B. Wall-mounted and wall-hung items that require backing plates, without limitation, include the following:
 1. Wall supported railings.
 2. Grab bars.
 3. Toilet compartments and screens.
 4. Toilet room accessories.
 5. Wall and base cabinets.
 6. Plumbing fixtures.
 7. Ladders.
 8. Wall mounted door stops.
 9. Bracket-mounted fire extinguishers.
 10. Signage.
 11. Window shades.
 12. Wall mounted furniture.
 13. Visual display and tack boards.
 14. Wall-mounted shelving.
 - C. Unless otherwise indicated, plates not provided with fixtures and equipment shall be long enough to span, as a minimum, across 3 studs and may be one of the following:
 1. Fifty-four mils thick (16-gage) minimum steel plate by 4 inches wide.
 2. Fifty-four mils thick (16-gage) unpunched wide flange stud by 4 inches wide.

- D. Notch studs so that backing plate will be flush with exterior face of stud.
- E. Weld plates continuously along all contact surfaces at each stud crossing, or secure with 2 countersunk machine screws at each stud.

END OF SECTION

SECTION 09 22 26 - CEILING & SOFFIT SUSPENSION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes ceiling and soffit suspension systems for gypsum wallboard and plaster assemblies.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Shop drawings:
 - 1. Dimensioned shop drawings of all ceiling and soffit suspension and framing system.
 - 2. Show plan layout.
 - 3. Detail attachment to overhead construction.
 - 4. Identify and dimension adjacent materials and supports.
- B. Data: Manufacturer product data, including specifications and installation instructions for each type of suspension system, including provisions for fixture and equipment anchorage.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.4 HANDLING

- A. Store materials undercover, off the ground or floor, in a dry, ventilated space.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

- A. Ceiling support system shall limit deflection of finished ceilings to less than L/360 for lath/plaster and L/240 for gypsum board.

2.2 MATERIALS

- A. Metal channels: ASTM C 645, galvanized in compliance with ASTM A 924, G60 coating designation.

1. Framing, furring and stiffening:

Size	Type	Pounds per 1,000 linear feet
3/4-inch with 7/16-inch flanges	Cold-rolled	300
One-inch	Hot-rolled	410
1-1/2-inch with 7/16-inch flanges	Hot-rolled	475
2 inches	Cold-rolled	590

2. Furring channels: Minimum 16 mils thick (26-gage) galvanized steel with knurled faces, hat-shaped or Zee section as required.

- B. Hanger wire: Galvanized, soft, mild annealed steel, 0.145-inch diameter (8 BW gage) unless otherwise indicated.
- C. Diagonal bracing wire: Galvanized, soft, mild annealed steel, 0.109-inch (12 BW gage) unless otherwise indicated.
- D. Tie-wire: 0.0598-inch (16-gage), galvanized, single-strand annealed steel or 0.0478-inch (18-gage), galvanized, double-strand annealed steel.
- E. Fasteners and attachments:
 - 1. Screws: ASTM C 1002, 3/8-inch head diameter, cadmium-plated pan head screws; length and gage required by Code, or recommended by manufacturer for uses and materials involved.
 - 2. Furring channel clips: Manufacturer standard clips for attaching gypsum board furring channels to runner channels.
 - 3. Welding electrodes: ASTM A 233, as recommended by AWS for the conditions of use and the metals to be welded.
 - 4. Hanger and bracing wire fasteners for concrete and metal deck with structural concrete fill: Unless otherwise indicated, provide ITT Phillips Drill Div., Red Head Sleeve Anchor No. TW-1614, 5/16-inch diameter, or equal, minimum 2-1/4-inch embedment.
- F. Uplift stiffeners: 0.0209-inch (25-gage) channel studs, 1-1/2-inch or compression posts indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 CEILING SUSPENSION FRAMING

- A. Space main runners not over 4 feet o.c. in any dimension so that hanger wires do not support more than 12 square feet of ceiling.
- B. Hang suspended framing independent of walls, columns, pipes, ducts, and conduits, and their insulation.
- C. Do not attach wires to, or bend around, interfering material such as ductwork, pipes and conduits. Provide trapeze, or equivalent devices substantiated by detailed shop drawings and calculations, where obstructions interfere with direct suspension.

- D. Space runner channels not more than 6 inches from parallel walls or beams.
1. Align runner channels accurately relative to indicated ceiling height and saddle tie with hanger wires.
 2. Lap channels 12 inches at splices and tie at each end of lap.
- E. For gypsum board soffits and ceilings, install 7/8-inch hat channels perpendicular to carrying channels, spaced 16 inches o.c. and within 6 inches of walls.
1. Provide one-inch clearance between furring channels and abutting walls and partitions.
 2. Attach to carrying channels with furring channel clips or wire-tie with triple wrap and triple twist.
 3. At splices, nest furring channels with a minimum 8 inches overlap and wire-tie each end.
- F. For plaster soffits and ceilings, install 1-1/2-inch cold-rolled cross-furring channel spaced 4 feet o.c. and 7/8-inch hot-rolled channels on 16-inch centers, and within 6 inches of walls.
1. Stop main runners penetrations and perimeter walls one-inch.
 2. Provide one-inch clearance between cross furring channels and abutting walls and partitions.
 3. Attach to carrying channels by saddle tying with 3 strands of 18-gage tie wire with triple wrap and triple twist.
 4. At splices, nest cross furring channels with minimum 8-inch overlap and wire tie each end.
- G. Install 4-way, 45-degree diagonal bracing wires in a 12-foot grid maximum.
- H. Stiffener:
1. For gypsum board ceiling/soffits, install uplift stiffener for each 144 square feet of ceiling, consisting of a vertical metal stud occurring at the junction of the carrier and furring channel. Wire-tie to carrier or screw to channel and secure to overhead structure.
 2. For exterior plaster ceilings/soffits, use either 2 channels back-to-back wire-tied together, or rigid electrical conduit. In both cases, make the stiffener 1-1/2 inch shorter than the hanger wires to accommodate ceiling/soffit movement.
- I. At control joints, provide discontinuous lap in main runners occurring over joints.
1. Do not bridge joints with cross furring where joints run perpendicular to furring.
 2. Where joints run parallel to furring, provide furring to support each side of joint.
- J. Provide recesses and openings where indicated for lighting fixtures, registers, access panels and other items to be installed in ceilings. Provide additional furring channels where required by opening condition.

END OF SECTION

SECTION 09 23 13 - ACOUSTICAL PLASTER SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Seamless acoustical plaster ceiling system consisting of acoustical panels finished with trowel-applied acoustical plaster.
 - 2. Acoustical plaster trowel-applied over gypsum wall board.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for the following
 - a. Portland cement plaster.
 - b. Ceiling furring channels.
 - c. Painting acoustic plaster.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer product data, including installation instructions, test data substantiating compliance with quality assurance.
 - 1. Complete description of products to be supplied including product data and specifications.
 - 2. Manufacturer's recommended application instructions and procedures.
 - 3. Laboratory test data showing proposed product has been tested in accordance with latest editions of ASTM C 423 and ASTM E 795 and has met or exceeded specified Noise Reduction Coefficient (NRC) rating required.
- B. Samples:
 - 1. Minimum twelve-inch square sample of the following texture variations for approval.
 - a. Acoustical ceiling board with the specified plaster finish.
 - b. Gypsum wall board with the specified plaster finish.
 - 2. Resubmit samples as required until approved.
 - 3. Samples must be certified by manufacturer as being representative of the texture that was acoustically tested in supporting acoustical test reports.
- C. Test reports:
 - 1. Test reports from all suppliers showing material to be 100 percent free of asbestos, mineral fibers, polystyrene and cellulose.
 - 2. Testing results and procedures certified by Cedar Knolls Acoustical Labs, or other accredited independent testing laboratories. Peak thickness of test samples must be determined and reported by acoustical laboratory. Nominal thicknesses are not acceptable unless peak thicknesses are also reported. Edges of test samples must be sealed with wooden or metal frames.

3. NRC not less than 0.65 at one inch thickness and coefficient not less than 0.40, plus or minus 0.03, at 250 Hz. Conduct testing on solid backing with no air gap.

- D. Certification: Certification of applicator licensing.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.

1.4 QUALITY ASSURANCE

- A. Installer's qualifications: Experienced firm licensed by manufacturer and who has successfully completed acoustical or other plaster installations similar in material, design, and extent to that indicated for Project.
- B. Applicator qualifications:
 1. Firm with a minimum of 3 years of successful experience in application of textured finishes similar to that specified.
 2. Licensed or approved by manufacturer.
- C. Mockups – At a location selected by the Design Consultant, prepare the following mockups at the job site prior to proceeding with the remainder of the work for the Design Consultant's approval.
 1. Minimum 10 square foot sample panel of acoustical plaster ceiling, including ridge and valley intersections and edge condition.
 2. Designated are of the gypsum board wall mockup specified in Section 09 29 00.
 3. Modify or repeat sample panels when first ones are not satisfactory.
 4. When approved, mockups may remain a part of the Work.
 5. Remove unacceptable panels.

1.5 HANDLING

- A. Keep material dry until ready for use.

1.6 PROJECT CONDITIONS

- A. Do not apply materials when temperature is below 44 degrees F (ambient), or substrate is below 40 degrees F.
- B. Provide ventilation, and avoid excess drying rates.

1.7 WARRANTY

- A. Manufacturer shall warrant the material supplied, agreeing to repair/replace materials that crack, flake, dust excessively, peel or fall from substrate, or otherwise deteriorate to a condition where it would not perform effectively as intended for a sound-absorbent purpose.
- B. Warranty period: 10 years from Substantial Completion.

PART 2 - PRODUCT

2.1 MANUFACTURERS/SYSTEM

- A. Pyrok, Inc. "StarSilent" acoustical ceiling system (basis of design.).

- B. BASWaphon "Classic" or "Fine."
- C. Or equal.

2.2 MATERIALS

- A. Acoustical panels manufactured from recycled crushed glass and edge sealer.
- B. Pyrok "Top Basic" plaster base coat.
- C. Pyrok "Top Finish" coat with a smooth finish to match approved sample, color TBD.
- D. Or equal.

2.3 PERFORMANCE REQUIREMENTS

- A. Density: 1.8 Lbs./Sq.Ft, STM E 605.
- B. Surface Burning Characteristics: 15, ASTM E 84.
- C. Sound Absorption: NRC = 0.55 – 0.75, ASTM C 423.
- D. Compression Strength 125 PSI, ASTM E 761.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate and conditions.
- B. Verify that substrates are free of oil, grease, dirt, paint, or other matter that would impair bond or install metal lath as recommended by the manufacturer.
- C. Preparation of existing substrates to receive this work is a responsibility of this Section. Prepare substrate by filling voids and cracks and offsets, and removing projections that would result in telegraphing presence of imperfections.
- D. Correct other unsuitable conditions before proceeding with installation.

3.2 PROTECTION

- A. Mask adjoining surfaces to minimize damage from plastering activities.
- B. Provide temporary enclosures to confine operations.

3.3 APPLICATION

- A. Follow acoustical plaster ceiling manufacturer's instructions.
- B. Install cold-rolled channels on 4-foot centers and 20-gage 7/8-inch hat channels 16 inches o.c.
- C. Fasten panels to ceiling framing.
- D. Apply edge sealer to panel edges and over fasteners.
- E. Sand over fasteners and panel seams.
- F. Apply base coat over the entire surface.
- G. Apply acoustical plaster finish coat uniformly over the base coat and trowel to a smooth plaster finish to match approved mockup for texture and color.

3.4 CLEANING AND PATCHING

- A. Remove fallout materials immediately upon completion of the work in each area. Clean surfaces to remove evidence of soiling.

- B. Patching and repairing acoustical plaster, regardless of the source or cause of the damage, shall be performed by the original installer and shall match the adjacent undamaged surfaces, as approved by the Design Consultant.

END OF SECTION

SECTION 09 24 00 - LATH AND PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Lath and lathing accessories.
 - 2. Portland cement plaster.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for gypsum plaster.
 - 3. Division 09 for painting plaster.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer Product Data for reinforcing mesh, fiber reinforcement, additives, metal lath, metal trim members and plaster finish.
- B. Affidavit: Signed by materials supplier stating that sand delivered to jobsite complies with the requirements of this Section.
- C. Shop Drawings: Show the proposed locations and types of metal lathing accessories (screeds, etc.) in cement plaster surfaces, and a list of all proposed metal trim.
- D. Plasterer qualifications: Submit a list of local (Los Angeles, Orange and Ventura Counties) projects, listing locations, with photographs, where proposed plaster subcontractor has installed plaster systems similar to the one specified.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.4 QUALITY ASSURANCE

- A. Installer qualifications: Firm with a minimum of 10 years of successful experience with plaster system similar to the one specified below.
- B. Mockup:
 - 1. Construct a cement plaster mockup mounted on plywood and studs, where directed. The mockup shall be approximately 6 feet wide by full height, with one corner and one soffit, and shall show typical conditions to be found in the finished plaster work, including painting the mockup.
 - 2. Paint one half of the mockup.
 - 3. The Design Consultant will inspect the mockup for color and texture. Make corrections required until Design Consultant's approval is secured, including the construction of additional mockups if the first one is disapproved.

4. Promptly remove rejected mockup(s) from the jobsite and dispose of it (them) off the site. The approved mockup shall remain until plasterwork is completed and approved.
5. The remainder of the cement plaster installed on the job shall match the approved mockup.

1.5 HANDLING

- A. Delivery: Deliver materials, except sand and water, to the site in sealed containers or bags clearly identified with manufacturer's name, brand, type and grade.
- B. Storage: Store lathing materials on platforms under plastic sheeting. Store plastering materials, including sand, on platforms under plastic sheeting to prevent hydration or contamination.

1.6 JOB CONDITIONS

- A. Protect adjacent surfaces from damage as a result of plastering operations.
- B. Protect plaster against extreme climatic conditions, including uneven and excessive evaporation from hot dry air.

PART 2 - PRODUCTS

2.1 METAL LATH & ACCESSORIES

- A. Weather barrier: Complying with FS UU-B-790, Type I, Grade D (vapor permeable), Style 2, except with a water resistance of 60 minutes:
 1. Fortifiber Corp. "Super Jumbo Tex,"
 2. Firstline Corp. "Kraftex Stucco Paper"
 3. Or equal.
- B. Lath: Expanded diamond mesh lath weighing 3.4 lb./square yard made from zinc-coated (galvanized) steel sheet to produce lath complying with ASTM C 847, by Clark/Western, Amico West, Cemco, or equal.
 1. On solid surfaces use self-furred lath.
 2. On soffits use flat rib lath with rib depth of not more than 1/8 inch, weighing 3.4 lb/square yard.
- C. Plastering accessories:
 1. Minimum 26 gage galvanized steel with expanded wings. Include casing beads, and other items as shown or specified. by Fry Reglet Architectural Metals, Western Metal Lath & Steel Framing Systems, Superior Metal Products, or equal.
 - a. Aluminum plaster moldings, Screeds and Trim: Fry Reglet Corporation, Alhambra, CA, Flannery Corp., Sunland, CA., or equal products ,050-inch extruded aluminum with painted coating to match adjoining surface. Use for reveals, drip screeds and elsewhere where trim is exposed.
 - b. Foundation weep screed: Superior Metal Products SBJ 038W31 22 "J" bead with weepholes. No substitutions.
- D. Tie-wire: 18-gage galvanized, annealed steel wire for accessories-to-lath.
- E. Nails: "Fastenseal" self-sealing nails conforming to ASTM F 1667, with a 0.1205-inch diameter shank, a 7/16-inch diameter head, length to satisfy Code, with an HDPE spacer containing butyl rubber, by Fasten Seal (www.fastenseal.com) – no known equal.

- F. Water: Potable, fresh from domestic source.

2.2 PLASTERING MATERIALS

- A. Portland cement: ASTM C 150, Type I or II, common cement only. Use only one brand of cement.
B. Hydrated lime: ASTM C 206, Type S.
C. Silica sand for scratch and brown coats: Clean, washed, and sharp, ASTM C897 ASTM C 897 or C 144, graded as follows.

Percentage retained on each sieve		
Sieve Size	Max.	Min.
No. 4	0	0
No. 8	10	0
No. 16	40	10
No. 30	65	30
No. 50	90	70
NO. 100	100	90
No. 200	100	97

- D. Fiber reinforcement: 1/2-inch long alkaline-resistant chopped glass fiber strands, Dur-O-fibar by Dur-O-Wall, Inc. or Cem-Fil by Pilkington, 1/2-inch long nylon/Caprolan-RC fibers by Nycon, Inc., or 1/2-inch long polypropylene monofilament fibers by Grace Construction Products Div., or equal.
E. Reinforcing mesh: Alkali-resistant, open weave, polypropylene mesh, 4 oz/square yard minimum, or equivalent glass fiber mesh with a coating compatible with Portland cement plaster, Mesa Mesh by Cota Industries, Inc., or equal by Dryvit.
F. EVA Bonder, or equal.
G. Acrylic admixtures: The following products by Synergy, or equal by C-Cure or Standard Drywall Products, Inc. Use same manufacturer's products for all plaster coats.
1. Color: Match paint color and approved mockup.
2. Texture: Smooth trowel, matching approved mockup.
H. Acrylic finish coat: Akroflex "Semi-Smooth" by Omega Products International, Inc., or equal, of color matching the selected paint color.

2.3 PLASTER MIXES

- A. Plaster proportions:
- Scratch coat (by volume): One part Portland cement, 10 percent maximum lime, 4 parts maximum loose sand, 1 lb. of fibers, unless otherwise recommended by the fiber manufacturer, and 1 gallon of acrylic admixture per sack of cement.
 - Brown coat (by volume): Same as specified for scratch coat except that sand may be increased to 5 parts of the total volume of cement.
 - Finish coat: Specified factory-mixed finish coat with acrylic admixture as specified below.

B. Mixing:

1. Mix as accurately as possible. Add ingredients to the mixer from calibrated containers. Do not use materials which are caked, lumpy, dirty or contaminated by foreign materials.
 - a. If calibrated container supply interferes with progress of Work, shovels may be used provided they are measured to determine the accuracy of the volume of aggregate they carry, in accordance with manufacturer's printed instructions.
2. Premix acrylic admixture for plaster basecoats with water before being added to the cement and sand. Comply with admixture manufacturer's printed instructions to assure a minimum of 4 percent resin-to-cement ratio in base coats.
3. For plaster scratch coat, comply with admixture manufacturer's printed instructions to assure a minimum of 4 percent resin to cement ratio.
4. Add one part of "Acrylic Admix B" to every 3 parts of water required for mixing with finish coat to assure a minimum ratio of 10 percent resin to premixed finish coat.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Before plastering begins, insure that adjacent finish work is well protected with waterproof covers securely taped in place.
- C. Before enclosing stud walls, thoroughly clean space of debris.
- D. Correct detrimental conditions before proceeding with installation.

3.2 GENERAL

- A. The applicable provisions of ASTM C 1063 and ASTM C 926, govern the work of this Section, except as specified herein.

3.3 WEATHER BARRIER

- A. Install over the air/water barrier and framing members with a minimum of fasteners.
- B. Lap shingle fashion 2 inches at horizontal joints and 6 inches at vertical joints. No weather barrier is required on soffits. Stagger vertical joints.
- C. Continue weather barrier uninterrupted behind control joints.
- D. Lap over flange of accessories to prevent direct contact between lath and accessories and to ensure water tightness.
- E. Interface weather barrier with flashing materials at windows, doors, electrical boxes, pipes, and other penetrations to properly discharge water to the exterior face of the wall (refer to Section 07 62 00). Absence of flashing must be corrected prior to installing weather barrier.
- F. Seal unused holes from fasteners in weather barrier with silicone sealant specified in Section 07 92 00.

3.4 LATHING

- A. Comply with ASTM C 1063, except as specified below, and where Code requirements are more stringent.
- B. Apply lath taut with long dimension at right angle to supports.

- C. Apply first course at bottom and work up.
 - 1. Stagger vertical joints. Lap end joints 1 inch minimum and horizontal joints 1/2 minimum.
 - 2. Wire-tie intermediate horizontal joints at 9 inches o.c. maximum.
- D. Attach lath to metal supports, thru weather barrier and waterproof membrane where applicable, at 6 inches o.c.
- E. Cut lath at control joints.
- F. Hold lath 1/4 inch clear of electrical boxes, columns, and similar items projecting through the plaster.

3.5 PLASTERING ACCESSORIES

- A. Wire-tie at no more than 24 inches o.c. to metal lath or studs.
- B. Use single length wherever length of run does not exceed longest standard stock length available.
- C. Miter or cope at corners with hairline joints, and seal with sealant specified in Section 07 92 00. Seal butt splices in the same manner.
- D. Set accessories level, plumb and true to line with a tolerance of not more than 1/8 inch in 5 feet. Shim as required and align joints with concealed splice or tie plates.
- E. Install corner reinforcement at external corners.
- F. At plaster terminations, provide casing bead at the following locations:
 - 1. Where plaster termination abuts other finishes, isolate casing bead from contact with adjacent finishes with 1/4 inch thick tape sealant specified in Section 07 92 00.
 - 2. Where plaster termination is not covered by another finish or applied trim, provide cased opening by installing casing bead around perimeter of opening as detailed.
- G. Accessories that butt each other need to be lapped, sealed, soldered or welded, and/or stripped with flexible flashing.

3.6 PLASTERING

- A. General: Comply with ASTM 926, except as specified below, and where Code requirements are more stringent.
- B. Type: Smooth-finished Portland cement plaster installed on metal lath; one inch total thickness.
- C. Allowable tolerances: Maximum deviation from true planes of finish plaster shall not exceed 1/8 inch in 10 feet when measured with a straightedge placed at any point on the plaster.
- D. Protection:
 - 1. Protect adjacent surfaces from damage as a result of plastering operations.
 - 2. Protect plaster against extreme climatic conditions, including uneven and excessive evaporation from hot dry air.
- E. Application - general:
 - 1. Provide sufficient manpower and equipment to ensure a continuous operation free of cold joints, scaffold lines, texture variations, and other objectionable conditions.
 - 2. Plaster surfaces in one operation once the application of any coat has begun.
 - 3. Stop plaster at control joints, edges or corners only. Plaster in one operation, full height and width between control joints.
 - 4. Plaster flush with metal trim members and make corners square and true.

5. Where permanent grounds are too far apart to serve as guides for rodding, provide supplemental plaster screeds as required. Establish true surfaces with rods before setting the screeds. Keep grounds clean and free of plaster.
6. Finish plaster in a true, plumb or level plane flush with grounds.

F. Plastering:

1. Scratch coat: Apply with sufficient material and pressure to form good full keys, and to cover well.
 - a. Minimum thickness of scratch coat shall be 1/2-inch when measured from backing to crest of scored plaster.
 - b. Scratch before plaster hardens to provide sufficient mechanical key for brown coat. Cure in accordance with the polymer manufacturer's instructions.
2. Brown coat:
 - a. Dampen the scratch coat thoroughly and apply the brown coat to a 3/8-inch thickness.
 - b. Bring to a true, even surface by rodding and floating, and leave slightly rough to receive the mesh embedment specified hereafter.
 - c. Begin floating only after hydration of the cement has commenced and sufficient moisture evaporates, so that surface sheen disappears but before plaster is too rigid to be moved under the float.
 - d. Moist cure continuously for a minimum of 48 hours, including weekends and holidays.
3. Curing: Unless hot conditions exist, do over-wet polymerized cementitious base coats by excessive curing.
4. Reinforcing mesh:
 - a. After the brown coat has been moist-cured, apply a layer of reinforcing mesh over the brown coat in a 1/8-inch thick bed of cement adhesive.
 - b. Cement adhesive may be a proprietary embedment adhesive such as used in EIFS plastering, or a job-mixed preparation consisting of 48 lbs. of common Portland cement, 10 lb. of plaster grit silica sand, and emulsified acrylic admixture mixed with water.
 - c. Fully embed the mesh in the adhesive so it is free of wrinkles and with edges lapped a minimum of 2-1/2-inch
5. Finish coat: Apply finish coat over reinforcing mesh when temperatures are between 65 and 90 degrees F.
 - a. Apply the finish coat with stainless steel trowel in a double back operation to a total minimum thickness of 3/16 inch.
 - b. Trowel on a tight first finish coat a minimum of 1/16-inch thick and draw it up to an even surface before applying the double back coat.
 - c. When the finish coat sets, trowel it to smooth and even surface free of tool marks, blemishes or cracks, matching the mockup, as approved by the Design Consultant.

G. Plaster flush with metal frames and other built-in metal items or accessories which act as plaster grounds. Provide a "V" cut with the edge of the trowel where plaster abuts metal frames.

H. Where permanent grounds are too far apart to serve as guides for rodding, provide supplemental plaster screeds as required.

1. Establish true surfaces with rods before setting the screeds.
2. Keep grounds clean and free of plaster.

3. Finish plaster in a true, plumb or level plane flush with grounds.

3.7 FIELD QUALITY CONTROL

- A. Be responsible for determining the most effective procedure for curing and time lapse between application of coats, based on climatic and job conditions.
- B. Completed plaster shall match approved mockup, be within the tolerances specified, be uniform in thickness, texture and color when applicable, free of cracks, blisters, pits, checks and other defects.
- C. Repair, or remove and replace, as determined by the Design Consultant, lath/plaster that does not meet these requirements, with materials satisfactory to the Design Consultant.

3.8 REPAIRING/CLEANING/PROTECTING

- A. Cut, patch, repair and point-up defective plaster. Repair cracks and indented surfaces by moistening plaster and filling with new material, troweled or tamped flush with adjoining surfaces. Point-up finish plaster surfaces around items built into, or penetrating the plaster.
- B. Promptly remove plaster spatter and droppings from adjacent surfaces. Repair surfaces which have been stained, marred or otherwise damaged during plastering operations at no additional cost to the City.

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Gypsum board.
2. Fasteners, joint reinforcing and finishing compound.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 06 for wood framing and sheathing.
3. Division 06 for gypsum sheathing board.
4. Division 08 for access panels in gypsum board surfaces.
5. Division 09 for soffit board.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer Product Data for all materials to be used in gypsum board construction.
- B. Shop Drawings: Show proposed locations of control joints. Joint location is subject to the Design Consultant's approval and shall be relocated, when requested, at no cost to the City.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content.
 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 4. Credit MR 6, Rapidly Renewable Materials.
 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.4 QUALITY ASSURANCE

A. Requirements of regulatory agencies:

1. Comply with fire resistance ratings indicated and required by Code.
2. Provide materials, accessories and application procedures listed by UL or tested in compliance with ASTM E 119 for the type of construction shown.

B. Mockup:

1. Where directed, construct a mockup of a gypsum board wall and ceiling inside the building. Make mockup full height (minimum 8 feet high by 8 feet wide) with a 4-foot return.

2. Tape and finish joints, trim and screw heads as specified for Level 5 herein. Refer to Section 09 23 13 for finishing the ceiling and a designated portion of the wall with acoustical plaster, and Section 09 90 00 for painting the remainder of the walls with a semi-gloss paint.
3. The Design Consultant will review the mockup under various light conditions for defects and improperly finished joints, trim and screw heads. Provide a portable light for that purpose when so requested.
4. Make corrections requested by the Design Consultant, or remove and replace mockup when the corrective work is not acceptable to the Design Consultant.
5. The approved mockup shall remain in the building until its removal is directed, and will be used as a standard for the gypsum board work for the Project.

1.5 HANDLING

- A. Procedure: In accordance with GA 801 "Handling and Storage of Gypsum Panel Products."
- B. Storage: Do not overload the floors with localized concentration of gypsum board.

1.6 JOB CONDITIONS

- A. Comply with the gypsum board manufacturer's recommendations and GA "Application and Finishing of Gypsum Board" for temperature limitations and ventilation before, during and after installation of gypsum board.
- B. Protect installed materials from drafts during hot, dry weather.
- C. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. BPB America, Inc.
- B. CertainTeed.
- C. G-P Gypsum Products.
- D. Goldbond Building Products/Div. National Gypsum Co.
- E. Lafarge Gypsum.
- F. National Gypsum Co./Goldbond Building Products Division.
- G. PABCO Gypsum.
- H. Temple-Inland Co.
- I. US Gypsum Co.
- J. Or equal.

2.2 GYPSUM BOARD

- A. General:
 1. Provide boards complying with ASTM C 1396 as follows and in maximum lengths available to minimize end butt joints.
 2. Unless otherwise acceptable to the Design Consultant, no end-to-end butt joints are allowed on walls or ceilings less than 12feet long or wide.

- B. Under ceramic tile, paperless, mold-resistant gypsum board (ASTM D 3273):
1. CertainTeed "GlasRoc.
 2. Dens-Shield "G-P Gypsum "Fireguard Tile Backer.
 3. "Temple Inland "Greenglass Gypsum Tile Backer"
 4. Or equal.
- C. In unlined air shafts and plenums: USG Sheetrock "Mold Tough," or equal, meeting ASTM D 3273 for mold-resistance.
- D. On ceilings: Contractor may use "Gypsum Ceiling Boards."
- E. For surfaces to be painted in Toilet Rooms: CertainTeed "Glasroc," or equal embedded glass mat gypsum panels.
- F. Elsewhere where gypsum board is exposed and painted: Standard, Type X or C boards, as applicable to the assembly. Provide boards with paper face suitable to receive decorative finish, and long edges tapered to receive joint compound.
- G. Screws: The following sized in compliance with the gypsum board manufacturer's instructions and Code requirements. Do not use nails.
1. ASTM C 954 for fastening to supporting studs and furring.
 2. ASTM C 1002, Type G for gypsum board-to-gypsum board.
- H. Metal trim:
1. Galvanized steel of the types specified hereafter complying with ASTM C 1047.
 - a. LC-Bead: J-shaped; exposed long flange to receive joint compound; use at exposed panel edges.
 - b. CB corner bead: Square corner bead.
 - c. L-Bead: L-shaped; exposed long leg to receive joint compound; use where indicated.
 - d. U-Bead: J-shaped; exposed short flange not to receive joint compound; use at exposed panel edges.
 - e. Control joint: USG No. 093, Goldbond Building Products E-Z Strip, Trim-Tex 093V, or equal.
 2. Aluminum trim, Type 6063, ASTM B 221: Final Forms I by Gordon Interior Specialties Division, Gordon, Inc., or equal, configurations and finish as indicated on the Drawings.
- I. Joint treatment for paperless assemblies: 2-inch wide fiberglass mesh tape and ToughRock 90 Setting Type joint compound, or equal.
- J. Joint tape, compound and laminating adhesive: ASTM C 475, low or very low shrinkage, type recommended by the manufacturer, by Hamilton Materials, (basis of design), USG or equal by one of the gypsum board manufacturers named above.
1. Taping, and fastener and metal trim concealment: Sheetrock Brand Taping Joint Compound, Ready-Mixed by USG, or equal.
 2. Topping, finish and skim coats: Sheetrock Brand Topping Joint Compound, Ready-Mixed by USG, or equal.
 3. Joint tape complying with ASTM C475: Sheetrock Joint Tape – Heavy by USG, or equal.
- K. Sealants: As specified in Sections 07 92 00 and 09 80 00.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine conditions affecting the work of this Section at site.
- B. Verify framing members' straightness and alignment.
- C. Correct detrimental conditions before proceeding with installation.
- D. Before enclosing stud walls and spaces that will be inaccessible after gypsum board is installed, thoroughly clean spaces of debris and dust.

3.2 GYPSUM BOARD INSTALLATION - GENERAL

- A. Comply with the applicable provisions of the references standards and the following.
- B. Use only full size boards above door and window openings; joints at corners of heads are not acceptable.
- C. Minimize butt joints and avoid butt joints centered on walls, over protruding studs, and above doors and windows. Avoid abutting end joints in the central area of each ceiling.
- D. Install all gypsum panels, including those in non-rated applications, with joints in moderate contact.
- E. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints.
- F. Position adjoining panels so that tapered edges abut tapered edges, and field-cut edges abut field-cut edges and ends.
 - 1. Do not place tapered against cut edges or ends.
 - 2. Where square (non-tapered) joints abut on ceilings, use Trim-Tex "Buttboard" behind the joint in accordance with Trim-Tex recommendations.
- G. Stagger vertical joints over different studs on opposite sides of partitions.
- H. Attach gypsum panels to steel studs so that the leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Attach gypsum panels to framing provided at openings and cutouts.
- J. Provide perimeter relief where board abuts structural decks, ceilings, vertical structural elements, or glazed assembly.
- K. Install horizontal boards first. Butt joints between boards loosely. Do not force boards into place. Place tapered or wrapped edges next to one another.
- L. Attach boards to studs and furring members with power-driven screws securely engaging supporting member, and with fastener heads uniformly depressed not over 1/32-inch below surface of board (except for first layer of multiple layer assembly) without breaking face paper.
- M. After boards are installed over screws and backing plates, tap boards with a rubber mallet to depress backside of board over heads to eliminate unacceptable bulges.

3.3 SINGLE LAYER APPLICATION

- A. Horizontal surfaces:
 - 1. Install board with long dimension at right angle to supports, with end joints located over supports.
 - 2. Use maximum practical length boards to minimize end joints. Stagger end joints in alternate boards.
- B. Vertical surfaces: Unless otherwise acceptable to the Design Consultant, install board vertically. Use floor-to-ceiling length boards (unless height exceeds 12-foot) with vertical joints located over supports.

1. At high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. Offset joints at least one stud on opposite sides of partition/walls.
 3. Extend gypsum board continuously from finish floor to underside of structure above, except where indicated otherwise on the Drawings.
- C. Multiple layer application on vertical surfaces:
1. Install board vertically using floor-to-ceiling length boards (unless height exceeds 12 feet) with vertical joints located over studs.
 2. Offset joints at least one stud spacing on opposite sides of partitions and between subsequent layers of gypsum board.
 3. Fasten all layers of gypsum board to metal framing with screws.
- D. Patching existing gypsum board: Patch to maintain the fire resistance of the assembly so that after a Level 5 is applied to the wall (go to nearest corner) and painting, the patch will be invisible from a distance of 2 feet under normal lighting conditions.
- 3.4 ALLOWABLE TOLERANCES
- A. Do not exceed 3/16-inch in 8 feet, and 1/8-inch in 4 feet from plumb, level and flat (all directions) in gypsum board surfaces.
 - B. Do not exceed 1/16 inch offset at joints between boards.
 - C. Shim boards as necessary to comply with these tolerances.
- 3.5 FINISHING
- A. Finish gypsum board surfaces with exposed joints, corners and edges reinforced or trimmed in compliance with GA-216 and the following.
 - B. General:
 1. Fill joints, fastener heads, trim accessory flanges and surface defects with joint compound in compliance with the gypsum board manufacturer's recommendations to obtain a smooth, flush surface.
 2. All joints, fastener heads and trim flanges in surfaces which will remain exposed to view in the building, shall be invisible after application of joint tape and compound.
 - C. Trim: Install in single unjointed length, unless length exceeds manufacturer's standard. Attach to gypsum board in compliance with manufacturer's instructions.
 1. Install Type CB trim at external corners.
 2. Install Type LC trim where gypsum board edges are exposed in the finish work.
 3. Install Type CB or LC trim where gypsum board abuts a different material, and the edges are not covered by a finish material.
 4. Install control joints at no more than 30 feet on center in any direction (full height door frames count as control joints). Joint locations are subject to the Design Consultant's approval. When "through wall" control joints are required in fire-rated assemblies, comply with WH International, Inc. Report WHI 651-0318.1.
 - D. Joints: Reinforce joints between gypsum boards, and interior corners and angles with tape set in joint compound.
 1. Apply skim coat over tape in one application.

2. Where space greater than 1/16-inch occurs between abutting gypsum boards (except at control joints and for concealed layers of multiple layer assemblies), pre-fill joints with joint compound and allow to dry before applying joint tape.
3. All joints and interior angles shall have tape embedded in joint compound and 2 separate coats of joint compound applied over all flat joints and one separate coat of joint compound applied over interior angles.

E. Joint compound:

1. Lap each coat not less than 4 inches over the preceding coat (2 inches on each edge). Width of joint compound on tapered board edges shall be not less than 12 inches; width of joint compound on square board edges not less than 18-inch.
2. Cover fastener heads and accessories with 3 separate coats of joint compound.
3. Allow at least 24 hours drying time between applications of joint compound.
4. Finish joint compound so that little or no sanding is required. When sanding, use sandpaper or mesh cloth with grit as fine as possible; do not scuff face paper. Remove sanding dust before painting or applying other finishes.

F. Finishing levels:

1. Level 1: Use in areas where the assembly will generally be concealed.
2. Level 2: Use where gypsum tile backer board is used as a substrate for tile, in storage and similar areas where surface appearance is not of primary concern.
3. Level 3: Not used.
4. Level 5 – skim coat (spray and roller-applied finish is not acceptable):
 - a. Use for all public areas to be painted, including surfaces to be painted with dry-erase coating, and existing gypsum board to be patched. Finish, including joints and fasteners as follows to match approved mockup.
 - b. Apply a thin skim coat of joint compound to the entire surface to result in a smooth surface free of tool marks and ridges. Use setting-type, sandable topping compound or drying-type; do not use all-purpose compound consisting of high-build interior coating product designed for application by airless sprayer.
5. Level 4: Use for all other locations, including walls to receive wall coverings and marker boards and tack boards.

G. Leave gypsum board surfaces smooth, undamaged and ready to receive scheduled finishes.

END OF SECTION

SECTION 09 31 00 - CERAMIC TILE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Ceramic floor and wall tile, and trim shapes.
2. Setting materials, grouts and sealants.
3. Waterproofing membrane.
4. Stone thresholds.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Divisions 07 and 09 for sealants other than specified herein.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting:

1. Prior to start of installation arrange a pre-installation meeting between the waterproofing manufacturer authorized representative, the Contractor, the Design Consultant, and the installer to review Project conditions, the Drawings, Specifications and the waterproofing manufacturer data.
2. If more than one trade will be responsible for the successful performance of the work of this Section, these trades shall attend the meeting.
3. Identify areas of concern and remedial measures.
4. Record meeting minutes and distribute copy to all concerned, including the Design Consultant, within 7 days after the meeting.

B. Manufacturer's inspections:

1. Request the manufacturer's presence before start of this work to verify substrate acceptability, and as required thereafter to review installation procedures and completed work, and to issue warranty specified.
2. Unsatisfactory conditions disclosed by the manufacturer visits to the site shall be promptly and satisfactorily repaired and the areas re-inspected by the manufacturer before work starts or resumes in affected areas.

1.4 SUBMITTALS

A. Samples:

1. Twenty-four-inch square samples of each type and color of tile glued to hardboard backing; grout joints.
2. Type, color and shape of trim and base.
3. Six-inch long marble threshold, finished as specified.

- B. Data: Manufacturer Product Data for waterproofing membrane, pre-mixed mortars and grouts, with certification that they meet ANSI standards specified when applicable.

- 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.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.5 QUALITY ASSURANCE

- A. Uniformity:
 - 1. Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
 - 2. Obtain materials of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.
- B. Installer qualifications: Experienced firm who has successfully completed tile installations similar in material, design, and extent to that indicated for Project for at least 5 years.
- C. Master grade certificate: Submit, bearing the Certification Mark of the Tile Council of North America, Inc. (TCNA), signed by the tile manufacturer, stating the type and quality of each type of tile delivered to the job site.

1.6 HANDLING

- A. Procedure: In accordance with ANSI A137.1 for labeling sealed tile packages.
- B. Delivery: Deliver tile cartons with grade seals unbroken.

1.7 JOB CONDITIONS

- A. Set and grout this work when ambient temperature is at least 50 degrees F or higher. Do not install materials on surfaces (or when ambient temperature) is less than 40 degrees F.
- B. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform this work and as will occur in the room or space after the building is in operation.

1.8 SPECIAL WARRANTY

- A. Warrant tile installation, including grout and waterproofing (system warranty), against faulty materials and workmanship for 15 years after Substantial Completion.
- B. Make repairs required during the warranty period at no cost to the City.

1.9 MAINTENANCE

- A. Furnish to the City one full box of each type, color and size of tile properly packaged and identified, by room or area.

PART 2 - PRODUCTS

2.1 MATERIALS – GENERAL

- A. All components of the waterproofing and tile setting assemblies must be by the same manufacturer to obtain warranty specified.

2.2 TILE

- A. Tile: By SpecCeramics, DalTile, Natural Hues Price Group 2, or equal. Sizes as indicated on the Drawings. 4 colors TBD.
 - 1. Floor tile: Shall meet the static coefficient of friction prescribed by ADAAG – 0.6 for level floors and 0.8 for sloped surfaces.
 - 2. Trim: Provide matching base, caps, stops, returns, trimmers required to complete the installation.
- B. Factory-blending: For tile exhibiting color variations within the ranges selected during sample submittals, factory-blend tiles and package accordingly so that tiles taken from one package show the same color range as those taken from other packages, and match approved samples.

2.3 MARBLE THRESHOLDS

- A. White veined marble, honed, MIA Group A complying with ASTM C 503 for exterior use and abrasion, uniform in color, with a minimum Ha of 12 when tested in accordance with ASTM C 1353.
- B. Fabricate with a uniform honed (400 to 1,200 grit abrasive) finish on exposed surfaces for a tight fit against door jambs and a smooth transition between tile and adjoining floor surface.
- C. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2-inch or less.

2.4 SETTING MATERIALS AND GROUT

- A. Portland cement: ASTM C 150, Type 1.
- B. Latex modified dry-set mortar:
 - 1. Thin set:
 - a. MerKrete “705” and “735”, or ” MerKrete “750 RS”
 - b. ”Mapei “Ultraflex 1 and 3 or “Granirapid” as selected by the installer for the conditions of use.
 - c. Or equal.
 - 2. Medium bed:
 - a. MerKrete “720 Marble Pro”
 - b. Mapei “Franurapid.”
 - c. Or equal.
- C. Grout:
 - 1. Portland cement grout sanded or unsanded as applicable to the joint width and recommended by the grout manufacturer.
 - a. MerKrete “Versatile”
 - b. Mapei “Opticolor,”

- c. Or equal.
- 2. Epoxy grout, 2 colors TBD:
 - a. MerKrete "Pro Epoxy."
 - b. Custom Building Products "CEG."
 - c. Or equal.

2.5 MISCELLANEOUS MATERIALS

- A. Sealant and backup for control joints in tiles: Refer to Section 07 92 00.
- B. Waterproof membrane:
 - 1. "Hydo-Guard SP-1" by MerKrete.
 - 2. "AquaDefense" by Mapei.
 - 3. Or equal.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Remove glaze and contaminants, including remaining adhesive and setting bed, from floors by scraping, wire-brushing or with a self-contained beadblasting apparatus.
- C. Verify that surfaces to be tiled are firm, dry, clean, and free from oil or waxy films and curing compounds, and within the following tolerances:
 - 1. Thin-set tiles: 1/8 inch in 10 feet for floors and 1/8 inch in 8 feet for walls.
 - 2. Mortar-set tiles: 1/4 inch in 10 feet for floors and 1/4 inch in 8 feet for walls.
 - 3. Maximum deflection of walls to be tiled: L/360 under loads prescribed by Code. Coordinate this requirement with other design criteria specified in Section 09 22 16.
- D. Examine that installation of grounds, anchors, recessed frames, electrical and mechanical work, and similar items located in or behind tile have been completed before installing tile.
- E. Correct detrimental conditions before proceeding with installation.

3.2 WATERPROOFING MEMBRANE

- A. General: Application: Comply with the waterproofing membrane manufacturer's instructions, ANSI A 108.13, and the following.
- B. Surface preparation:
 - 1. Mask adjacent areas not to be waterproofed.
 - 2. Prepare surfaces to be waterproofed so that they are clean, smooth and free of contamination.
 - 3. Repair defects such as honeycombs, rock pockets, cracks, gaps, penetrations and protrusions. Remove glaze from concrete as recommended by the waterproofing manufacturer.
 - 4. Prime/seal concrete and vertical substrates.
- C. Apply waterproofing in 2 coats when substrate temperature is above 40-degrees F.
- D. Install reinforcing fabric, where recommended by the waterproofing manufacturer, in waterproofing liquid at drains, coves, corners, over cracks and gaps in substrate.
- E. Avoid interruptions during installation of membrane; if interrupted, clean interface surfaces to assure adhesion.
- F. Completed membrane shall be uniform in thickness and texture, monolithic and waterproof.
- G. Keep traffic on completed membrane to a minimum. Cover traffic path until tile is installed.

- H. Set tile no sooner than 24 but no more than 72 hours after membrane installation.

3.3 TILE INSTALLATION

- A. General: Install proprietary materials in compliance with their manufacturer's instructions. Press or beat the tiles to obtain 100 percent coverage of mortar on back of tile; back butter tile if necessary.
1. Maintain minimum temperature limits and installation practices recommended by waterproofing membrane, mortar and grout materials manufacturers in areas where this work is performed.
 2. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignment. Saw-cut and drill tiles to obtain tight fitting, clean, sharp, undamaged cut edges.
 - a. Rub cuts smooth with fine abrasive stone.
 - b. Cut and drill so that electrical outlets, plumbing fixtures, pipes, fixtures and fittings standard plates, escutcheon and collars will overlap the tile.
 - c. Do not cut or split tile at penetrations.
 3. Install tile in patterns indicated with uniform joints and perimeter units not less than 1/2 unit wide. Adjust to minimize cutting.
 4. Accurately set tile with flush well-fitted joints, finished in true planes, plumb, square, sloped or level as required.
 5. Form corners, returns, and exposed tile edges with approved trimmers.
 6. Where tiles selected by the Design Consultant are installed in the same plane, but are of a different thickness, it is the Contractor responsibility to adjust the setting bed or mortar thickness so that all tiles are flush.
 7. Under no circumstances will glazed tile installations be accepted if any part of unglazed tile body of any unit remains exposed after tile is installed.
 8. Provide matching tile trimmers of all types required to prevent such condition.
 9. Maximum deviation from true lines and levels shall not exceed 1/8-inch in 10-foot for floors, and 1/8-inch in 8-foot for walls.
 10. Calk penetrations in tile with sealant and backing rod specified in Section 07 92 00. Provide expansion joints where indicated or as recommended by TCNA Method EJ171.
- B. Tile blending:
1. For tile exhibiting color variations within the ranges selected during sample submittals, verify that tiles have been factory-blended and packaged accordingly so that tiles taken from one package show the same color range as those taken from other packages, and match approved samples.
 2. If not factory-blended, either return to manufacturer or blend tiles at Project site before installing.
- C. Tile installations:
1. Wall tile: Install over gypsum backer board in compliance with ANSI A108.5 and TCNA installation method W245, modified to be used over waterproofing membrane.
 2. Floor tile: Install over waterproof membrane in compliance with ANSI A108.5 and TCNA installation method F122.
- D. Sound tile after setting. Replace or reset hollow sounding units.
- E. Install thresholds as specified for tiles above and in compliance with TCNA installation method TR611.

3.4 GROUTING/CURING

- A. Grouting: Comply with ANSI A108.10. Finish joints of square edge tiles flush with tile surfaces; finish joints of cushion edge tiles to depth of cushion. Finish grout free of voids and pits.
 - 1. Fill epoxy-filled joints flush with tile edges. The epoxy will cure to a slight depression.

3.5 SEALANTS

- A. Comply with sealant manufacturer's instructions and ASTM C 1193.
- B. Install backing rod and fill joints completely with sealant tooled below surface of tile. Do not disturb until fully cured.

3.6 FIELD QUALITY CONTROL

- A. Plug drains and dam door and other openings after waterproofing is installed and flood the floor with approximately 2-inch of water.
 - 1. Let the water stand undisturbed for 48 hours and check for leaks.
 - 2. Repair discovered leaks and retest; repeat as necessary to stop leaks before proceeding with tile installation

3.7 CLEANING/PROTECTING

- A. Cleaning:
 - 1. Clean tile and repair faulty grouting. Sponge and clean surfaces with clean water and soft brushes.
 - 2. Polish glazed tile after cleaning with clean, dry cloths.
- B. Protect completed installations until acceptance by the City.
- C. Protect floor tiles with reinforced Kraft paper or other heavy covering securely taped in place during the construction period to prevent damage and stains. Remove protection when no longer needed.
- D. When recommended by tile manufacturer, apply a coat of neutral protective cleaner to completed tilework.
- E. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- F. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
- G. Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tiles.

END OF SECTION

SECTION 09 62 29 - CORK TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Cork floor tiles.
 - 2. Accessories, installation and finishing materials.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for the following:
 - a. Resilient base.
 - b. Resilient sheet flooring.
 - c. Access flooring to receive cork tile.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer Product Data and test reports for the flooring and adhesive.
- B. Samples: Full size Samples of each type of floor tile, and 12-inch long Samples of each linear material.
- C. Tests: Moisture and pH tests results for concrete substrates.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
- E. Closeout:
 - 1. Furnish the City 2 copies of the tile manufacturer recommended maintenance products, and recommended maintenance methods and procedures.
 - 2. Include precautions against cleaning materials and methods detrimental to finishes and their performance.

1.4 QUALITY ASSURANCE

- A. Uniformity:
 - 1. Provide tile, adhesive and maintenance materials from one manufacturer.
 - 2. If required, provide accessories including leveling and patching compounds supplied from one manufacturer.

- B. Installer: Firm competent in installation of cork flooring.

1.5 HANDLING

- A. Store materials indoors above 60 degrees F for at least 24 hours before use.

1.6 JOB CONDITIONS

- A. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.
- B. Maintain temperature in spaces to receive cork flooring between 70 and 90 degrees F for not less than 24 hours before and 48 hours after installation.
- C. Maintain minimum temperature of 60 degrees F after resilient flooring has been installed, except as specified above.

1.7 MAINTENANCE

- A. Furnish the City one percent of the quantity of cork tile installed on the Project, but not less than 1/2 box, properly boxed and labeled.
- B. Coordinate selection of floor polish with the City's maintenance service.

1.8 SPECIAL WARRANTY

- A. Manufacturer shall warrant materials and workmanship for 10 years from Substantial Completion and agree to make repairs and replacements due to faulty materials and workmanship during the warranty period at no cost to the City.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Wicanders.
- B. Or equal.

2.2 FLOOR TILES

- A. Type: Wicanders "Up High Performance Surface (HPS) Series 4000.
 - 1. Wear layer thickness: Minimum 0.5 mm.
 - 2. Total thickness: 8 mm.
 - 3. Density: 55/kg/m³.
 - 4. Edge configuration: Monolithic.
 - 5. Finish: TBD (Allow for 2 selections.)
 - 6. Flammability: ASTM E 648, Class 2.
 - 7. Compression recovery: With loading of 38.5 lbs/in² 10% initial, 1.5% residual after one hour, ISO 9727.
 - 8. Disintegration: Does not disintegrate in water after boiling for 3 hours.
 - 9. Abrasion resistance:
 - a. Taber Model 5130.

- b. Applied Load: 500 g/wheel.
- c. Resistance: (IP-FP)/2.
- d. Revolutions: 6583.

B. Accessories: TBD.

2.3 ADHESIVES AND FLOOR FINISH

- A. Primer, adhesive and crack filler: Type and brand recommended by cork flooring manufacturer for the conditions of use.
- B. Floor finish: Commercially available product acceptable to flooring manufacturer which, when cured, shall have a coefficient of friction of 0.6 or greater when tested in accordance with ASTM D 2047.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Prepare substrates according to adhesive manufacturer's instructions and the following to ensure adhesion of floor coverings.
- B. Concrete: Prepare according to ASTM F 710.
 - 1. Verify that substrate is dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Perform alkalinity and adhesion tests recommended by manufacturer. Proceed with installation only after substrates passes testing.
 - 4. Moisture testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869, or equivalent test recommended by the flooring manufacturer. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 square foot in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - 5. Check pH level and correct until it is within range recommended by the adhesive manufacturer.
 - 6. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
 - 7. Level surfaces to be covered with flooring by grinding bumps and filling-in depressions to a tolerance an overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17. Use fill material compatible with both substrates.
- C. Sweep and vacuum clean substrates to be covered with flooring before installation.

- D. Move resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation. Do not install resilient flooring until materials are the same temperature as space where they will be installed.
- E. Correct other detrimental conditions before proceeding with installation.

3.2 ADHESIVES

- A. Mix and apply adhesives in compliance with their manufacturer's instructions.
- B. Apply adhesive uniformly over backing surfaces, but only on areas that can be covered by flooring material within the recommended working time of the adhesive.
- C. Remove adhesive that dries or films over. Do not soil adjacent surfaces with adhesive, and promptly remove spillage without damaging those surfaces.

3.3 TILE

- A. Match tiles for color and pattern, when applicable, by using tiles from cartons in the same sequence as manufactured and packaged.
- B. Install tiles working from centerlines of each room or space and work outward towards the perimeter. Lay out tiles so none are less than 1/2 the width of a full size tile.
- C. Fit tiles neatly and tightly into breaks and recesses, against bases, around pipes and penetrations, under metal thresholds and around permanent fixtures and equipment.
- D. Lay tiles in grid pattern with the tile pattern running in the same direction, parallel to room axis in straight lines, except where impractical because of room shape.
- E. As floor tile is installed and within adhesive's recommended working time, roll floor with a clean, smooth, 100-pound roller in both directions.
 - 1. As the rolling proceeds, replace loosened, defective, or damaged tile with new and finish to the specified condition.
 - 2. Take particular care to roll edges and corners thoroughly.

3.4 ACCESSORIES

- A. Install as indicated on the Drawings and in accordance with cork flooring manufacturer's instructions.
- B. Install linear accessories in one piece between door jambs, and in longest possible length elsewhere with no piece less than 6 feet long.
- C. Butt tightly to resilient tiles, where applicable, and scribe accurately to doorframe and other abutting surfaces.

3.5 FINISHING/CLEANING/PROTECTING

- A. Protect flooring against mars, marks, indentations, and other damage immediately after installation and sealing..
- B. Use protection methods recommended by flooring manufacturer.
- C. Do not move heavy and sharp objects directly over resilient flooring. Place hardboard panels over flooring and under objects being moved. Slide or roll objects over tiles without moving tiles..
- D. Cover traffic paths with undyed, untreated building paper taped securely in place. Remove at final cleaning.

- E. Clean installed cork flooring not more than 4 days before dates scheduled for inspections intended to establish Substantial Completion in each area of the Project.
 - 1. If required to restore sealer, and if recommended by flooring manufacturer, strip sealer applied after completing installation, but before cleaning.
 - 2. After cleaning, reapply sealer to floor to restore floor finish according to flooring manufacturer instructions. Coordinate with City's maintenance program.
- F. Remove and replace materials that are damaged or cannot be cleaned.

END OF SECTION

SECTION 09 65 10 - RESILIENT WALL BASE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Rubber bases.
 - 2. Adhesive.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Samples: 12-inch long Samples of each type and color of base.
- B. Data: Proof of compliance with specified requirements.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.4 HANDLING

- A. Store materials indoors at a temperature above 60-degree F for at least 24 hours before use.

1.5 JOB CONDITIONS

- A. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.
- B. Maintain temperature in spaces to receive resilient bases between 70-degree and 90-degree F for not less than 24 hours before and 48 hours after its installation.
- C. Maintain minimum temperature of 60-degree F after bases have been installed, except as specified above.

1.6 MAINTENANCE

- A. Furnish 100 feet of each type and color of base for future maintenance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Burke Flooring Products
- B. Johnsonite, Flexco Co.
- C. Mercer Products Co., Inc.,
- D. Roppe Rubber Corp.
- E. Or equal.

2.2 MATERIALS

- A. Rubber bases:
 - 1. 1/8-inch thick, by height indicated on the Drawings, ASTM F 1861, Type TS (thermoset vulcanized rubber), Group 1 (homogeneous), color(s) selected by the Design Consultant.
 - 2. Top set base where no flooring and resilient flooring occur; straight (carpet) base at all other locations; do not use preformed corners.
 - 3. In rolls minimum 100-foot long. Walls 20-foot or less in one piece; do not use short pieces.
 - 4. Base shall be from same batch and run number for each color.
- B. Adhesive: Type and brand recommended by base manufacturer for the conditions of use.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine walls for excessive moisture content and unevenness which would prevent the proper execution of the work of this Section. Fill cracks and sand down bumps.
- B. Remove dirt, oil, grease, or other foreign matter from surfaces to receive bases.
- C. Correct detrimental conditions before proceeding with installation.
- D. Do not install bases until they are same temperature as space where they are to be installed. Move bases and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

3.2 ADHESIVE

- A. Mix and apply adhesive in compliance with its manufacturer's instructions.
- B. Provide safety precautions during mixing and application as recommended by the adhesive manufacturer.
- C. Apply adhesive uniformly over backing surfaces, but only on areas which can be covered by bases within the recommended working time of the adhesive.
- D. Tape adjacent surfaces to prevent migration and misapplication of adhesive.
- E. Remove adhesive which dries or films over. Do not soil walls, bases, and other adjacent surfaces with adhesive. Promptly remove spillage from adjacent surfaces without damaging those surfaces.

3.3 BASE

- A. **[At masonry surfaces, fill voids along top edges of base with base manufacturer's recommended adhesive filler material.]**
- B. Match edges at seams or double cut adjoining lengths. Install with hairline, flush butt joints.
- C. Locate end of runs not less than 36 inches from a corner, except where impossible due to length of wall.
- D. Do not use pieces less than 6-foot long, except where impossible due to length of wall.
- E. Do not use preformed corner pieces.
 - 1. Form inside corners on job from straight pieces of maximum lengths possible by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce snug fit to substrate.
 - 2. Form outside corners on job from straight pieces of maximum lengths possible by shaving back of base at point where bending will occur. Remove a strip perpendicular to length of base and only deep enough to produce a snug fit without bends whitening or removal of more than half the thickness of base.
 - 3. Form without producing discoloration (whitening) at bends.
- F. Scribe base accurately to abutting materials.

3.4 FIELD QUALITY CONTROL

- A. After adhesive has set, clean bases with a neutral cleaner recommended by the base manufacturer.
- B. Verify that there are no open joints and that base is completely adhered for its full length. Re-install in fresh adhesive where applicable.
- C. Protect completed installations from damage until final acceptance.

END OF SECTION

SECTION 09 65 16 - LINOLEUM SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Linoleum sheet flooring, seamless heat-welded installation with integral, coved bases.
2. Accessories and installation materials.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 09 for other types of resilient flooring.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

A. Samples:

1. Materials: 24-inch square sample of linoleum, and 12-inch long samples of termination bar.
2. Seam sample: For seamless installation technique indicated and for each resilient flooring type, with seam running lengthwise and in center of minimum 6- by 12-inch sample applied to rigid backing.

B. Shop drawings:

1. Showing seam locations, where applicable. Seam locations are subject to Design Consultant's approval and relocation at no cost to the City.
2. Show edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- a. Show details of special patterns.

C. Tests: Moisture and pH tests results for concrete substrates.

D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

E. Closeout:

1. Furnish the City 2 copies of the sheet flooring manufacturer recommended maintenance products and recommended maintenance methods and procedures.
2. Include precautions against cleaning materials and methods detrimental to finishes and performance.

1.4 QUALITY ASSURANCE

A. Uniformity:

1. Provide sheet flooring, adhesive and maintenance materials from one manufacturer.
2. If required, provide accessories including leveling and patching compounds supplied by one manufacturer.

B. Installer qualification: Firm competent in installation of resilient flooring.

1.5 HANDLING

A. Store materials indoors above 60-degree F for at least 24 hours before use.

1.6 JOB CONDITIONS

- A. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.
- B. Maintain temperature in spaces to receive resilient flooring between 70 and 85 degrees F for not less than 24 hours before and 48 hours after installation.
- C. Maintain minimum temperature of 60 degrees F after installation of resilient flooring, except as specified above.

1.7 WARRANTY

- A. Manufacturer shall warrant materials and workmanship for _____ years, and agrees to make repairs and replacements due to faulty materials and workmanship during the warranty period at no cost to the City.

1.8 MAINTENANCE

- A. Furnish maintenance materials consisting of 6-foot long roll of each type and color of sheet flooring installed on the Project.

PART 2 - PRODUCTS

2.1 PRODUCTS

2.2 MANUFACTURERS

- A. Armstrong Contract Interiors.
- B. Forbo Industries, Inc. (basis of design.)
- C. Kentile Floors, Inc.
- D. Tarkett.
- E. Azrock Domco Inc., USA
- F. Burke Flooring Products.
- G. Johnsonite.
- H. Mercer Products Co.
- I. Or equal.

2.3 LINOLEUM TYPE

- A. Forbo Marmoleum Real, 2.5 mm thick with a coefficient of friction shall be a minimum of 0.6 with the applied finish, when tested in compliance with ASTM C 2047.

2.4 MATERIALS

- A. Linoleum: Natural materials and calendared onto natural jute backing. Pattern and color shall extend through thickness of material.
- B. Heat-welding beads: Vinyl rods, same color as the flooring, provided by linoleum flooring manufacturer.
- C. Edging and reducer strip: Tapered hard rubber edging strip made specifically for termination of resilient flooring, by Mercer Products Co., Inc., Macklanburg-Duncan, Johnsonite, or equal, of the color selected by the Design Consultant.
- D. Primer, adhesive and crack filler: Waterproof, alkali-resistant type, non-staining and antimicrobial, 510 Clear Adhesive Thin Spread Adhesive by Ecoprotek, or equal, unless otherwise as recommended by linoleum flooring manufacturer for the conditions of use.
- E. Cover filler strip: Stock No. 70, vinyl extrusion by Burke Mercer Flooring Products, or equal, or softwood cove strip.
- F. Edge cap: Vinyl extrusion Stock No. 71 by Burke Mercer Flooring Products, CR1041 P&S by Bengard, or equal.
- G. Floor finish: Type recommended by the linoleum flooring manufacturer. Floor finish, when cured, shall have a coefficient of friction of 0.6 or greater when tested in accordance with ASTM D 2047.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Prepare substrates according to manufacturer's instructions to ensure adhesion of floor coverings.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

3. Perform alkalinity and adhesion tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
4. Moisture testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869, or equivalent test recommended by the flooring manufacturer. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 square foot in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
5. Check pH level and correct until it is within range recommended by the adhesive manufacturer.
6. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
7. Level surfaces to be covered with flooring by grinding bumps and filling-in depressions to a tolerance an overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17. Use fill material compatible with both substrates.
- C. Sweep and vacuum clean substrates to be covered with flooring before installation.
- D. Move resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation. Do not install resilient flooring until materials are the same temperature as space where they will be installed.
- E. Correct other detrimental conditions before proceeding with installation.

3.2 ADHESIVES

- A. Mix and apply adhesives in compliance with their manufacturer's instructions.
- B. Apply adhesive uniformly over backing surfaces, but only on areas that can be covered by flooring material within the recommended working time of the adhesive.
- C. Remove adhesive that dries or films over. Do not soil adjacent surfaces with adhesive, and promptly remove spillage without damaging those surfaces.

3.3 LINOLEUM FLOORING

- A. General:
 1. Install in accordance with its manufacturer instructions, with the minimum number of seams as accepted on shop drawings. Lap and recut seams to a hairline, tight and flush.
 2. Roll flooring into adhesive with heavy roller to eliminate air pockets and to thoroughly bond to the substrate.
 3. Install cove strip at junction of floor and wall. Turn flooring up 4 inches without breaks, glue to wall and cover exposed top edge with metal trim installed in longest available length.

B. Seamless installation:

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
2. Chemically-Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly-fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.

C. Self-coved base:

1. Locate end of runs not less than 36 inches from a corner, except where impossible due to length of wall.
2. Do not use pieces less than 6 feet long, except where impossible due to length of wall.
3. Do not use pre-formed corner pieces.
4. Install cove strip at junction of floor and wall. Turn flooring up 4 inches without breaks, glue to wall and cover exposed top edge with metal trim installed in longest available length.

3.4 REDUCER AND EDGING STRIPS

A. Install at termination of linoleum flooring where the flooring material is not covered by another material.

1. Install in one piece between door jambs, and in longest possible length elsewhere with no piece less than 6 feet long.
2. Butt tightly to resilient flooring, where applicable, and scribe accurately to door frame and other abutting surfaces.
3. Glue securely to clean, dry subfloor.

3.5 FINISHING/CLEANING/PROTECTING

- A. Protect flooring against mars, marks, indentations, and other damage immediately after installation and polishing.
- B. Use protection methods recommended by flooring manufacturer.
- C. Do not move heavy and sharp objects directly over resilient flooring. place hardboard panels over flooring and under objects being moved. slide or roll objects over panels without moving panels.
- D. Drying room yellowing: Exposed installed linoleum to either natural or artificial light to allow "drying room yellowing" on installed linoleum flooring to disappear prior to initiating temporary protection procedures.
- E. Cover traffic paths with undyed, untreated building paper taped securely in place. Remove at final cleaning.
- F. Apply protective polish to floor surfaces that are free from soil, visible adhesive and surface blemishes.
- G. Clean resilient floors not more than 4 days before dates scheduled for inspections intended to establish Substantial Completion in each area of the Project.
 1. Clean according to flooring manufacturer's recommendations.
 2. If required to restore polish finish, and if recommended by flooring manufacturer, strip protective floor polish applied after completing installation before cleaning.

3. After cleaning, reapply polish to floor to restore floor finish according to flooring manufacturer instructions. Coordinate with City's maintenance program.
- H. Remove and replace materials that are damaged or cannot be cleaned as approved by the Design Consultant.

END OF SECTION

SECTION 09 67 70 - INTERIOR CONCRETE FLOOR SEALER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes clear concrete sealer on exposed surfaces of the interior concrete floors indicated.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation meeting:
 - 1. Prior to start of installation, arrange a pre-installation meeting between the sealer manufacturer, the applicator, and related trades whose work will be in contact with the treated surface, including but not limited to those for colored concrete and joint sealers.
 - 2. Record minutes of the meeting, file in the Project file, and send a copy to the Design Consultant.
- B. Coordination:

1.4 SUBMITTALS

- A. Data: Manufacturer product data of the proposed sealer, including recommended coverage rates, include material test reports indicating and interpreting test results for compliance of water-repellent sealer with criteria specified.
- B. Manufacturer certification:
 - 1. Letter from the sealer manufacturer to verify its acceptance of the applicator, acceptance of substrates as satisfactory to receive the specified sealer, and affidavit that sealer is compatible with concrete curing agent used.
 - 2. Duplicate copies of manufacturer affidavit with each shipment of materials delivered to the jobsite certifying that material furnished complies with specified requirements.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 QUALITY ASSURANCE

- A. Installer qualifications: Firm with a minimum of 3 consecutive years of experience in application of the sealer proposed for use, or similar sealers, on projects of similar size and scope, and licensed or approved in writing by the sealer manufacturer.
- B. Sample panels: When requested by the sealer manufacturer, or necessary to adjust sealer formulation, provide sealer manufacturer with sufficient samples of substrate to be coated to determine exact formulation and coverage rates.
- C. Manufacturer inspections:
 - 1. Obtain materials only from manufacturer who will send a qualified technical representative to the Project site before start of this work to verify substrate acceptability. Schedule subsequent visits as required thereafter to review installation procedures and completed work, and to issue warranty specified.
 - 2. Unsatisfactory conditions disclosed by the manufacturer visits to the site shall be promptly and satisfactorily repaired and the areas re-inspected by the manufacturer before work starts or resumes in affected areas.
- D. Pre-installation testing:
 - 1. Test sample panel in accordance with ASTM E 514, modified for field use.
 - 2. Report results of tests and apply additional sealer, when appearance is unchanged, or re-formulate and re-apply sealer, when test results are not satisfactory.

1.6 JOB CONDITIONS

- A. Comply with manufacturer's recommendations regarding environmental requirements, and temperature and conditions of surfaces to receive sealer.

1.7 WARRANTY

- A. Warrant sealer against water penetration through treated surfaces, peeling, cracking, discoloration and other defects of the sealer, caused by faulty materials and workmanship, for 5 years after Substantial Completion.
- B. The warranty shall include repair of defects and failures in the sealer during the warranty period, at no cost to the City.

PART 2 - PRODUCTS

2.1 SEALER/MANUFACTURER

- A. Basis of design is "Consolidek LS" by ProSoCo., or equal by one of the following:
 - 1. Harris Specialty Chemicals, Inc. (Hydrozo).
 - 2. L&M Construction Chemicals, Inc.
 - 3. Pecora Corp.
 - 4. Sivento.
 - 5. Sonneborn.
 - 6. Or equal.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide sealer with the following properties based on testing manufacturer standard products, according to test methods indicated, applied to substrates simulating Project conditions using same materials and application methods to be used for Project.
 - 1. Absorption: Minimum 90 percent reduction of absorption after 24 hours in comparison of treated and untreated specimens for hardened concrete: ASTM C 642.
 - 2. Water-vapor transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, ASTM E 96.
 - 3. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, ASTM G 53.
 - 4. Permeability: Minimum 80 percent breathable in comparison of treated and untreated specimens, ASTM D 1653.
- B. Appearance: When compared visually to an untreated sample under same lighting conditions, the sealer shall not change the color and sheen of the coated substrate, and shall be invisible after application and over the life of the building.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Provide services of a factory-authorized technical service representative, from the sealer manufacturer, to inspect and approve the substrates before application and to instruct the applicator on the product and application method to be used.
- B. Verify that slabs to be sealed are clean, dry and free of dust, dirt, oil, grease and other foreign material that would affect the application and performance of the sealer.
- C. Correct detrimental conditions before proceeding with installation.

3.2 PROTECTING

- A. Protect adjacent work, including sealant bond surfaces, from spillage or blow-over of sealer.

3.3 PHASING

- A. Where feasible delay sealer application until installation of sealants is complete in joints adjoining surfaces to be coated.
- B. Sealer work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, sealer, and sealant materials identical to those used in the Work.

3.4 APPLICATION

- A. Test application:
 - 1. Before performing this work, including bulk purchase and delivery of products, prepare a small application in an unobtrusive location and in a manner approved by Design Consultant to demonstrate the final effect (visual, physical, and chemical) of planned application.
 - 2. Proceed with work only after Design Consultant review of test application.

- B. Sealer shall be applied by manufacturer-approved applicators using recommended methods and equipment.
- C. Do not exceed the application rate recommended by the manufacturer.
- D. Topcoat (LSGuard):
 - 1. Uniformly spread the product in a thin layer using a microfiber pad pre-moistened with sealer prior to use. Do not allow product to dry prior to spreading.
 - 2. Allow to dry tack free (20 to 60 minutes).
 - 3. Once dry, burnish to a high gloss finish using high-speed burnishing equipment and a high-speed burnishing pad designed for use on a high-gloss finish. Additional coats may be applied and burnished depending upon concrete porosity and desired finish.

3.5 FIELD QUALITY CONTROL

- A. The City may employ a testing agency to test the in-place sealer in compliance with standards specified.
- B. The City will pay cost of test, except when test discloses that the sealer tested does not comply with these Specifications; the Contractor shall pay subsequent retests until application meets Specifications requirements.
- C. In the event test shows that the sealer is deficient, apply additional sealer.
- D. Repetition of the above procedure on all previously treated surfaces will be at Contractor's expense.

3.6 CLEANING

- A. Clean sealer from adjacent surfaces immediately after spillage.
- B. Comply with manufacturer's recommendations for cleaning.

END OF SECTION

SECTION 09 68 13 - CARPET TILE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Furnishing carpet tile for installation over access flooring.
 - 2. Furnishing and installing carpet tile where indicated on the Drawings.
 - 3. Adhesive.
 - 4. Accessories.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Samples:
 - 1. Full size samples of carpet tile.
 - 2. Twelve-inch long samples of carpet edge guard profile.
- B. Layout drawings: Three-eight-inch minimum layout drawings showing tile layout, pattern direction, if any, and pile direction.
- C. Tests: Results of test conducted on concrete (refer to Part 3 below) slabs prior to start of installation.
- D. Data:
 - 1. Copies of manufacturer's recommended cleaning and maintenance instructions for carpet.
 - 2. Manufacturer product data for carpet, adhesive and accessories.
 - 3. Evidence that the carpet, accessories and adhesives to be used comply with Code requirements for combustibility, flammability and toxicity.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Carpet.
- F. Manufacturer warranties: Published warranties as specified below.

1.4 QUALITY ASSURANCE

- A. Installer qualifications: FCIB or IFCI certified carpet installers, unless otherwise acceptable to the Design Consultant.
- B. Pre-installation conference:
 - 1. Prior to start of installation, arrange a pre-installation meeting between the carpet installer, Contractor, Design Consultant and electrical trade responsible for wire access, where applicable.
 - 2. Mark chalk lines on the slab, showing pattern alignment for placement of seams and pattern layout. Spray lacquer on chalk lines, after Design Consultant has approved the locations.
 - a. The permanent lacquered chalk lines will be used as the approved seam locations for carpet.

1.5 HANDLING

- A. Procedure: In accordance with CRI 104 Section 5. Store carpet indoors in a protected location.
- B. Delivery: Deliver carpet with manufacturer registry number attached and intact.
- C. Storage: Store carpet bins to prevent pile crush. Temporary storage shall be in flat bins with a maximum height not to exceed 3 rolls.
- D. Handling:
 - 1. Transport carpet on flat dollies equipped with carpet cradles. Equip fork lifts with booms.
 - 2. Bending or folding of individual carpet rolls is not recommended, however, if it is absolutely necessary for delivery purposes, under no circumstances shall carpet be left bent or folded for longer than 4 hours.
- E. Conditioning:
 - 1. Condition carpet and adhesive on site in a heated, dry space at a minimum temperature of 65-degree and a relative humidity between 10 percent and 65 percent for at least 48 hours before installation.
 - 2. Maintain these conditions night and day during installation and for at least 72 hours after completion.

1.6 JOB CONDITIONS

- A. Temperature: Maintain a uniform temperature, in the space being carpeted, in the range of 65 to 75 degrees F during and after carpet installation.
- B. Lighting: Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work and as will occur in the room or space after the building is in operation.
- C. Ventilation:
 - 1. Maintain fresh air ventilation in installation spaces in accordance with current guidelines of ASHRAE standard 62 published by American Society of Heating, Refrigerating and Air Conditioning Engineers.

2. During installation, maintain fresh air ventilation by utilizing exhaust fans, and by operating the ventilation system at full capacity. Exhaust air to the outside and avoid recirculation of air.
3. After installation, maintain fresh air ventilation for 48-72 hours at normal room temperatures by operating ventilation or exhaust fan system at full capacity. Open doors and windows, if possible to dissipate, and eliminate lingering odors from the installation.

1.7 WARRANTIES

A. Carpet manufacturer shall warrant the carpet as follows:

1. The life of the carpet shall be 15 years under normal conditions.
2. Primary and secondary backing shall not delaminate for the life of the carpet.
3. Twenty-pound tuft-bind, wet and dry, shall be warranted for the life of carpet.
4. Stain resistant properties shall be permanent and inherent in the fiber. Topically applied stain resistant treatments are not acceptable. Stain resistant properties shall not be removed by commercial cleanings and abrasive wear.
5. Carpet shall be warranted to be impervious to water damage.
6. There shall be no more than 10 percent face yarn loss for the life of the carpet.

1.8 MAINTENANCE

- A. Furnish the following full-size units equal to 2 percent of amount installed for each type indicated, but not less than 2 full boxes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Interface.
- B. Or equal.

2.2 CARPET TILE

- A. Interface FLOR 24-inch squares.
- B. Style: "House Pet."
- C. Colors: Up to 4 colors TBD.

2.3 CARPET ACCESSORIES AND INSTALLATION MATERIALS

- A. Binder bars and edge strips: Designed specifically for conditions of use. The Design Consultant will select Color(s).
- B. Adhesives: Premium quality pressure-sensitive, type approved by carpet tile manufacturer for conditions of use.
- C. Edge sealer: USG Durabond Carpet Square Adhesive D2, WW Henry Peach Glue, 3M Blue Glue, or equal adhesive formulated for heavy commercial approved by the carpet manufacturer.

- D. Floor leveling material:
 - 1. Provide a minimum of one 10 lbs. bag of Portland cement-based floor prep material for every 100 square yard of carpet to be installed.
 - 2. Do not use gypsum-based materials.
- E. Other miscellaneous materials: As recommended by the carpet manufacturer for the conditions of installation and use.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Comply with the applicable specifications and recommendations of the Carpet and Rug Institute (CRI), Standard for Installation of Textile Floor covering Materials CRI 104, except as noted.
- B. Vacuum substrate immediately prior to carpeting and remove deleterious substances, which would interfere with the installation or be harmful to this work.
- C. Prepare concrete surfaces in accordance with CRI 104 Section 6.1.1 and 6.2.
- D. Check floors for moisture content. Be sure that they are sufficiently dry to receive carpet by testing in compliance with ASTM D 4263. Allow sufficient time in the construction schedule to allow slabs to dry sufficiently, force dry slabs, or provide a compatible surface coating so that water vapor emission will be at a level acceptable to the floor-covering manufacturer.
- E. Test the alkalinity level of the concrete using a Litmus test. If the pH is above a level unacceptable to the adhesive manufacturer, treat the surface so that the floor PH is within acceptable levels.
- F. Remove dirt, oil, grease, or other foreign matter from surfaces to be carpeted and/or to receive floor filler.
- G. Use a floor filler, recommended by the carpet manufacturer, to fill-in cracks, holes and other indentation marks; grind down bumps to flat surface. Floor under carpet shall not exceed an Ff of 25.
- H. Correct other detrimental conditions before starting installation.

3.2 INSTALLATION

- A. General:
 - 1. Comply with the carpet manufacturer's instructions and recommendations, except as modified herein.
 - 2. Align carpet with centerline of room or space, and adjust at edges for wall variations.
 - 3. Dry lay carpet in one room before going further to verify side match, dye sequence, pattern and defects. Obtain Design Consultant's approval of dry lay before installing the remainder of carpet tile.
 - 4. Install carpet edge guard, where edge of carpet is exposed to traffic, in single length without joints except at changes in direction. Cut for a tight fit against abutting surfaces. Center under doors when applicable.
 - 5. Extend carpet at the following locations:
 - a. Under open-bottomed and raised bottomed obstructions, and under removable flanges of obstructions.
 - b. Into closets and alcoves of spaces scheduled to be carpeted, unless another floor finish is indicated for such space.
 - c. Under movable furniture and equipment.

6. Install carpet in one direction in each room and do not reverse direction at any locations.
 7. Carpet shall have full adhesion to subfloor without loose edges.
- B. Carpet tile installation:
1. Install in accordance with CRI 104 Section 14 and the following.
 2. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignment. Cut tiles to obtain clean, sharp edges.
 3. Install tile by the stair step method in full bed of adhesive, with tight joints and perimeter units not less than 1/2 tile wide. Adjust to minimize cutting.
 4. Install tiles so that the arrows on the back point in the same direction.
 5. Fit tiles snugly to prevent gaps, but do not force into place so as to cause buckles. Align tiles to avoid trapping pile yarns in the joint.
 6. Roll completed installation with a 35 to 75 lb. linoleum roller in both directions to ensure uniform bond everywhere.
 7. Installation tolerance: Comply with appropriate Sections of CRI 104.

3.3 CLEANING/PROTECTING

- A. Remove debris from installation, carefully sorting pieces to be saved from scraps to be disposed of.
- B. Vacuum carpet with a commercial machine, with a rotating agitator or beater in the nozzle. Remove soiled spots.
- C. Close areas to traffic during installation. Cover carpet in traffic areas with protective non-staining building paper. Do not use plastic sheeting.
- D. Prior to acceptance of the Work, replace damaged and stained carpet with new carpet.

END OF SECTION

SECTION 09 69 00 - ACCESS FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Access Flooring System consisting of concrete-filled, formed-steel panels on pedestals with stringers.
 - 2. Floor panel coverings.
- B. Related requirements:
 - 1. Division 01 for the following:
 - a. LEED requirements.
 - b. Allowances for cutouts and service outlets.
 - c. Unit prices for cutouts and service outlets.
 - d. Alternate floor covering.
 - 2. Division 08 for overhead coiling door terminating on access floor.
 - 3. Division 09 for the following:
 - a. Concrete floor sealer.
 - b. Cork tiles and carpet tiles applied over access flooring panels.
 - 4. Division 12 for walk-off mats on access flooring.
 - 5. Division 23 for pressure testing of underfloor plenum.
 - 6. Division 23 for variable-air-volume diffusers.
 - 7. Division 26 for connection to ground of access flooring understructure.
 - 8. Division 26 for coordination with understructure.
 - 9. Division 27 for voice and data cabling for service outlets and for coordination with understructure pedestals.
- C. Quantity Allowances: Provide the following as specified in Division 01 Section "Allowances."
 - 1. Cutouts in floor panels.
 - 2. Service outlets.

1.2 UNIT PRICES

- A. Unit Prices: The Contract Sum will be adjusted for changes in quantity from that indicated in allowances for cutouts in floor panels and service outlets based on amounts stipulated in the Form of Agreement and complying with Division 01 Section "Unit Prices." Changes to quantities and to the Contract Sum will be made by Change Order.

1.3 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include layout of access flooring system and relationship to adjoining Work based on field-verified dimensions, including walk-off mats installed on access flooring.

1. Details and sections with descriptive notes indicating materials, finishes, fasteners, typical and special edge conditions, accessories, understructure, and assemblies interfacing with access flooring.
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.

C. Samples:

1. Resilient Accessories: Manufacturer's standard accessories but not less than 12 inches long.
2. Exposed Metal Accessories: 12 inches long.
3. One complete full-size floor panel, pedestal, and understructure unit for each type of access flooring system required.

D. Product Certificates: For each type of access flooring system, signed by product manufacturer.

E. Qualification Data: For Installer.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, or performed by access flooring manufacturer and witnessed by a qualified testing agency, for each type of flooring material and exposed finish.

G. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 QUALITY ASSURANCE

A. Manufacturer qualifications: ISO9001:2000-certified, demonstrating it has a robust and well-documented quality management system with continuous improvement goals and strategies.

B. Manufacturer facilities: ISO1400:2004-certified, demonstrating regular maintenance of an environmental management system.

C. Installer Qualifications: An employer of workers trained and approved by manufacturer.

D. Source Limitations: Obtain access flooring system through one source from a single manufacturer.

E. Regulatory Requirements: Fabricate and install access flooring to comply with NFPA 75 requirements for raised flooring.

F. Provide floor panels that are clearly and permanently marked on their underside with panel type and concentrated-load rating.

G. 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 of typical access flooring assembly as shown on Drawing. Size to be an area no less than 5 floor panels in length by 5 floor panels in width.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1. Review connection with mechanical and electrical systems.

2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install access flooring until spaces are enclosed, subfloor has been sealed, ambient temperature is between 40 and 90 deg F, and relative humidity is not more than 70 percent.

1.7 COORDINATION

- A. Coordinate location of mechanical and electrical work in underfloor cavity to prevent interference with access flooring pedestals.
- B. Mark pedestal locations on subfloor by use of a grid, with a module equal to width of five floor panels in both directions, to enable mechanical and electrical work to proceed without interfering with access flooring pedestals.
- C. Proceed with installation only after completion of other construction within affected spaces.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described in subparagraphs below that match products installed and that are packaged with protective coverings for storage and identified with labels describing contents.
 1. Flooring Panels: TBD.
 2. Pedestals: TBD.
 3. Stringers: TBD.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tate Access Floors, Inc.
- B. Or equal.

2.2 ACCESS FLOORING

- A. Tate Concore system 1500.
- B. Floor Panels:
 1. Configuration: no person, using a portable lifting device, can interchange with other field panels without disturbing adjacent panels or understructure:
 2. Die-cut flat steel top sheet and bottom, die-formed and stiffened to form an enclosed assembly. Fully grout internal spaces of completed units with manufacturer's standard cementitious fill.
 3. Nominal Panel Size: As indicated on the Drawings.
 4. Fabrication Tolerances: Fabricate panels to the following tolerances with squareness tolerances expressed as the difference between diagonal measurements from corner to corner:
 - a. Size and Squareness: Plus or minus 0.015 inch of required size, with a squareness tolerance of plus or minus 0.015 inch, unless tolerances are otherwise indicated for a specific panel type.
 - b. Flatness: Plus or minus 0.020 inch, measured on a diagonal on top of panel.

5. Panel Attachment to Understructure: By bolting to pedestal head. Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk screws with heads flush with top of panel.
- C. Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel.
1. Provide pedestals designed for use in seismic applications.
 2. Base: Square or circular base with not less than 16 sq. in. of bearing area.
 3. Column: Of height required to bring finished floor to elevations indicated. Weld to base plate.
 4. Provide vibration-proof leveling mechanism for making and holding fine adjustments in height over a range of not less than 2 inches and for locking at a selected height, so deliberate action is required to change height setting and vibratory displacement is prevented.
 5. Head: Designed to support understructure system indicated.
 - a. Provide sound-deadening pads or gaskets at contact points between heads and panels.
 - b. Provide head with four holes aligned with holes in floor panels for bolting of panels to pedestals.
- D. Stringer Systems: Modular steel stringer systems made to interlock with pedestal heads and form a grid pattern placing stringers under each edge of each floor panel and a pedestal under each corner of each floor panel. Protect steel components with manufacturer's standard galvanized or corrosion-resistant paint finish.
1. Bolted Stringers: System of main and cross stringers connected to pedestals with threaded fasteners accessible from above.
 2. Provide continuous gasket at contact surfaces between panel and stringers to deaden sound, to seal off underfloor cavity from above, and to maintain panel alignment and position.
 3. Provide stringers that support each edge of each panel where required to meet design-load criteria.

2.3 FLOOR PANEL FINISHES

- A. Exposed steel surfaces: Manufacturer's standard corrosion-resistant finish.
- B. Applied floor covering: **[including perforated panels]**.
1. Carpet tile adhesively bonded to top surface of panel: As specified in Section 09 68 13.
 2. Cork tile adhesively bonded to top surface of panels: As specified in Section 09 62 29.
- C. Resilient Wall Base: As specified in Section 09 65 10.

2.4 ACCESSORIES

- A. Post-Installed Anchors: For anchoring pedestal bases to subfloor, provide **[2] [4]** post-installed **[expansion anchors]** [threaded concrete screws] made from carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild), with the capability to sustain, without failure, a load equal to 1.5 times the loads imposed by pedestal overturning moment on fasteners, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

- B. Cutouts: Provide cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with standard performance requirements.
1. Number, Size, Shape, and Location: To be determined.
 2. Fit cutouts with manufacturer's standard grommets in sizes indicated or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding having tapered top flange. Furnish removable covers for grommets.
 3. Provide foam-rubber pads for sealing annular space formed in cutouts by cables.
- C. Service Outlets:
1. Standard UL-listed and -labeled assemblies, for recessed mounting flush with top of floor panels, for power, communication, and signal services, and complying with the following requirements:
 2. Structural Performance: Cover capable of supporting a 1000-lbf concentrated load.
 3. Cover and Box Type: Hinged polycarbonate cover with opening for passage of cables when cover is closed and including frame and steel box or formed-steel plate for mounting electrical receptacles.
 4. Location: In center of panel quadrant, unless otherwise indicated.
 5. Receptacles and Wiring: Electrical receptacles and wiring for service outlets are specified in Division 26 Sections.
- D. Diffusers: Manufacturer's standard round diffusers, designed to produce a removable one-piece unit complete with diffuser, manually adjustable flow regulator, dirt and dust receptacle, trim ring, and underfloor compression mounting ring; precisely fitted in factory-prepared openings of standard field panels.
- E. Floor Grilles: Standard load-bearing grilles, removable one-piece unit precisely fitted in factory-prepared openings of standard field panels, with adjustable/removable dampers.
- F. Cavity Dividers: Provide manufacturer's standard metal dividers located where indicated to divide underfloor cavities.
- G. Vertical Closures (Fasciae): Where underfloor cavity is not enclosed by abutting walls or other construction, provide metal-closure plates with manufacturer's standard finish.
- H. Perimeter Support: Where indicated, provide manufacturer's standard method for supporting panel edge and forming transition between access flooring and adjoining floor coverings at same level as access flooring.
- I. Panel Lifting Device: Manufacturer's standard portable lifting device of type required for specified panels. Provide one lifting devices per room of each type required.
- J. Electrostatic discharge: To be determined.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with installer and manufacturer's representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
1. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, foreign deposits, and debris that might interfere with post-installed anchor attachment of pedestals.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than 6 inches.
- B. Locate each pedestal, complete any necessary subfloor preparation, and vacuum clean subfloor to remove dust, dirt, and construction debris before beginning installation.

3.3 INSTALLATION

- A. Install access flooring system and accessories under supervision of access flooring manufacturer's authorized representative to produce a rigid, firm installation that complies with performance requirements and is free of instability, rocking, rattles, and squeaks.
- B. Attach pedestals to subfloor with post-installed mechanical anchors.
- C. Adjust pedestals to permit top of installed panels to be set flat, level, and to proper height.
- D. Secure stringers to pedestal heads according to access flooring manufacturer's instructions.
- E. Install flooring panels securely in place, properly seated with panel edges flush. Do not force panels into place.
 - 1. Carpeted Panels: Install panels with carpet pile in same direction.
 - 2. Cork over panels: For cork-covered panels exhibiting color variations, blend and arrange panels so that installed units show no extreme color variations in any area.
- F. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater than 1/8 inch where panels abut vertical surfaces.
- G. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote location or as required to prevent contamination of subfloor under access flooring already installed.
- H. Ground flooring system as recommended by manufacturer and as needed to comply with performance requirements for electrical resistance of floor coverings.
- I. Scribe and install underfloor-cavity dividers to closely fit against subfloor surfaces, and seal with mastic.
- J. Scribe vertical closures to closely fit against subfloor and adjacent finished-floor surfaces. Set in mastic and seal to maintain plenum effect within underfloor cavity.
- K. Clean dust, dirt, and construction debris caused by floor installation, and vacuum subfloor area, as installation of floor panels proceeds.
- L. Seal underfloor air cavities at construction seams, penetrations, and perimeter to control air leakage as recommended in writing by manufacturer.
- M. Install access flooring without change in elevation between adjacent panels and within the following tolerances:
 - 1. Plus or minus 1/16 inch in any 10-foot distance.
 - 2. Plus or minus 1/8 inch from a level plane over entire access flooring area.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. After completing installation, vacuum clean access flooring and cover with continuous sheets of reinforced paper or plastic. Maintain protective covering until time of Substantial Completion.
- B. Replace access flooring panels that are stained, scratched, or otherwise damaged or that do not comply with specified requirements.

END OF SECTION

SECTION 09 72 20 PRESENTATION DRY ERASE WALL COVERING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes scrim-backed dry erase wall covering.

1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. E 84: Test Method for Surface Burning Characteristics of Building Materials.
 - 2. D751: Methods of Testing Coated Fabrics.
- B. Underwriters Laboratory, Inc. (UL): UL 723: Test for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

- A. Data: Submit product data and installation instructions for wallcovering, and adhesive, and product data indicating compliance with specified materials required.
- B. Samples: Submit manufacturer's standard size sample of the wall covering, and minimum 12-inch samples of each type of aluminum accessory. Approved samples will serve as Design Consultant's control samples.

1.4 QUALITY ASSURANCE

- A. Applicator's qualifications: Skilled commercial wallcovering applicators with no less than 3 years of documented experience installing dry erase wallcovering of the types and extent required.
- B. Fire hazard classification: Provide materials that comply with Class-A fire rating when tested in accordance with ASTM E 84. Identify components with markings from testing and inspection organization.

1.5 HANDLING

- A. Deliver wall coverings to the Project site in unbroken and undamaged original factory wrappings and clearly labeled with the manufacturer's identification label, quality or grade, and lot number.
- B. Store in a clean, dry storage area with temperature maintained above 55 deg. with normal humidity, in a flat position to prevent damage to roll-ends. Do not cross-stack material. Support material off the floor to prevent sagging and warping.

1.6 PROJECT CONDITIONS

- A. Comply with wall covering manufacturer's instructions for temperature and humidity limitations in spaces, and for substrates to receive wall covering.

- B. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform the work, and as will occur in the room or space after the building is in operation.
- C. Provide continuous ventilation during installation and for not less than the time recommended by the wall covering manufacturer for full drying or curing.

1.7 WARRANTY

- A. Submit manufacturer's limited 5-year written warranty against manufacturing defects.

1.8 MAINTENANCE

- A. Maintenance instructions: Include precautions against cleaning materials and methods that may be detrimental to finishes and performance.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Walltalkers Wallcoverings by Koroseal Wallcovering West, Inc. (basis of design.)
- B. Or equal.

2.2 TYPE/CONSTRUCTION

- A. Walltalkers "Just-Rite," moderate gloss vinyl surface with woven backing, complying with the following:
 - 1. Laminate thickness: 21 mils.
 - 2. Tensile strength (warp x fill): 95 by 95 lbs.
 - 3. Flammability testing: Class A, ASTM E 84.

2.3 ACCESSORIES

- A. Primer: Type recommended by the wall covering manufacturer.
- B. Adhesive: Heavy-duty recommended by the wall coverings manufacturer for the substrate.
- C. Aluminum trim, end caps, tray and presentation rails: Match Design Consultant's control samples.
- D. Miscellaneous accessories: : To be selected.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Verify substrate surfaces are clean, dry, smooth, structurally sound and free from surface defects and imperfections that would show through the finished surface.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Acclimate wall covering to the area of installation a minimum of 24 hours before installation.
- B. Follow the instructions in the manufacturer's installation instructions.
- C. Apply primer and adhesive uniformly in accordance with their manufacturer's instructions.
- D. Install dry erase wall covering horizontally using a level line.
- E. Smooth wall covering to the hanging surface to eliminate air bubbles, wrinkles, gaps and overlaps. Do not use sharp edged smoothing tools. Smooth material on the wall from the middle to the outside edge.
- F. Remove excess adhesive along finished seams immediately after each wallcovering strip is applied. Clean entire surface with warm, mild soap solution, a natural sponge and clean towels. Rinse thoroughly with water and let dry before using. Change water often to maintain water cleanliness.

3.3 CLEAN-UP

- A. Upon completion of installation, wash wall covering with an ammonia or alcohol based cleaner or mild soap and rinse thoroughly with water prior to using.

END OF SECTION

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SECTION 09 80 00 - ACOUSTIC INSULATION AND SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: The requirements below apply to all rooms and spaces where partitions are indicated to be filled with acoustical insulation and where acoustical insulation is indicated over suspended ceilings. Section includes.
 - 1. Acoustic insulation.
 - 2. Acoustic sealants and related materials.
 - 3. Acoustic pads, tape and gaskets.
- B. Thermal insulation, including pipe and duct insulation.
- C. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Manufacturer product data for materials specified below.
- B. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.4 HANDLING

- A. Store materials under cover, protected from moisture and off the ground or floor.
- B. Remove insulation that becomes wet or damp immediately from the job site.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Acoustic sealant and pads shall prevent transmission of airborne sound through cracks in the construction.

2.2 MANUFACTURERS/PRODUCTS

- A. Batt insulation:
 - 1. Low-density glass fiber insulation for packing and filling small joints and openings behind sealants.

2. Long-strand glass fiber insulation of one to 2 pcf density, without covering, thickness as required.
 - a. 700 Series Insulation by Owens-Corning Fiberglas.
 - b. Microlite by Johns Manville.
 - c. Toughgard Fiber Glass Duct Liner Insulation by CertainTeed.
 - d. Or equal.

B. High-density ceramic or mineral fiber safig:

1. For packing and filling large and/or critical openings, usually behind a sealant or putty.
2. Long-strand ceramic or mineral fiber insulation of minimum 6 pcf density, without covering, thickness as required. Mineral (glass and rock wool) fiber, flame spread and smoke developed in conformance with IBC requirements and other authorities having jurisdiction. Non combustible having a minimum density of 1.1 pcf and minimum Noise Reduction Coefficient of 1.10 at 1/3 Octave Center Frequency (Hz).
 - a. "QuietZone Accoustical Batts" by Owens Corning.
 - b. "Roxul AFB - Acoustical Fire Batts" by Roxul Inc.
 - c. "Fibrex Sound Attenuation Batt (SAFB) Insulation" by Fibrex Insulations Inc.
 - d. "Thermafiber" by U.S. Gypsum.
 - e. Or equal.
 - f. Thickness; 2-1/2 inches, except as otherwise indicated.

C. Insulation in stud cavity:

1. Formaldehyde-free, unfaced fiber glass blankets, complying with ASTM C 665, Type 1, unfaced:
 - a. "Sound-Shield" by Johns Manville.
 - b. "Greenguard" by Knauf.
 - c. Or equal.
2. Unless other indicated, provide insulation of same thickness as the stud depth. Select batt widths to match stud spacing and to be self supporting between the studs.

D. For application above ceilings, select batt widths to be supported on ceiling construction over the entire ceiling area.

2.3 ACOUSTIC SEALANTS & TAPE

A. Bulk sealant for closing small openings and joints up to a maximum of one-inch wide. Sealant backed with glass fiber packing, compressible joint filler or resilient backer rod.

1. Products:
 - a. Pecora Corp.: AC-20.
 - b. US Gypsum Co.: Sheetrock Acoustical Sealant.
 - c. Tremco, Inc.: Acoustical Sealant.
 - d. WW Henry Co.: Henry 313.
 - e. Or equal.

B. Fire-barrier (acoustical) putty:

1. For closing large openings and joints typically over one inch wide. Applied full depth or backed with a dense safing, as detailed.
2. Non-shrinking, highly-adhesive, minimum 40-pcf density fire-barrier putty.
3. Products:
 - a. Series SSP Firestop Putty and Putty Pads by Specified Technologies Inc.
 - b. Nelson FSP Firestop Intumescent Putty by Chargar Corp.
 - c. Fiberfrax Fyre Putty by Unifrax.
 - d. Hilti CP 617 and CP 617L, intumescent moldable firestop putty for electrical outlet boxes.
 - e. Or equal.

C. Foamed-in-place silicone sealant:

1. For closing electrical ducts and cable trays where they penetrate constructions. Apply full depth of construction between permanent or temporary dams.
2. Fire-resistant, minimum 17-pcf density, foamed-in-place silicone sealant.
3. Products:
 - a. Fire Barrier 2001 Silicone RTV Foam by 3M Fire Barrier Products Division.
 - b. Or equal.

D. Fire-resistive acoustic foam tape:

1. "Norseal V740FR" compressible, closed cell polyvinyl chloride foam tape with pressure sensitive adhesive by Saint Gobain.
2. Or equal.
3. Provide one-inch wide by not less than 1/4-inch thick, self-extinguishing, 6 pcf density UL-listed acoustical foam tape.
4. Furnish tape in rolls with protective release liner on non-adhesive face.

2.4 ACOUSTIC PADS

A. Use: For sealing the backs and sides of standard electrical back boxes. Select size to completely cover the box and overlap wall facing material at least one-inch.

1. Fire-rated assemblies:
 - a. Flamesafe FSP 1077 Putty Pads by WR Grace & Co.
 - b. Putty Pads by Specified Technologies Inc.
 - c. Hilti CP617 Putty Pads by Hilti.
 - d. 3M Fire Barrier Moldable Putty Pads by RectorSeal.
 - e. Putty Pads by International Protective Coatings.
 - f. Or equal.
2. Elsewhere:
 - a. Type FSP Firestop Putty Pads by Nelson Electric.
 - b. Lowry's Outlet Box Pads by Harry A. Lowry & Associates.
 - c. Sound Pad #68 by L.H. Dottie Co.
 - d. Or equal.

B. Self-adhesive sponge neoprene pads:

1. For providing a compressible filler and acoustical seal in the gaps of slip joints. Set in place with 10 to 15 percent compression. Airtight splices work in length-wise direction.
2. Closed-cell sponge or foam neoprene of 8- to 12-pcf density, self-adhesive on one side, thicknesses and widths as required.
3. Products:
 - a. Type V760 Norseal Foam Sealants by American Saint-Gobain.
 - b. DS Brown Co.
 - c. Or equal.

C. Felt-lined metal sleeves:

1. For sealing around pipe, hanger rod or other round element penetrating a construction. Inside sleeve diameter to equal outside diameter of penetrating element. Exposed end of sleeve closed with acoustical sealant.
2. Products:
 - a. Pipe Isolator by Eleen.
 - b. P-R Isolator by Potter-Roemer.
 - c. Trisolator by Stoneman Engineering.
 - d. Or equal.

D. Self-adhesive bubble gaskets:

1. To seal around the edge of an operating access panels. Typically set on jamb or head frame or stop to act as a compression seal.
2. Nominal 1/4-inch by 1/2-inch compressible bulb of silicone rubber or polyurethane with self-adhesive on one side.
3. Products:
 - a. 5050 Self-Adhesive Gasket by National Guard Products.
 - b. S88D or S88W Silicone Seal by Pemko.
 - c. 797 or 797W by Reese Enterprises.
 - d. Or equal.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Before installing insulation in stud walls, thoroughly clean space of debris.
- C. Correct detrimental conditions before proceeding with installation.

3.2 ACOUSTIC PADS

- A. Install acoustic pads behind all recessed boxes in walls that have acoustical insulation in their stud cavities.
- B. Clean the contact area of loose and foreign material in accordance with the pad manufacturer's instructions.
- C. Verify that all unused knockouts are plugged before installing the pad.

- D. Center the pad and cover the back and sides of all electrical, telephone and CATV boxes in sound-insulated walls with the acoustical pad.
- E. Mold around conduits and cables entering the box.
- F. Mold pads tightly to the boxes and to the adjacent surfaces.

3.3 BATT INSULATION

- A. Cut to fit irregular spaces, butt edges into firm contact with each other and adjoining surfaces.
- B. Hand pack around pipes, ducts, conduits, electrical boxes, etc., as required to thoroughly fill all voids and spaces between framing members and to form a continuous acoustical barrier.
- C. Comply with the National Electrical Code (NEC) for installation in proximity to light fixtures. Do not install insulation closer than recommended by NEC.
- D. Where in-wall electrical conduits is parallel to the wall, slit the insulation halfway to bury the conduit in it. Where the conduit is perpendicular to the wall (penetration), do not oversize the penetration; tape the conduit to prevent sound leakage.
- E. [For application above ceilings, select batt width to be supported on ceiling construction over entire ceiling.]

3.4 ACOUSTIC SEALANT

- A. Comply with ASTM C 919 and the following.
- B. Clean space to be calked of debris, dust and powdered materials which would prevent the sealant from adhering properly.
- C. Seal openings between gypsum board and the perimeter of items penetrating gypsum board, such as electrical boxes, continuously using sealant specified.
- D. Seal openings between the gypsum board and floors and ceilings along sound-insulated walls continuously, and along those intersecting walls for a minimum distance of 3 feet from insulated walls. When multiple layers occur, seal the perimeter of each layer continuously.
- E. Seal gypsum board edges in contact with door frames continuously.

3.5 FIELD QUALITY CONTROL

- A. Prior to closing-in of insulated assemblies, or prior to Substantial Completion for insulation that will remain exposed in the building, refit, reinstall and/or replace wet, damaged and displaced insulation.

END OF SECTION

SECTION 09 83 16 – ACOUSTIC PAINT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustic wall and ceiling plaster paint.
- B. This Section supplements Section 09 90 00, Painting.
- C. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. As specified in Section 09 90 00.

1.4 SUBMITTALS/QUALITY ASSURANCE/JOB CONDITIONS & HANDLING

- A. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

- 1. Credit MR 4.1 & 4.2, Recycled Content.
- 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
- 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
- 4. Credit MR 6, Rapidly Renewable Materials.
- 5. Credit EQ 4.1, Low Emitting Materials, Paints.

- B. All other submittals: As specified in Section 09 90 00.

1.5 WARRANTY

- A. Paint shall have its original adherence at the end of one year and there shall be no evidence of blisters, running, peeling, scaling, chalking, streaks, or stains at the end of this period.
- B. Washing painted surfaces with alkali-free soap and water shall remove surface dirt from painted surfaces without producing deteriorating effects.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. ProCoat Products, Inc.
- B. Or equal.

2.2 MATERIALS

- A. Paint: ProCoustic Acoustical Coating consisting of vinyl acrylic resin, and pigmented with titanium dioxide, calcium carbonate, silicate wetting and stabilizing agents, and water.
- B. Performance requirements:
 - 1. Sound absorption: ASTM C 423 and E 795, Improve Noise Reduction Coefficient from 0.55 to 0.60.
 - 2. Fire rating: ASTM E 84, Class A flame spread.
 - 3. Light reflectance: ASTM C 523, Improve reflectance of light from 0.81 to 0.88.
 - 4. Combustion toxicity test: Pass.
 - 5. Specific gravity: 1.26.
 - 6. Viscosity: 70 to 75 Krebs at 75 degrees F.
 - 7. Solids: 40 percent plus or minus one percent.
 - 8. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION/SURFACE PREPARATION

- A. As specified in Section 09 90 00.

3.2 PAINTING

- A. Comply with acoustic paint manufacturer instructions and recommendations and the requirements of Section 09 90 00.
- B. Re-coat or remove and replace work which does not match approved submittal and sample panel, or shows loss of adhesion.

END OF SECTION

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SECTION 09 90 00 – PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Painting and finishing all interior and exterior new, exposed surfaces throughout the Project, except as excluded in Paragraphs B and C below.
2. Surface preparation, priming and coats of paint specified herein are in addition to shop priming and surface treatment specified in other Sections.
3. Paint all exposed surfaces whether or not colors are designated, except where the natural finish of the material is obviously intended or specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.
4. This Section also includes sealing joints between surfaces to be painted, except for joints designed to be expressed in the Work and joints between a natural finish and a painted surface.
5. Touching up paint on the existing adjacent building where damaged by the work of this Contract.
6. Section also includes preparation of existing surface to be painted and painting these surfaces.

B. Related requirements: Division 01 for LEED requirements.

C. Painting specified elsewhere:

1. Shop priming of ferrous metal items included under miscellaneous metal fabrications, hollow metal work, and similar work.
2. Finished (not primed) mechanical and electrical equipment including light fixtures, switchgear and distribution cabinets, except as specified in Article 3.4 below.
3. Prefinished glazed assemblies, including skylights.
4. Pavement markings.
5. Toilet compartments and screens.
6. Exterior wall louvers.
7. Flagpole.
8. Signage.
9. Piping identification.
10. Acoustic paint for acoustic wall and ceiling plaster.

D. Painting not included: Do not paint the following surfaces.

1. Insulation and its facing.
2. Roofing.
3. Finish hardware, except those items noted USP.
4. Flexible door and window seals and weatherstripping (paint exposed metal to match door frame).
5. Finished metal surfaces such as anodized aluminum, stainless steel, chromium-plating, copper, bronze, brass and similar finished materials will not require finish painting.
6. Painting is not required on walls or ceilings in concealed and inaccessible areas, such as furred areas, pipe spaces, and duct shafts.

7. Operating parts, labels and nameplates:

- a. Do not paint moving parts of operating units, mechanical and electrical parts, such as valve and damper operator linkages, sinkages, sensing devices, motor and fan shafts.
- b. Do not paint over nameplates, Code required labels, such as UL and FM, or equipment identification, performance rating, name, or nomenclature plates.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling and sequencing: Sequencing: Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

1.4 DEFINITIONS

- A. Paint: The term, as used in this Section, means all coating system components, including primers, emulsions, enamels, varnishes, stains, lacquers, sealers, fillers, and other applied materials whether used as prime, intermediate or finish coat.
- B. Definitions of painting terms: ASTM D 16, unless otherwise specified.
- C. Dry film thickness (DFT): Thickness of a coat of paint in fully cured state measured in mils (1/1000-inch).
- D. Sheen: The terms used in these Specifications refer to the following gloss ranges when tested in accordance with ASTM D 523 test method.

Name	ASTM D 523 Test Method	Gloss Range
Flat	60-degree meter	0 to 7
Low sheen	60-degree meter	10 to 15
Eggshell	60-degree meter	25 to 30
Semi-gloss	60-degree meter	55 to 60
Gloss	60-degree meter	85 to 90

- E. Coat: As used in this Section means a layer of paint, varnish, lacquer, or other material applied, then allowed to dry. To backroll or apply a wet-on-wet film still constitutes a single coat.
- F. Finish: As used in this Section means the entire coating system including the texture, color, and sheen of a surface.
- G. Refinish: As used in this Section implies a new finish will be applied to a surface that has been finished as defined above.
- H. Touchup: As used in this Section means correction of deficiencies in the specified work to achieve a properly painted surface.

1.5 SUBMITTALS

- A. Materials:
1. Copies of a complete materials list, identified by manufacturer name and product label or stock number.
 2. Prepare list in the form of a repetition of the specified paint finishes, with the addition of the specific product intended for each coat.

B. Color samples:

1. Eight-and-one-half- by 11-inch samples of each color for painted finishes.
2. Provide stepped samples, defining each separate coat, including block fillers and primers.
3. Use representative colors when preparing samples for review.
4. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
5. Resubmit until required sheen, color, and texture are achieved.

C. Data: Manufacturer Product Data as follows.

1. Data for paint products, including paint label analysis, application instruction, and VOC content in grams/liter.
2. Duplicate copies of manufacturer affidavit with each shipment of materials delivered to the job site certifying that each material furnished complies with specified requirements.

D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Paints.

1.6 QUALITY ASSURANCE

A. Painter's qualifications: Firm and individuals experienced in applying paints and coatings similar in material, design, and extent to those specified for the Project, whose work has resulted in applications with a record of successful in-service performance for at least the last 5 years preceding Bid date..

B. Field Samples:

1. Apply Sample paint finishes (approximately 10-foot square) of each color scheme to wall areas, as directed by the Design Consultant. Refer to Section 09 24 00 for painting cement plaster mockup and to Section 09 29 00 for painting gypsum board and up.
2. Obtain Design Consultant's approval of field samples before proceeding further. Approved samples will be used as a standard for the Project, and if properly identified may remain a part of the Work.
3. Final acceptance of colors will be from job-applied samples.

1.7 JOB CONDITIONS

A. Environmental requirements:

1. Comply with paint manufacturer's recommendations for environmental conditions and the following.
2. Provide adequate heating and ventilating to maintain environmental conditions recommended by paint manufacturer.
3. Do not apply finish in areas where dust is being generated.

4. Apply paint under the following prevailing conditions.
 - a. Air and surface temperatures are not below 40 degrees F. or above 120 degrees F.
 - b. Surface temperature is at least 5 degrees F. above the dew point.
 - c. When there is not threat of impending rain.

B. Protection:

1. Protect adjacent surfaces whether being painted or not against damage from painting operation. Correct damage by cleaning, repairing, replacing, and repainting, as approved by Design Consultant, and leave in an undamaged condition.
2. Use protective methods and materials, including temporary covering, recommended in writing by deferred (finish) manufacturer.
3. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work. Post signs immediately after painting.
4. Provide drop cloths, shields, barricades and other protection necessary to safeguard adjacent surfaces not to be painted.
5. Provide and maintain protection as required to protect finished work from damage until its acceptance.

- C. Illuminate work area during painting to provide the same or greater level of illumination required to properly perform the work and will occur in the room or space after the building is in operation.

1.8 HANDLING

- A. Store materials indoors and mix only in spaces suitable for such purpose. Protect adjacent surfaces when mixing.
- B. Store paint containers so the manufacturer's labels are clearly visible.

1.9 WARRANTY

- A. Color of exterior surfaces painted, as part of the work of this Section shall, at the end of one year, have remained free from serious fading when compared to a control sample of the original paint.
- B. Interior and exterior paint shall have its original adherence at the end of one year and there shall be no evidence of blisters, running, peeling, scaling, chalking, streaks, or stains at the end of this period.
- C. Washing painted surfaces with alkali-free soap and water shall remove surface dirt from painted surfaces without producing deteriorating effects.

1.10 MAINTENANCE MATERIAL

- A. With closeout submittals deliver one identified unopened gallon of each type and color of paint material used on the Project to the City for future paint touchup.
- B. In addition to manufacturer label, identify with room number, floor or area, type of paint, color and sheen, as applicable, for future identification.

PART 2 - PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Vista Paint Corp.
- B. Dunn Edwards.
- C. Sherwin Williams.
- D. Frazee Paint Co.
- E. Or equal.

2.2 PAINT

A. General:

- 1. Biocide content shall not exceed 0.025 percent by weight or volume.
- 2. Paint shall not contain fungicides or bactericides classified as mercury acetates, phenol phenates, or phenol formaldehyde.
- 3. Water-based paints shall not be formulated or manufactured with chemicals listed by Green Seal to be hazardous including, but not limited to, formaldehyde, halogenated solvents, aromatic hydrocarbons, mercury, and mercury compounds.
- 4. Paints shall not be tinted with pigments of lead, cadmium, chromium, and their oxides.

- B. Quality and manufacture: Insofar as practicable, each paint shall be factory-mixed to match approved samples and colors, and be of a consistency permitting immediate application. Use best quality grade regularly manufactured by one of the manufacturers listed in the schedule at the end of the Section.

C. Paint uniformity and compatibility:

- 1. Box at the job site or factory-batch paint to ensure color uniformity and consistency. This includes the required maintenance materials.
- 2. Provide finish coats compatible with the prime coats used.
 - a. Review other Sections of these Specifications, in which prime coats are specified, and manufacturer data for shop-primed surfaces to be painted.
 - b. Be responsible for the compatibility of the total coating system.
- 3. Provide barrier coats over incompatible primer or remove and reprime.
- 4. Products of more than one approved manufacturer may be used, except that all products applied on a surface shall be by the same manufacturer.

2.3 MISCELLANEOUS MATERIALS

- A. Joint sealant: Paintable sealant as specified in Section 07 92 00.
- B. Galvanized etching product: One of the following.

- 1. Oakite CryCost 747.
- 2. Oakite 747 LTS.
- 3. Henkel Galvaprep 5.

2.4 COLOR SCHEDULE

- A. Refer to the Finish and Materials Schedule for paint colors.
- B. Number of colors to be used will be determined by the Design Consultant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be painted for conditions that would adversely affect the permanence and quality of this work.
- B. Correct unsuitable conditions before proceeding with painting.

3.2 SURFACE PREPARATION

- A. General: Prepare surfaces to receive the specified finishes in compliance with the paint manufacturer's instructions and the following. Extend painting on all surfaces visible from any angle.
- B. Galvanized steel: Comply with American Galvanizers Association recommendations, ASTM D 2092, and the following.
 - 1. Clean with commercial phosphoric acid solution or one of the products named above for pretreatment or by brush off blast cleaning with a fine abrasive to achieve a uniform anchor profile of 1.5 to 2 mils.
 - 2. Recoat within the time limit recommended by the primer manufacturer.
- C. Shop-primed metal: Remove oil, grease, dirt and foreign matter. Spot prime abraded surfaces with compatible primer.
- D. Shop-painted metal: Sand to provide a mechanical bond with field applied finishes, or use a commercial preparation specifically formulated to improve paint bond.
- E. Unprimed ferrous metal: Remove rust, mill scale, oil and other foreign matter.
- F. Aluminum: Remove foreign matters and clean with mineral spirit.
- G. Factory-primed equipment: Repair damaged primer; remove rust and clean to bright metal where appropriate. Sand or etch primer to permit bonding of finish coats. Clean surfaces thoroughly before applying additional coats.
- H. Plaster and CMU:
 - 1. Clean surfaces of dirt, laitance, encrustations and foreign matter.
 - 2. In new and existing plaster patch holes, pits and other imperfections, not patched under other Sections, flush and smooth with adjacent surfaces.
 - 3. Do not apply sealer or paint when the moisture content of the surfaces to be painted exceeds 8 percent.
 - 4. Touchup suction spots after priming with an additional prime coat until all surfaces show a uniform coating.
- I. Gypsum board:
 - 1. Remove dust, loose particles or other matter that would prevent proper paint adhesion.
 - 2. Check to see that joints and screw heads are properly covered with joint compound and sanded smooth and flush with adjacent surfaces.
- J. Wood:
 - 1. Sandpaper smooth and dust clean. Remove handling marks and raised grain.
 - 2. Fill nail holes, cracks and depressions with wood filler, colored to match finish for wood scheduled to receive a transparent finish. Use a tack cloth on wood to receive a transparent finish to remove sanding dust.

- K. Other materials not covered above: Prepare to receive paint in compliance with the paint manufacturer instructions.
- L. Existing painted surfaces:
 - 1. Wash surfaces with biodegradable detergent to remove dirt, dust and contaminants. Rinse clean. Use bleach on mildew.
 - 2. Patch dents, gouges and other imperfections in painted surfaces and sand smooth and flush with adjacent undamaged surfaces.
 - 3. Remove dust, rust and other surface contaminants, loose and unsound paint coatings, etc. as required to provide clean and sound surfaces to receive new paint.
 - 4. Remove gloss from enamel paints with steel wool or by treating them with a commercial de-glosser used in compliance with its manufacturer's instructions.
- M. Hardware:
 - 1. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be painted, or provide surface- applied protection prior to surface preparation and painting.
 - 2. Coat cutouts for hinges, edges of lockset holes and same as for first coat.
 - 3. Following completion of painting each space or area, reinstall the removed item by workmen skilled in the trades involved.
- N. Fire extinguishers and fire hose cabinets: Apply 2 coats of paint finish, inside and out, matching finish and color of adjoining areas, unless otherwise noted or directed.
- O. Weatherstripping and sound seals. Paint exposed metal surfaces to match the door frame, whether or not unfinished, furnished with factory prime coat, or factory treated for paint adhesion.
- P. Access doors and panels: Generally, paint both sides of doors and frame the color of surrounding walls and ceiling.
- Q. Phasing: Program cleaning and painting so that dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

3.3 PAINT PREPARATION

- A. Open paint containers only as required for use. Mix paint in designated areas.
- B. Thoroughly stir and agitate paint to uniformly smooth consistency suitable for proper application.
- C. Do not reduce, change or use any materials except in compliance with manufacturer printed instructions.
- D. In all cases, prepare and handle paint to prevent deterioration and inclusion of foreign matter.

3.4 APPLICATION

- A. General:
 - 1. Seal interior joints between wood or wood composite materials, trim, baseboard, molding, and casements and adjacent materials with paintable sealant specified in Section 07 92 00.
 - 2. Except for prefinished wood doors, finish top, bottom and edges of doors the same as faces promptly upon delivery to the jobsite.
 - a. Apply 2 coats of paint or sealer to top, bottom and cutouts of doors immediately after trimming.

3. Where the 2 faces of doors differ in color or finish, finish the edges to match the face visible when the door is open.
 4. Apply paint only under conditions that will insure finishes free from blemishes and defects. Leave corners with no undue amount of paint buildup.
 5. Use a slightly different shade for each coat of paint so that it may be readily identified.
 6. Primer and intermediate coats shall be unscarred and completely integral when succeeding coats are applied. Sand and dust between each coat to remove defects visible from a distance of 5 feet.
 7. Give particular attention to edges, angles, flanges, and other similar areas, where insufficient film thicknesses are likely to be present, and ensure proper millage in these areas.
 8. Remove paint spillage and spatters on adjacent surfaces so as not to damage the surface being cleaned.
 - a. Perform patching and repairs required because of painting operations.
 - b. Refinish entire panel or assembly where portion of finish has been damaged or is not acceptable to the Design Consultant.
 9. Paint interior surfaces of ducts, where visible thru registers and grilles, with a flat nonspecular black paint.
 10. Unless otherwise directed by the Design Consultant, spray-paint exposed surfaces of ceiling diffusers, air return grilles, speakers and other electrical and mechanical items, except smoke detectors and sprinkler heads, in painted ceilings to match the ceilings, whether these items are primed or factory-finished.
 11. Number of coats:
 - a. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried.
 - b. The number of coats specified is the minimum required for complete coverage and uniformity of color.
 - c. Apply additional coats when undercoats, stains, or other conditions show through the final finish until the finish is of uniform color and appearance.
 12. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 13. Paint interior surfaces, which are a continuation of exterior surfaces, subject to exterior exposure (such as an out-swinging door), with the applicable exterior coating system.
 14. Completely cover surfaces to be painted to provide an opaque, smooth surface film uniform in finish, color, appearance, and coverage. Painted surfaces with cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness and other imperfections are not acceptable. Cut paint in sharp lines and color breaks.
 15. Completed work shall match approved samples, as determined by the Design Consultant. Remove, refinish, or repaint work not complying with specified requirements.
- B. Labeling rated (fire and smoke walls and partitions): Identify both sides of rated walls and partitions above finished and decorative ceilings (plenum) with minimum 2-inch high, bright red letters spaced at 10 feet o.c. maximum, as follows. Identification can be painted using a stencil or by using pre-printed self-adhesive labels.
1. Fire rated partitions: "FIRE PARTITION - DO NOT PENETRATE."
 2. Smoke barrier partitions: "SMOKE PARTITION - DO NOT PENETRATE."

- C. Application method: Contractor's option provided applied coatings match approved samples. The Design Consultant reserves the right to require that paint be sprayed for smoothness and uniformity.
- D. Priming:
1. Prime bare metal scheduled to be painted, and not embedded in concrete and masonry, immediately upon delivery to the site.
 2. Time lapse between priming and application of second coat shall be as short as possible.
- E. Shop-primed metal:
1. Apply 2 finish coats of paint to match adjoining surfaces, as directed by the Design Consultant, to shop primed mechanical and electrical equipment. This work includes but is not limited to interior of fire hose cabinets, air grilles, ceiling diffusers, electrical and telephone panels, and access panels.
 2. Paint conduits, outlets and pull boxes, and mechanical equipment exposed to view, such as covered and uncovered piping and ductwork, pumps, compressors, air conditioning equipment and tanks as specified in this Section.
 3. Paint the back side of access panels, removable or hinged covers to match the exposed surfaces.
- F. Miscellaneous painting: Surfaces to be painted and not specifically described herein, shall be painted with a product specifically manufactured or prepared for the material and surface to be painted with a prime and 2 finish coats.

3.5 TOUCHUP/CLEANING

- A. At completion of construction activities of other trades, touchup and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.6 PAINT FINISH SCHEDULE

- A. Finish all surfaces in compliance with the following schedule. Catalog names and numbers refer to products by the Vista Paint Co., Dunn Edwards and Sherwin Williams, except as otherwise specified.

SURFACE	NUMBER OF COATS	VISTA PAINT	DUNN-EDWARDS	SHERWIN WILLIAMS
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EXTERIOR SURFACES

Ferrous Metal - (Including Doors and Frames): See Section 09 96 00 – “High-Performance Coatings”

Aluminum & Galvanized Steel: See Section 09 96 00 – “High-Performance Coatings”

Stair tread edges: series 222 Deco-Tread “black” by Tnemec.

Portland Cement Plaster: 100 percent Acrylic Flat

1 st Coat	4600 Uniprime II	W 709 Eff-Stop
2 nd & 3 rd Coat	2000 Duratone	W 701 Evershield

CMU: 100 percent Acrylic Elastomeric

1 st Coat	4600 Uniprime II	W 718 Super Loc
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SURFACE	NUMBER OF COATS	VISTA PAINT	DUNN-EDWARDS	SHERWIN WILLIAMS
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	2 nd Coat	1900 Weather Master at 8 to 10 MILS per coat DFT	W370 Endurawall at 8 to 10 MILS per coat DFT	
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INTERIOR SURFACES

Wood: Acrylic Dryfall – Flat

1 st Coat	DF 12 Dryfall Flat	W 6079 Aquafall Flat
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2 nd Coat	DF 12 Dryfall Flat	W 6079 Aquafall Flat
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CMU: Semi-Gloss Acrylic

1 st Coat	018 Acrylic Block Filler	MBPR00 Blockfil
2nd & 3rd Coat	8400 Carefree SG	SPMA50 Suprema SG

Plaster: Flat Acrylic

1 st Coat	4600 Uniprime II	W 781 Super-Loc
2nd & 3rd Coat	8100 Carefree Flat	W 401 Decovel

Gypsum Board: Eggshell

1 st Coat	1100 Hi-Build PVA Primer	W 101 Vinylastic
2nd & 3rd Coat	8200 Carefree Velva Sheen	W411V Suprema

Gypsum Board: Semi-Gloss Acrylic

1 st Coat	1100 Hi-Build PVA Primer	W 411V Suprema
2 nd & 3 rd Coat	7000 Acriglo Semi- Gloss	W 450V Decoglo

Gypsum Board:
Gloss Acrylic Epoxy

1 st Coat	1100 Hi-Build PVA Sealer	W 420 Walltone
2 nd & 3 rd Coat	Carboline Sanitile 255 @ 2-3 MILS DFT	Intergard 735

Plaster: Gypsum, Eggshell

1 st Coat	4000 Uniprime II	W 707 Unikote
2 nd & 3 rd Coat	7000 Acriglo	W411V Suprema

Particleboard, Hardboard: Flat

1 st Coat	4000 Uniprime II	W 707 UniKote
2 nd & 3 rd Coat	8100 Carefree Flat	W 401 Decovel

Particleboard, Hardboard: Semi-Gloss Acrylic

1 st Coat	4000 Uniprime II	W 707 Unikote
2 nd & 3 rd Coat	7000 Acriglo SG	W 450V Decoglo

Particleboard, Hardboard: Gloss 100 percent Acrylic

1 st Coat	4000 Uniprime II	W 707 Unikote
2 nd & 3 rd Coat	8500 Carefree Gloss	W 960V Permagloss

SURFACE	NUMBER OF COATS	VISTA PAINT	DUNN-EDWARDS	SHERWIN WILLIAMS
Ferrous Metal: Semi-Gloss 100 percent Acrylic				
	1 st Coat	4800 Metal Pro Primer	W715 Ultra Grip	
	2 nd Coat	8400 Carefree Semi-Gloss	W 901V Permasheen	
	3 rd Coat	8400 Carefree Semi-Gloss	W 901V Permasheen	
Ferrous Metal: Gloss 100 percent Acrylic				
	1 st Coat	4800 Metal Pro Primer	W715 Ultra Grip	
	2 nd Coat	8500 Carefree Gloss	W 960V Permaggloss	
	3 rd Coat	8500 Carefree Gloss	W 960V Permaggloss	
Ferrous Metal (Heavy Duty): Aliphatic Urethane. Refer to Exterior Surfaces				
	1 st Coat	Carboline Carboguard 890VOC at 5 MILS DFT	International IP714 VOC Primer @ 5 MILS DFT	
	2 nd Coat	Carboline Carbothane 133MC at 5 MILS DFT	International 630 VOC Ultra-Shield Urethane at 5 MILS DFT	
	OR	For shop-primed, omit first coat	For shop-primed, omit first coat	
Aluminum: Semi-Gloss 100 percent Acrylic				
	1 st Coat	4800 Metal Pro Primer	W715 Ultra Grip	
	2 nd Coat	8400 Carefree SG	W901V Permasheen	
	3 rd Coat	8400 Carefree SG	W901V Permasheen	
Aluminum: Gloss 100 percent Acrylic				
	1 st Coat	4800 Metal Pro Primer	W715 Ultra Grip	
	2 nd Coat	8500 Carefree Gloss	W960V Permaggloss	
	3 rd Coat	8500 Carefree Gloss	W960V Permaggloss	
Intumescent Paint on Plywood Backing Panel: Apply one or more coat (as recommended by the paint manufacturer, of latex paint "Intumescent Latex" (thin film) by Contego International, "Flame Stop IM" by Flame Stop, Inc., or equal.				
Concrete Epoxy Flooring System in Electrical and Telephone Closets: Track blast or bead blast floor prior to application (ASTM D 4260)				
	1 st Coat	Carboline Carboguard 890VOC at 5 MILS DFT	International IP714 VOC Primer @ 5 MILS DFT	
	2 nd Coat	Carboline Carboguard 890VOC at 5 MILS DFT	International IP714 VOC Primer @ 5 MILS DFT	

END OF SECTION

SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Surface preparation and field application of high-performance coating systems to exterior steel surfaces, except for stainless steel and prefinished surface.
2. Establishing requirements for shop priming specified assemblies/materials. Coordinate surface preparation and shop priming with the requirements of this Section.
3. Surface preparation and priming steel components scheduled to receive aluminum cladding.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 05 for shop-primed ferrous metal.
3. Division 09 for general field painting.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Scheduling and sequencing:
B. Pre-installation meeting:

1.4 DEFINITIONS

- A. Standard coating terms defined in ASTM D 16 apply to this Section.
- B. Gloss ranges used in this Section include the following:
1. Semi-gloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
 2. High gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.
- C. Coating types:
1. Shop primer: Zinc.
 2. Intermediate coat: Epoxy.
 3. Finish coat: Hybrid Urethane/Modified Siloxane.

1.5 SUBMITTALS

- A. Data: The manufacturer Product Data for each coating system indicated, including primers.
 - 1. Material list: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.
- B. Manufacturer's certification: Certifications that products supplied comply with requirements indicated that limit the amount of VOC in coating products.
- C. Samples: Samples of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Provide stepped Samples defining each separate coat, including primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. List of material and application for each coat of each sample. Label each sample for location and application.
 - 3. Samples for each substrates for Design Consultant review of color and texture: Provide two 12-inch square samples for each type of substrate with each type of finish.
- D. Qualification data: For applicator to demonstrate its capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Design Consultant and Citys, and other information specified.
- E. Certification: Duplicate copies of manufacturer's affidavit with each shipment of materials delivered to the jobsite certifying that material furnished complies with specified requirements.
- F. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Paints.

1.6 QUALITY ASSURANCE

- A. Manufacturer qualifications: Firm that specializes in producing high quality industrial coatings with a minimum of 10 years experience demonstrated by case histories in the designated field of application.
- B. Applicator qualifications: Firm who has completed high-performance coating systems similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.
- C. Source limitations:
 - 1. Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.
 - 2. Only coatings that meet or exceed the performance of those identified herein may be submitted. No substitutions will be considered that change the generic chemistry of the coatings required by the Specifications.

3. Where manufacturer's coating recommendations exceed those listed, the increased coating thickness shall be used. The coating thickness and coverage rate shall not be reduced from those scheduled.
- D. SCAQMD Rule 1113: Submit paint manufacturer's certificate stating that provided coatings meet or exceed current SCAQMD Rule 1113 requirements.
- E. Mockups: Provide a full-coat benchmark finish sample of each type of coating and substrate required.
 1. Design Consultant will select areas or surface to represent surfaces and conditions for application of each type of coating and substrate.
 2. After permanent lighting and other environmental services have been activated in interior locations, apply coating systems to each surface as specified. Provide the required sheen, color, and texture of each surface.
 - a. After finishes are accepted, Design Consultant will use each surface to evaluate coating systems of a similar nature.
 3. Final approval of colors will be from benchmark samples.

1.7 HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:
 1. Name or title of material.
 2. Product description (generic classification or binder type).
 3. Manufacturer's stock number and date of manufacture.
 4. Contents by volume, for pigment and vehicle constituents.
 5. Thinning instructions.
 6. Application instructions.
 7. Color name and number.
 8. Handling instructions and precautions.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45-degree F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1.8 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95-degree F.
- B. Do not apply coatings in rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
 1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.
 2. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and temperature within the area can be maintained within limits specified by manufacturer during application and drying periods.
- C. Protection:
 1. Provide and maintain protection as required to protect finished work from damage until its acceptance.

2. Protect work of other trades, whether being coated or not, against damage from coating operation.
3. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protection.
4. Provide drop cloths, shields, barricades and other protection necessary to safeguard adjacent surfaces not to be painted. Post signs immediately after painting.

1.9 EXTRA MATERIALS

- A. With closeout submittals, deliver one identified unopened gallon container of each color (if more than one color was used) of coating used on the Project. Identify with area and material for future identification.
- B. Provide the City copy of instructions for touchup and maintenance recommendations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tnemec Co. Inc. (basis of design).
- B. Carboline Co.
- C. DuPont.
- D. Sherwin Williams; Industrial and Marine Coatings (SW).
- E. Or equal.

2.2 COATINGS MATERIALS, GENERAL

- A. General: Provide paint systems meeting or exceeding current SCAQMD Rule 1113 requirements.
- B. Material compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- C. Material quality:
 1. Provide manufacturer's highest grade of the various high-performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.
 2. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.
 3. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

2.3 COLORS

- A. Colors: Match Design Consultant's control samples.

2.4 COATING SYSTEM FOR INTERIOR UNPRIMED METAL SURFACES EXPOSED TO PUBLIC CONTACT

- A. Applies to handrails and guardrails, exposed structural and miscellaneous steel, steel doors and frames, metal surfaces in toilet rooms and in maintenance storage areas, and in areas of similar conditions indicated.
- B. Surface preparation: SSPC-SP6 Commercial Blast Cleaning.

C. Zinc-rich Urethane Primer/Polyamide Epoxy Finish, Satin Finish.

D. Shop primer:

1. Tnemec Series 69 Epoxoline at 4 to 6 mils (100-150 microns) DFT.
2. Carboline: Carboline 890.
3. SW: Tile Clad Plus B-62.

E. Finish coat:

1. Tnemec series 69 Epoxoline at 4 to 6 mils (100 – 1550 microns) DFT.
2. Carboline: Carboline 890.
3. SW: Tile Clad Plus B-62.

F. Gloss range: To be determined.

G. Total DFT: No less than 8 mils (200 microns) DFT

H. Quality assurance standards:

1. ASTM D 4541: Primer and complete coating system shall have adhesion strength of not less than 1000 psi.
2. ASTM D 3359: Primer and complete coating system shall have a rating of not less than 5.
3. ASTM D 3363: Finish coat hardness shall be 3H.
4. ASTM D 4060: Finish coat shall pass no more than 115 mg loss after 1,000 hours with 1,000 g load.

2.5 COATING SYSTEM FOR EXTERIOR/INTERIOR EXPOSED FACTORY-PRIMED METAL SURFACES

A. Compatibility: Test coating compatibility prior to application.

B. Surface preparation: SSPC-SP11 for damaged and abraded areas.

C. Touchup:

1. Where shop primer is damaged or abraded, field repairs shall consist of surface preparation by SSPC-SP11 followed by application of surface tolerant primer to bare surfaces.
2. Where the shop primer is incompatible with the finish system, apply the same spot primer be fully at the 3 mils (75 microns) DFT as a tie-coat for succeeding applications.

D. Surface tolerant epoxy primer/aliphatic acrylic preparation finish — semi-gloss finish (where primers are incompatible).

E. Spot primer:

1. Tnemec Series 135 Chembuild at 3 to 5 mils (75-125 microns) DFT.
2. Carboline: Carbomastic 15.
3. SW: Surface-tolerant epoxy B-58.

F. Primer:

1. Tnemec Series 135 Chembuild at 3 to 5 mils (75 – 125 microns) DFT.
2. Carboline: Carbomastic 15.
3. SW: Surface-tolerant epoxy B 58.

G. Finish coat:

1. Tnemec Series 750 UVX at 3 to 5 mils (75 to 125 microns) DFT.

2. Carboline: Carboxane 2000.
3. SW: Polysiloxane.
4. Gloss range: To be determined.

H. Total DFT: No less than 6 mils (150 microns) of field-applied coating.

I. Quality assurance standards:

1. ASTM D 3363: Finish coat hardness shall be HB.
2. ASTM D 4060: Finish coat shall pass no more than 95 mg loss after 1,000 hours with 1,000 g load.

2.6 COATING SYSTEM FOR GALVANIZED STEEL

A. Surface preparation:

1. SSPC-SP1 preparation to remove soluble contamination.
2. Thoroughly roughen the entire surface to be coated using compressed air nozzle brush-off blast cleaning with a fine abrasive to achieve a uniform anchor profile (1.5 to 2 mils) (38 to 50 microns).
3. Pressure wash with 140 to 150-degree F alkaline cleaner followed by tap water rinse is the preferred method to remove both water soluble and organic solvent soluble contaminants.

B. Touchup: Where the galvanized surface is damaged, repair shall consist of mechanical surface cleaning to bare metal, followed by touchup application of organic zinc-rich moisture cured urethane primer at 2.5 mils DFT minimum.

C. Surface tolerant epoxy primer/aliphatic acrylic polyurethane gloss finish.

D. Spot primer:

1. Tnemec Series 90-97 Tnemec-zinc at 2.5 to 3.5 mils (65 – 90 microns) DFT
2. Carboline: Carboline 621.
3. Corathane 1 galvanized zinc primer.

E. Primer:

1. Tnemec: Series L69 Epoxoline.
2. Carboline: Carboline 890.
3. SW: Tile Clad Plus B-62.

F. Finish coat: Tnemec Series 75UVX or Carboline "Carboxane 2000" at 2 to 3 mils (100-150 microns) DFT

1. Gloss range: To be determined.

G. Total DFT: No less than 4 mils (200 microns) of field-applied coating.

H. Quality assurance standards:

1. ASTM D 3363: Finish coat hardness shall be HB or better.
2. ASTM D 4060: Finish coat shall pass no more than 95 mg loss after 1,000 hours with 1,000 g load.

2.7 COATING SYSTEM FOR ALUMINUM

A. Surface preparation:

1. Preparation: Thoroughly roughen the entire surface to be coated using compressed air nozzle brush-off blast cleaning with a fine abrasive to achieve a uniform anchor profile (1.5 to 2 mils) (38 to 50 microns).
2. System Type: Epoxy/Hybrid Urethane.
 - a. Prime Coat: Tnemec L69 Epoxoline @ 2.0 to 4.0 mils DFT.
 - b. Finish Coat: Tnemec 750 UVX @ 2.0 to 4.0 mils DFT.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions under which high-performance coatings will be applied, for compliance with coating application requirements.
 1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
 2. Correct unsatisfactory conditions before starting application.
- B. Coordination: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. Furnish information on characteristics of specified finish materials to ensure compatible primers.
 1. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
 - a. Confirmation of primer's suitability for expected service conditions.
 - b. Confirmation of primer's ability to be top coated with materials specified.
 2. Notify Design Consultant about anticipated problems before using the coatings specified over substrates primed under other Sections.

3.2 PREPARATION

- A. General:
 1. Remove plates, machined surfaces, and similar items already in place that are not to be coated.
 2. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 3. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- B. Cleaning:
 1. Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings.
 2. Remove oil and grease before cleaning.
 3. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's instructions for each substrate condition, and as specified. Provide barrier coats over incompatible primers or remove primers and reprime substrate.

- D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
 3. Use only the type of thinners approved by manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

- A. General: Apply coatings according to their manufacturer's instructions and the following.
1. Use applicators and techniques best suited for the material being applied.
 2. Do not apply coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
 3. Coating colors, surface treatments, and finishes are indicated in the coating system descriptions.
 4. Provide finish coats compatible with primers used.
 5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convactor covers, grilles, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
 - a. Coat surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - b. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Scheduling coating: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for coating as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required is the same regardless of application method.
 - a. Omit primer on metal surfaces that have been shop primed and touchup painted.
 - b. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
 - c. Where manufacturer's written instructions require sanding, sand between applications to produce a smooth, even surface.
 - d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat does not cause undercoat to lift or lose adhesion.

2. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance. Give special attention to edges, corners, crevices, welds, exposed fasteners, and similar surfaces to ensure that they receive a dry film thickness equivalent to that of flat surfaces.
- C. Application procedures:
1. Brush, roller, spray, or other applicators according to manufacturer's requirements.
 2. Apply primers and first coats by brush unless manufacturer's written instructions permit using roller or mechanical applicators.
- D. Minimum coating thickness: Apply each material no thinner than manufacturers recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- E. Prime coats:
1. Before applying finish coats, apply a prime coat of material, as recommended by manufacturer, to material required to be coated or finished that has not been prime coated by others.
 2. Recoat primed and sealed substrates if there is evidence of suction spots or unsealed areas in first coat, to ensure a finish coat with no burn-through or other defects caused by insufficient sealing.
- F. Completed work: Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

3.4 FIELD QUALITY CONTROL

- A. City reserves the right to invoke the following procedure at any time and as often as City deems necessary during the period when coatings are being applied:
1. City may engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency may perform appropriate tests for the following characteristics as required by City:
 - a. Quantitative materials analysis.
 - b. Absorption.
 - c. Accelerated weathering.
 - d. Accelerated yellowness.
 - e. Color retention.
 - f. Alkali and mildew resistance.
 - g. Abrasion resistance.
 - h. Apparent reflectivity.
 - i. Washability.
 - j. Dry opacity.
 - k. Recoating.
 - l. Skinning.
 3. City may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements.
 - a. Contractor shall remove non-complying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials.

- b. If necessary, Contractor may be required to remove rejected materials from previously coated surfaces if, on recoating with specified materials, the 2 coatings are not compatible.

3.5 CLEANING

- A. After completing coating application, clean spattered surfaces.
- B. Remove spattered coatings by washing, scraping, or other methods.
- C. Do not scratch or damage adjacent finished surfaces.

3.6 PROTECTION

- A. At completion of construction activities of other trades, touchup and restore damaged or defaced coated surfaces.

END OF SECTION

DIVISION 10

SPECIALTIES

SECTION 10 11 23 - TACKBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes framed and unframed tackboards mounted with mechanical fasteners and adhesive as indicated on the Drawings.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data/shop drawings: Manufacturer data for item specified. Supplement with shop drawings showing elevation, and attachment to adjacent construction for each application.
- B. Samples: 24-inch square of the burlap-covered tackboard, complete with frame where applicable. Approved sample will serve as Design Consultant's control sample.
- C. Product test reports.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Composite Wood.
- E. Closeout: Copies of manufacturer's recommended maintenance products, and maintenance methods.

1.4 QUALITY ASSURANCE

- A. Fire-test-response characteristics: Identify materials with appropriate markings of applicable testing and inspecting agency.
- B. Mockups:
 - 1. Build a mockup of one mechanically-attached board and one adhesively-applied board to demonstrate appearance and aesthetic effects and set quality standards for installations.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 HANDLING

- A. Deliver factory-built units completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Design Consultant.

- B. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install tackboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Climatize panels to existing moisture conditions in accordance with panel manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 TACKBOARDS

- A. Core: 1/2-inch thick NCFR Homasote by Homasote Co., or equal, UL labeled with a flame spread (primed) and smoke developed of 20, in largest sizes available to fit the conditions shown with minimum number of joints.
 - 1. Thickness: 1/2 inch.
 - 2. Density: 34-40 pcf, ASTM C 209.
 - 3. Tensile strength, ASTM C 209:
 - a. Parallel: 400-700 psi.
 - b. Transverse: 600-900 psi.
 - c. Hardness: (Janka Ball): 275 lbs, ASTM D 1037.
 - d. Water Absorption by Volume, ASTM D 1037:
 - 1) 2 hour immersion: 5 percent maximum.
 - 2) 24 hour immersion: 14 percent maximum.
 - e. Expansion: 50 to 90 percent relative humidity, 0.30 percent, ASTM C 209.
 - f. Fire and smoke rating: Class I or A. Flame spread 25, fuel contributed 0, smoke developed, ASTM E 84.
- B. Facing material: Burlap to match Design Consultant's control sample.
- C. Installation adhesive: APA AFG-01 specification adhesive.
- D. Metal frame clips: Manufacturer's standard clip for securing panels to framing.
- E. Wall panel fasteners:
 - 1. Nails, Wood Framing: Annular threaded (ring shank) nail of length required to penetrate wood framing by not less than 3/4 inch (19 mm) minimum.
 - 2. Screws:
 - a. General: 20 gage or heavier, self-tapping drywall type steel screw.
 - b. Wood Framing: Coarse thread drywall type wood screw, length as required to penetrate framing 3/4 inch (19 mm) minimum.
- F. Extruded aluminum: ASTM B 221, Alloy 6063, 1/2-inch by 1/2-inch by 1/8-inch angles.
- G. Laminating adhesive: Manufacturer standard moisture-resistant thermoplastic type.

2.2 FABRICATION

- A. Fabricate panels in largest available size, with square corners, with joints in locations approved by Design Consultant.
- B. Laminate fabric facing to core; adhesive may be used at fabricator's option but shall not change the flame spread nor smoke developed ratings. Wrap board edges and conceal fabric edges on back side of each panel.
- C. Where penetrations occur, make accurate openings and securely return fabric under openings, with no visible fabric edges or fraying on panel surface.
- D. Eliminate air pockets between fabric covering and backing surface.
- E. Fabric covering shall be secure, smooth, clean, without wrinkles, bubbles, gaps, overlaps, tears, or other imperfections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Follow panel manufacturer's installation recommendations.
- B. Set tackboards securely, plumb, level and square with flush, hairline joints between adjacent tackboard panels.
- C. Space panel joints 1/8 inch space at floors, ceilings, and window and door frames. Install gypsum wallboard or other wall finish panels so that finish panel joints are staggered and do not coincide with panel joints.
- D. Clean exposed surfaces before Substantial Completion.
- E. Repair damaged panels in accordance with panel manufacturer's instructions and replace panels that cannot be repaired to the Design Consultant's satisfaction.

END OF SECTION

SECTION 10 14 00 – SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Work includes:

1. Provide signs, messages, and graphics requiring various materials, finishes, and fabrication and installation techniques – including all fasteners and fastenings and related electrical connections.
2. Shop drawings, layouts, mock-ups, samples, and prototypes for Design Consultant's approval.
3. Structural design and calculations when appropriate to substantiate design. This includes certified engineers' review and stamp.
4. Coordinate with Design Consultant during all phases of development, fabrication, and installation.
5. Coordinate with other Divisions.
6. Coordinate and verify sign and graphic messages with Design Consultant.
7. Verify of all conditions and dimensions in the field. Review and study architectural, interior design, lighting, electrical and related plans to ensure that all signs can be installed and supported prior to sign fabrication. Review with Design Consultant.
8. Footings for signage.

B. Related work includes:

1. Concrete, Division 03
2. Structural steel, Division 05
3. Finish painting miscellaneous, Division 09.
4. Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS": LEED Requirements.

C. Design Criteria

1. Details on Drawings indicate a design approach for sign fabrication but do not necessarily include all fabricating details required for the complete structural integrity of the signs, including consideration for static, dynamic, and erection loads during handling, erecting, and service at the installed locations, nor do they necessarily consider the preferred shop practices of the individual Sign Subcontractors. Therefore, it shall be the responsibility of the Contractor to perform the complete structural design of the signs and to incorporate the reasonable safety factors. Designs which survive rational engineering analysis will be acceptable, provided that shop drawings, including structural design, are approved by the Design Consultant.
2. The drawings in this package are for design intent only. The Contractor is responsible for the proper engineering of all items. The internal structure, dimensions, and specifications for all items shall be indicated in the shop drawings.
3. It shall be the responsibility of the Contractor to schedule all review meetings with the Design Consultant.
4. Omission in shop drawings of materials indicated in the Drawings, mentioned in the Specifications, or required for proper execution and completion of work, does not relieve the Contractor from responsibility for providing such materials. Contractor is responsible for accuracy, dimensions, quantities, strength of connection, coordination with various trades, and conformance to project requirements.
5. Approval of a separate or specified item does not necessarily constitute approval of an assembly in which item function.

D. References

1. US Green Building Council (USGBC), www.usgbc.org

1.2 SUBMITTALS

- A. Make submittals in accordance with the requirements of Section 01330.
- B. Provide shop drawings for all items including: Complete fabrication and installation drawings for each sign type. Indicate dimensions, materials, finishes, fastening, anchorage, joining, sealing, backing, utility requirements, rough-in, and adjacent related site conditions; each sign type with all graphic elements.
- C. Submit physical samples of sufficient size and quantity to illustrate materials, finishes, equipment or workmanship, and to establish standards by which completed work will be judged. Samples must represent the functional characteristics of the product or material, with integrally related parts and attachment devices, colors, and finishes. All letter styles shall be accurately reproduced.
- D. Required samples for review:
1. Full 12" x 12" set of all specified paint colors and finishes.
 2. Sample of each type of fastener to be used
 3. Each type of exposed metal used for major elements of work with respective finish.
 4. Complete set, full size message of all sign types to demonstrate proper spacing – solid text on white background, outline not accepted.
 5. 6" x 6" sample of each type and color of adhesive film to be used.
 6. Full size sample of sign types: A2 – letter 'a'; A7; A9 – letter 'c'; C1; C2; C3; C4; D3; E2.
 7. Full size panel of sign type A1
- E. Product data: Manufacturer's literature including general specifications, sign materials, finishes, colors, features, construction and installation instructions. Submit data from the manufacturer to certify the recycled content of materials, manufacture location and harvest location (cut sheets or manufacturer certification letters).
- F. LEED certification product data as specified in Division 1, Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
1. Credit MR 4.1 & 4.2, Recycled Content
 2. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally
 3. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants
 4. Credit EQ 4.4, Low Emitting Materials, Composite Wood & Agrifiber Products

1.3 QUALITY ASSURANCE

- A. Furnish products of a single manufacturer to ensure signage is of a uniform quality, appearance and color.
- B. Select materials that have the highest possible recycled content while still meeting performance criteria. Select materials from local manufacturers whenever possible.
- C. Language on signs shown on drawings subject to change. Design Consultant shall approve final language prior to fabrication.

PART 2 - PRODUCTS

2.1 SIGN TYPES

2.2 MATERIALS

- A. In fabricating items which will be exposed to view, limit materials to those which are free from surface blemishes, pitting and roughness.
- B. Exterior cabinets, letters, spacers, backplates and frames shall be constructed from 0.060 inch stainless steel, #4 horizontal brushed finish, unless otherwise specified on Drawings.
- C. Interior cabinets, letters, spacers, backplates and frames shall be constructed from 0.060 inch stainless steel, #4 horizontal brushed finish, unless otherwise specified on Drawings..
- D. Acrylic sheet shall be 0.25 or .375 inch with non-glare finish by Rohm & Haas or equal, unless otherwise specified on Drawings.
- E. Any/all exposed fasteners to be 0.125 inch flathead stainless steel screws painted to match adjoining surfaces unless otherwise specified on drawings. Screws to be painted and fully dry before applied to signs.
- F. Pin-mount supports shall be 3/16" to 1" diameter painted threaded rods as appropriate.
- G. Vinyl to be 3M Scotchlite Cast Vinyl or 3M Scotchlite Reflective Vinyl Sheeting unless otherwise specified on drawings, 7 yr. outdoor durability minimum.
- H. Electrical components must conform to applicable electrical codes and the following:
 - 1. All materials must be approved and listed by Underwriters Laboratories, Inc.
 - 2. Provide fluorescent or LED lamps of all types, as manufactured by General Electric, Sylvania, Westinghouse, or approved equal. Provide wattages required by use conditions.
 - 3. Low noise, high power factor type ballasts as required by work condition, as manufactured by General Electric, Sylvania, Westinghouse, or approved equal.
 - 4. Low noise, high power factory type transformers as manufactured by General Electric, Hubbell, Jefferson, or approved equal.
 - 5. Heavy duty, non-keyed, flush mounted, fused or un-fused disconnects, by General Electric, Square D, or ITE. Provide NEMA 1 for dry locations and proper enclosure for others.
- I. Fasteners: Provide non-corrosive fasteners, hangers and mounting devices that are compatible with sign material and finish. For interior signs provide vandal resistant screws, double sided VHB adhesive foam tape and/or silicone. For exterior signs provide tamper proof fasteners.

2.3 FABRICATION

- A. Signage shall be complete for proper installation as described in the Drawings.
- B. Finish work shall be firm, well anchored, in true alignment, properly squared, with smooth clean uniform appearance, without holes, cracks, discoloration, distortion, stains, or marks.
- C. Signage footings shall be sloped to drain away from sign post. Provide footing shop drawings to be reviewed and approved by Design Consultant.
- D. Construct all work to eliminate burrs, dents, cutting edges, and sharp corners.
- E. Finish welds on exposed surfaces to be imperceptible in the finished work.
- F. Provide miscellaneous metal items required for completion of the work even though not shown or specified.
- G. Except as indicated or directed otherwise, finish all surfaces smooth.
- H. Surfaces, which are intended to be flat, shall be without dents, bulges, oil canning, gaps, or other physical deformities.
- I. Surfaces, which are intended to be curved, shall be smoothly free-flowing to required shapes.
- J. Except where approved otherwise by Design consultant, conceal all fasteners.
- K. Make access panels tight-fitting, light proof, and flush with adjacent surfaces.
- L. Conceal all identification labels and Underwriters Limited labels to conform to Underwriters Limited Codes.
- M. Carefully follow manufacturer's recommended fabricating procedures regarding expansion or contraction, fastening, and restraining of acrylic plastic.
- N. Exercise care to ensure that painted, polished, and plated surfaces are unblemished in the finished work.

- O. Isolate dissimilar materials. Exercise particular care to isolate nonferrous metals from ferrous metals.
- P. All illumination shall be even and without hot spots.
- Q. Ease all exposed metal edges.
- R. Provide miscellaneous metal items required for completion of the work even though not shown or specified.
- S. Refer to Drawings for sign color specifications.
- T. Paint finishes shall be Matthews Acrylic Polyurethane with Matthews Primers and Metal Pre-Treatments or equal. Colors shall match Dunn Edwards, Benjamin Moore or Pantone Matching System palette.
- U. Shop painting to be uniform on and around all sign elements to ensure sign elements will withstand all weather conditions.
- V. Concrete shall be in conformance with RS Subsection 201-1, Class 500 C-2500 for fill and footing unless noted otherwise on Drawings.
- W. Mounting: Mounting plates shall be in conformance with manufacturer's written recommendations.
- X. All lettering applications shall use, except where specified, the typefaces designated for sign lettering on this project. A sample of the typefaces will be made available by the Design Consultant. The Contractor must purchase copies of the fonts from the type foundry. This procedure complies with copyright laws and current standards. Typographic substitutions shall not be acceptable.
- Y. Applied graphics: All painted, printed and fabricated finishes to be smooth, free of scratches, gouges, air bubbles, foreign matter or other imperfections.
- Z. Screen printed graphics: Apply copy and graphics to substrates using the photographic screen printing process using pre-tested compatible paints and inks only. All screen printed images shall be of high resolution with smooth edges free from nicks or saw tooth edges. Inks and paints shall be colorfast, permanent and have compatible adhesion to specified substrates.
- AA. Letterforms and symbols shall be photographically precise, crisp, clean and free of ticks, discontinuous curves, free of line waves, cut or ragged edges, edge build-up, bleeding surface pinholes, and other imperfections. Letterforms shall conform to the prescribed letterform proportions. Unless otherwise indicated, letterforms shall be aligned to maintain a baseline parallel to the sign format.

2.4 MANUFACTURERS

- A. Manufacturers (or equal)
 - 1. Neiman and Co; 818/ 781-8600
 - 2. Ampersand Contract Signing Group; 323/ 255-5311
 - 3. TFN Architectural Signage; 714/ 556-0990

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Correct detrimental conditions proceeding with installation.

3.2 INSTALLATION

- A. General
 - 1. Inspect all surfaces to receive signage and report all defects which would interfere with signage installation.
 - 2. Starting work implies acceptance of surfaces as satisfactory.
 - 3. Verify if anti-graffiti coating may be required for signage with a high degree of exposure to pedestrian traffic.
 - 4. Set work accurately into position, plumb, level, true, and free from rack

- B. Install signage upon acceptance by Design Consultant of material and substantial completion of job site area to receive such materials.
- C. Special Precautions: Guard against damaging existing pavements and planting where signage is to be installed.
- D. Footings beneath topping surface shall be installed and located prior to top surface installation.
- E. Prior to installation, check all components, nuts, bolts, and other connections for proper alignment, fit and any damage. Replace damaged or defective components.
- F. Prior to installation, confirm all electrical locations and requirements.

3.3 WORKMANSHIP AND CLEANUP

- A. Workmanship shall be in accordance with the best standard practices of the trade and shall be done by mechanics skilled in the type of work required.
- B. Keep areas of work clean, neat and orderly at all times. Clean surfaces, inside and out. Use approved cleaners if necessary to remove dirt.
- C. Protective coverings and strippable films shall be removed at a time that will afford the greatest protection of the furniture. Surfaces shall be cleaned to remove excess glazing and sealant compounds, dirt, and other substances.
- D. Upon completion of work and before final acceptance, remove tools, surplus materials, apparatus, and debris from the site. Leave the site in a neat, clean condition. Wash, clean, and leave paved areas without stains and smooth, and grind exposed weld joints smooth and flush.
- E. Upon completion of work, a final inspection for acceptance will be performed by the Design Consultant.
- F. All mock-ups and unused submittals shall be removed from site prior to final acceptance.
- G. Submit operation manuals, tools, and keys.

END OF SECTION

SECTION 10 21 13 - TOILET COMPARTMENTS AND SCREENS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Floor-mounted, overhead-braced solid phenolic toilet compartments.
 - 2. Wall mounted solid phenolic urinal screens.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for backing plates for attachment of compartments and partitions.
 - 3. Division 10 for toilet room accessories.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer's data for partitions and screens. Supplement with shop drawings showing plan layout, and large scale details of attachment to adjacent construction and supports.
- B. Shop drawings:
 - 1. Show layout of compartments and screens in each space to receive them.
 - 2. Show fabrication and erection of assemblies to extent not fully described by manufacturer's data sheets.
 - 3. Show anchorage, accessory items and finishes.
 - 4. Provide location drawings for bolt hole locations in supporting members for attachment of compartments.
- C. Samples:
 - 1. Six-inch square samples of each color of selected panel material.
 - 2. Full size samples of hardware.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
- E. Warranty: Sample copies of manufacturer's warranties for assemblies to be furnished under this Section, clearly defining terms, conditions, and time periods for the warranty.
- F. Closeout: Bound maintenance instructions for the panels.

1.4 QUALITY ASSURANCE

- A. Coordinate fabrication of toilet partitions for installation of surface-mounted and recessed toilet room accessories supported by the partitions. Obtain Shop or setting drawings, templates and directions required for reinforcement to be built-in the partitions.
- B. Comply with CCR, Title 24 and ADA Accessibility Guidelines for Buildings and Facilities, and ANSI 117.1 Accessibility Standard Voluntary or Enforceable.

1.5 HANDLING

- A. Maintain manufacturer's protective covers on panels as long as possible to protect them from damage.

1.6 WARRANTY

- A. Warrant materials against breakage, corrosion and delamination for 10 years after Substantial Completion.
- B. Repair defective materials, at no cost to the City, within the warranty period.

1.7 MAINTENANCE

- A. With closeout submittal, provide instructions for proper care of toilet partitions, such as: required lubrications, adjustments, and cleaning.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Accurate Partitions Corp.
- B. Bobrick Washroom Equipment, Inc.
- C. Capitol Partitions, Inc.
- D. Columbia Partitions, Inc.
- E. Flush-Metal Partition Corp.
- F. Gamco.
- G. General Partitions Manufacturing Corp.
- H. Global Steel Products (basis of design.)
- I. Metpar Steel Products Corp.
- J. Sanymetal Products Corp.
- K. Shanahan's Manufacturing.
- L. Or equal.

2.2 COMPONENTS

- A. Panels, doors and pilasters:
 - 1. Material: Trespa solid composite phenolic, 2 or more standard colors TBD.
 - 2. Provide materials selected for surface flatness and smoothness, and that are waterproof, non-absorbent and resistant to marking.
 - 3. Exposed surfaces which exhibit defects, discolorations, and other imperfections are not acceptable.
 - 4. Round edges to a 1/4-inch radius.

- B. Pilaster shoes and caps: ASTM A 167, Type 302/304 stainless steel, not less than 3 inches high, 0.0396-inch thick (20 gage), No. 304 stainless steel.
- C. Wall Brackets: 1-1/2-inch stirrup types fabricated from 6463-T5 aluminum alloy with a clear anodized finish.
- D. Headrail: Extruded 6463-T5 alloy aluminum with anti-grip design.
- E. Headrail brackets: 20-gage stainless steel with satin finish.
- F. Hardware and accessories: Heavy duty operating hardware and accessories of brass, stainless steel or aluminum. Low-temperature alloys are not acceptable. Include integral hinges, door latch housing, slide bolt and button, latch and keeper, combination hook and bumper and door U-shaped pulls, inside and outside for accessible compartments.

- 1. Hardware for accessible compartments shall not require the user to grasp or twist.

G. Anchorages and fasteners:

- 1. Manufacturer's standard exposed fasteners of stainless steel or brass, finished to match hardware, with theft-resistant type heads and nuts.
 - 2. For concealed anchors, use hot-dip galvanized, cadmium-plated, or other rust-resistant protective coated steel.

2.3 FABRICATION

A. General:

- 1. Fabricate units with cutouts, drilled holes, and internal reinforcement to receive partition-mounted hardware, accessories, and grab bars, as indicated.
 - 2. Exposed fasteners on the exterior of the partitions are not permitted.

B. Floor-supports:

- 1. Furnish galvanized steel anchorage devices complete with threaded rods, lock washers, and leveling adjustment nuts at pilasters to permit structural connection at floor.
 - 2. Provide shoe at each pilaster to conceal anchorage.

C. Wall-hung screens: Furnish panels of same construction and finish as partition system panels.

D. Hardware:

- 1. General: Provide hardware for each compartment for disabled accessibility and as follows.
 - a. Hinges: Cutout inset type, adjustable to hold door open at any angle up to 90 deg. Provide gravity type, spring-action cam type, or concealed torsion rod type to suit manufacturer's standards.
 - b. Latch and keeper: Manufacturer's standard surface mounted latch unit, designed for disabled accessibility, with combination rubber-faced door strike and keeper.
 - c. Coat hook: Manufacturer's standard unit, combination hook and rubber-tipped bumper, sized to prevent door hitting mounted accessories.
 - d. Door pull: Manufacturer's standard unit for out-swinging doors. Provide pulls on both faces of disabled compartment doors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct conditions detrimental to the proper and timely completion of this work before proceeding with installation.

3.2 INSTALLATION

- A. Set compartments and screens plumb, level, and space uniformly in compliance with their manufacturer's instructions and the following.
- B. Set pilasters with anchorages having not less than 2-inch penetration into structural floor, unless otherwise recommended by compartment manufacturer.
 - 1. Level, plumb, and tighten installation with devices furnished.
 - 2. Hang doors and adjust so that tops of doors are level with tops of pilasters when doors are in closed position.
- C. Secure panels to walls with not less than 2 stirrup brackets attached near top and bottom of panel.
 - 1. Locate wall brackets so that holes for wall anchorages occur in tile joints where applicable.
 - 2. Secure panels to pilasters with not less than 2 stirrup brackets located to align with stirrup brackets at wall.
 - 3. Anchor panels to studs or backing plates only; fastening components to walls with toggle bolts will not be allowed.
- D. Install hardware as recommended by manufacturer. Conceal evidence of drilling in finished work.
- E. Exposed fasteners on the exterior of the partitions are not permitted.

3.3 ADJUSTING/CLEANING

- A. Adjust brackets and hardware to provide uniform clearances not exceeding the following dimensions:
 - 1. Pilasters and walls: One-inch.
 - 2. Panels and walls: One-inch.
 - 3. Pilasters and panels: 1/2-inch.
 - 4. Pilasters and doors: 3/16-inch.
- B. Adjust hardware for proper operation. Set hinges on in-swinging doors to hold open approximately 30 deg. from closed position when unlatched, except set hinges on out-swinging doors (and entrance swing doors) to return to fully closed position.
- C. After completion of installation, clean and polish exposed surfaces and touchup minor scratches.
- D. Remove and replace, at no cost to the City, components, which cannot be satisfactorily touched-up in the field, in the Design Consultant's opinion.

END OF SECTION

SECTION 10 28 00 - TOILET ROOM ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes toilet accessories, including framed mirrors.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Divisions 09 and 10 for cutouts, openings and recesses for installation of accessories.
 - 3. Divisions 05, 09 and 10 for supports for toilet room accessories.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer Product Data, and illustrations, complete parts list, and installation requirements for each accessory specified.
- B. Samples: Full size Samples of accessories, when requested. Samples will be returned to the Contractor.
- C. Schedule: Schedule indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for the Project.
- D. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.

1.4 QUALITY ASSURANCE

- A. Compliance with CBC requirements for accessibility for accessories and their attachments is the Contractor's responsibility.

1.5 HANDLING

- A. When possible, keep protective covers on accessories until their installation is complete, then remove at final cleanup.

1.6 WARRANTY

- A. Special warranty: Provide the City the manufacturer warranty protecting mirrors against silver spoilage for 5 years after Substantial Completion.

1.7 MAINTENANCE

- A. Furnish operating instructions and keys for equipment locks.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. American Specialties, Inc.
- B. Bobrick Washroom Equipment, Inc.
- C. Bradley Corp.
- D. Georgia-Pacific.
- E. Koala Kare.
- F. Or equal.

2.2 MODELS

- A. As indicated in the schedule below.

2.3 MATERIALS

- A. Stainless steel: AAMA Type 302/304 complying with ASTM A 167.
- B. Sheet steel:
 - 1. Cold-rolled commercial quality, complying with ASTM A 336, 20 gage minimum.
 - 2. Galvanized steel: ASTM A 653 LQ, G60 zinc coating, 20 gage minimum.
- C. Mirrors: 1/4-inch "Silvering Quality" float glass with silver coating, copper protective coating and 2-mil thick protective paint; complying with CS 27.
- D. Mounting devices: Galvanized steel.
- E. Fasteners: Spanner head design stainless steel fasteners where exposed; may be galvanized steel where concealed.

2.4 FABRICATION

- A. Fabricate units with seamless one piece flanges on exposed faces.
 - 1. Miter corners, weld and grind smooth and flush with parent metal so that welds are invisible on exposed surfaces.
 - 2. Open joints (not fully welded) on exposed surfaces are not acceptable.
 - 3. Conceal anchoring devices.
- B. Hang doors or panels on continuous stainless steel piano hinges.
- C. Master-key locked dispensing units. Key coin boxes of coin-operated dispensing units separately from the lock on the unit.
- D. Grind edges smooth, both inside and out.
- E. Finish exposed surfaces with an AISI No. 4 finish running in the same direction (horizontal or vertical) for all accessories, except where a knurled surface is specified for grab bars.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that attachment surfaces are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.
- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Drill holes to correct size and location. Install accessories plumb, level and equally spaced (when applicable).
 - 1. Where accessories are attached to toilet compartments, do not “thru-bolt” but drill and tap partition reinforcement
 - 2. Provide templates of accessories for drilling and tapping required in Section 10 21 13.
- B. When installed in ceramic tile surfaces, coordinate accessory location with the tilework so that the top and one side (closest to the door) of the accessory will align with a tile joint.
- C. Attach accessories plumb, level, evenly spaced where applicable, securely anchored with screws or bolts to steel studs or backing plates. Do not use Molly or toggle bolts in gypsum board.
- D. Install grab bars to withstand a downward load of at least 250 lbf when tested according to method in ASTM F 446.
- E. Adjust accessories for proper operation. After completion of installation, clean and polish exposed surfaces after removal of protective coverings.

3.3 ACCESSORY SCHEDULE

- A. The following, with stainless steel satin finish, except for plastic liner.
 - 1. Seat Cover and Sanitary Napkin Dispenser:
 - a. Recess-Mounted: Bobrick B-3574.
 - b. Surface Mounted: Bobrick B-347.
 - 2. Seat Cover and Toilet Tissue Dispenser:
 - a. Recess-Mounted: Bobrick B3474.
 - b. Surface Mounted: Bobrick B-3579.
 - 3. Soap Dispenser: Bobrick B-306.
 - 4. Baby Changing Station: Koala Kare KB-110-SSRE.
 - 5. Waste Receptacle: Georgia-Pacific GP 59491.
 - 6. Plastic Liner, Gray: Georgia-Pacific enMotion 59591.
 - 7. Towel Dispenser: Georgia-Pacific enMotion 59466.
 - 8. Soap Dispenser: Bobrick Recessed B-306.
 - 9. Sanitary Napkin Dispenser: Bobrick B-3500X2 50.
 - 10. Coat Hooks:
 - a. Type 1: Bobrick B-6777.
 - b. Type 2: Bobrick B-6827.
 - 11. Grab Bar: Bobrick B-6806.
 - 12. Mirrors: 24 by 48 inches in single access restrooms.

END OF SECTION

SECTION 10 44 00 - FIRE EXTINGUISHERS AND CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Fire extinguishers.
2. Fire extinguisher cabinets.
3. Fire extinguisher mounting brackets.

B. Related requirements:

1. Division 01 for LEED requirements.
2. Division 21 for fixed fire protection systems.

1.2 SUSTAINABLE DESIGN REFERENCE

A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate size of fire extinguisher cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
2. Coordinate sizes and locations of fire extinguisher cabinets with wall depths. Final location of fire extinguisher cabinets is subject to the Fire Department's approval.
 - a. Verify cabinet locations with both the Fire Department and the Design Consultant and City's Authorized Representative during the framing stage of the Project.
 - b. Positioning of cabinets at locations other than where indicated shall be done at no additional cost to the City.
 - c. Where extinguishers are not indicated, assume cabinet and extinguishers will be located within 75 feet of any point in the building, or at a rate of one for each 3,000 square feet of building area, or portion thereof, whichever yields the greater number of extinguishers.

1.4 SUBMITTALS

A. Data: Manufacturer product data and installation instructions for the work of this Section.

1. For fire extinguishers, submit Drawings indicating locations and type of extinguishers after approval by Fire Marshall.
2. For extinguisher cabinets, include roughing-in dimensions and details showing mounting methods, door hardware, cabinet type and materials, trim style and door construction, and materials.
3. Include color charts showing full range of manufacturer standard colors and designs available.

- B. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
6. Credit EQ 4.1, Low Emitting Materials, Paints.

- C. Closeout: 2 keys for each cabinet, all keyed alike, and properly tagged.

1.5 QUALITY ASSURANCE

- A. Uniformity: Provide all fire extinguishers, cabinets and accessories made by one manufacturer.
- B. UL listing: Provide UL listed fire extinguishers bearing the UL "Listing Mark" for type, rating, and classification specified. Provide cabinets with the same fire-rating as walls in which they are installed.
- C. NFPA compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

1.6 WARRANTIES

- A. Fire extinguisher warranty:
1. Manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship for 5 years from Substantial Completion.
 2. Failures include:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-rolled steel sheet: ASTM A 1008, commercial steel (CS,) Type B.
- B. Stainless-steel sheet: ASTM A 666, Type 304.
- C. Tempered float glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick.

2.2 MANUFACTURERS

1. JL Industries, Inc./Division of Activar Construction Products Group.
2. Larsen's Manufacturing Company.
3. Potter Roemer (basis of design.)
4. Or equal.

2.3 FIRE EXTINGUISHERS

- A. Multi-purpose dry chemical: 3A:40B:C UL rated, 6 lb. capacity, aluminum valve.

B. Halon: 2A:40B:C UL-rated, 13 lb. capacity, chrome-plated brass valve.

1. Markings:
2. Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
3. Label with standard warnings concerning breathing, eyes, skin and ingestion. Provide emergency and first aid procedures.

2.4 ACCESSORIES

A. Mounting brackets (wall hooks):

1. Basis of design is Larsen's Model B4, or other manufacturer standard brackets of sizes required for extinguisher specified, in manufacturer standard plated finish.
2. Provide brackets for extinguishers, other than those in cabinets.

2.5 FIRE EXTINGUISHER CABINETS

A. Basis of design product: Potter Roemer Model Alta 7060-A-VW, recessed, stainless steel.

1. Box construction: Manufacturer standard enameled steel box. Miter and weld perimeter door and frames and grind smooth.
2. Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend). Miter and weld all joints.
3. Door hardware: Manufacturer standard door operating hardware and keyed lock. Provide concealed or continuous type hinge permitting door to open 180 degrees.
4. Factory-finishing:
 - a. After cleaning and pretreatment, apply manufacturer's baked enamel coating of the color selected by the Design Consultant from manufacturer's palette.
 - b. Identify fire extinguisher in cabinet with lettering spelling "FIRE EXTINGUISHER" painted on door by silk-screen process.
 - c. Provide vertical lettering on door as selected by Design Consultant from manufacturer's standard letter sizes, styles and layouts.

2.6 ACCESSORIES

A. Fire extinguisher mounting brackets (wall hooks):

1. Basis-of-design-products: Named manufacturer's standard brackets of sizes required for extinguisher specified, in manufacturer standard plated finish.
2. Provide brackets for extinguishers, other than those in cabinets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Verify that openings are within allowable tolerances, plumb, level, clean, will provide a solid anchoring surface.

- C. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Verify with Fire Marshal and Design Consultant each fire extinguisher cabinet location during the framing stage of the Project; location of fire extinguisher cabinets is subject to the Fire Marshal's approval.
 - 1. Position cabinets at locations other than indicated no cost to the City.
 - 2. Where not indicated locate cabinets and extinguishers with the Design Consultant's approval, so that they can be reached within 75 feet travel distance from any point, or one for each 3,000 square feet, whichever is more restrictive.
- B. Install cabinets so that the fire and/or acoustical rating of the walls are not compromised.
- C. Attach mounting brackets and fire extinguisher cabinets securely to studs or backing plates, square, plumb and level, in compliance with their manufacturer's instructions; do not attach them to gypsum board with Molly or toggle bolts. Install fire extinguisher locators where indicated. Secure to supports with double-sided foam tape.

3.3 FIELD QUALITY CONTROL

- A. Verify that installed extinguishers are fully charged and tagged in accordance with requirements of authorities having jurisdiction.
- B. Touchup damaged finish, when the results are acceptable to the Design Consultant, otherwise replace damaged components.

END OF SECTION

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SECTION 10 73 16 – INSTALLING FLAGPOLE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes installing existing flagpole indicated to be relocated.
- B. Related requirements: Division 03 for concrete base and grout.

1.2 SUBMITTALS

- A. Shop drawings:
 - 1. Large scale, dimensioned, showing methods of anchorage and grounding of the flagpole.
 - 2. The shop drawings shall be signed and stamped by a professional engineer licensed to practice in California.

1.3 QUALITY ASSURANCE

- A. Install the flagpoles to withstand, without permanent deformation or failure, the wind loading prescribed by Code, but not less than 20 psf.

PART 2 - PRODUCTS

2.1 FLAGPOLE

- A. Existing, to be re-located.
- B. Foundation:
 - 1. Sleeve: Tube-type formed of 16-gage galvanized, corrugated sheet steel.
 - 2. Base plate: Square steel plate 3/8-inch thick (minimum) and 3 to 4-inch larger than foundation sleeve diameter, with 3/16-inch or 1/4-inch thick centering wedges welded to plate and sleeve.
 - 3. Lightning protection rod: Copper-plated steel with 1/4 inch diameter copper wire bolted to flagpole with stainless steel bolt and galvanized steel washer to insulate cable lug from flagpole.
- C. Sealant: As specified in Section 07 92 00.
- D. Metal fabrications and bituminous coating: As specified in Section 05 50 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Coat mast sections to be encased in foundation sleeve with a heavy coating of asphalt paint both inside and out.
- B. Erect flagpole in accordance with the approved shop drawings plumb, centered in foundation sleeve with temporary wood wedges with cleat located in prevailing wind direction.
- C. Maximum variation from true vertical within one inch of true vertical measured at top of pole in 3 directions.
- D. Fill void between flagpole and sleeve with sand and tamp firmly to hold flagpole in position.
- E. Pour waterproof cement grout collar and seal with specified sealant after concrete paving is in place. Then install collar.
- F. Provide positive lighting ground.
- G. Adjust truck assembly and halyards to permit smooth non-binding hoisting.

3.3 REPAIR/REPLACEMENT

- A. Touchup marred and abraded surfaces to match adjacent undamaged surfaces, when the results are satisfactory to the Architect, otherwise promptly replace damaged components.

END OF SECTION

SECTION 10 99 00 - BUILDING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hanging system for art work.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Product Data: Manufacturer product literature and installation instructions for items specified herein.
- B. 12-inch sample of the track and one full-size sample for each accessory.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.

PART 2 - PRODUCTS

2.1 HANGING SYSTEM FOR ART WORK

- A. "W4012 Classic" wall system by AS Hanging Systems, or equal.

2.2 MATERIALS

- A. Wall track: Extruded aluminum, finish to be selected by the Design Consultant, and complying with the following:
 - 1. Rated strength: 300 lbs. per 72-inch track.
 - 2. Hole pattern: 9 pre-drilled 0.16 inch holes for No. 6 screws.
- B. Accessories: To be selected by the Design Consultant.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Install building specialties in compliance with their manufacturer's instructions and recommendations plumb, level and secured to their supports.

3.3 FIELD QUALITY CONTROL

- A. Remove protective coverings, where applicable, and clean building specialties.
- B. Touchup damaged finishes, where the results are acceptable to the Design Consultant, otherwise replace with new components.

END OF SECTION

DIVISION 11

EQUIPMENT

SECTION 11 31 00 - APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes installing City-furnished appliances.
- B. Related requirements: Divisions 22 and 26 for electrical power, ventilation, water supply, and waste lines for appliances specified herein.

PART 2 - PRODUCTS

2.1 CITY-FURNISHED APPLIANCES

- A. Staff lounge:
 - 1. Microwave.
 - 2. Full sized refrigerator.
 - 3. Garbage disposal.
- B. Community room kitchenette:
 - 1. Microwave.
 - 2. Full sized refrigerator.
 - 3. Garbage disposal.

PART 3 - EXECUTION

3.1 EXAMINATION/COORDINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.
- C. Coordinate installation of residential appliances with the work of related trades for necessary rough-in work, backing, supports and anchorage.
 - 1. Deliver backing and embedments, including templates and instructions for their installation, to affected trades before related construction begins.

3.2 INSTALLATION

- A. General:
 - 1. Install appliances in compliance with their manufacturer's instructions and recommendations plumb, level and secured to their supports.
 - 2. Provide service connections complying with regulations of governing authorities. Refer to Division 22 and 26 for plumbing and electrical requirements.
- B. Built-in equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.
- C. Freestanding equipment: Place units in final locations after finishes are completed in each area. Verify that clearances are adequate to properly operate equipment.

- D. Coordinate this work with that of trades whose work abuts. Remove and re-install minor trim of cabinets and walls necessary to install the equipment.

3.3 FIELD QUALITY CONTROL

- A. At completion of installation, conduct an operating test of each appliance, adjusting same until in operating condition.
- B. Remove and replace appliance that doesn't function as intended, cannot be adjusted or repaired on the site at no cost to the City.

END OF SECTION

SECTION 11 51 16 - LIBRARY BOOK DEPOSITORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following:
 - 1. Exterior In-wall book return assemblies.
 - 2. Interior in-wall book return assembly.
 - 3. Metal book bins.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer Product Data for the book bins and book drop assemblies, including installation instructions, operation and maintenance data, details of construction-relative materials, dimensions, profiles, component parts, accessories, and finishes.
- B. Shop Drawings:
 - 1. Indicate layouts, roughing-in details, unit dimensions, required clearances, component parts, methods of field assembly and installation.
 - 2. Show required clearances for service and operation of the assemblies.
 - 3. Include setting drawings, templates, and directions for installing anchor bolts and other anchorages.
 - 4. Show connection for the interior book return to the automated sorting system.
- C. Samples: Submit 12-inch square Samples of each exposed finish required.
- D. Maintenance data: Include operating and maintenance instructions in the maintenance manual.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.4 QUALITY ASSURANCE

- A. Installer qualifications: Manufacturer's authorized representative who is trained and approved for installation of library equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Kingsley Co.
- B. Tech Logic Corporation.
- C. Or equal.

2.2 BOOK RETURNS

- A. Basis of design for exterior, manual book drop inlets: Kingsley "Standard Kwik Drop Ensemble," Model 15-8950, consisting of a 2-piece through-wall system, including the following:
 - 1. Spring-loaded depository door and entry chute.
 - 2. Steel chute and housing.
 - 3. Rear cover plate.
 - 4. Exterior faceplate with weather shroud.
 - 5. "KwikLock" open/close lever locking system.
 - 6. "Airbloc" systems (40 Duro Decco Neoprene rubber panels.)
 - 7. Weatherstripping.
 - 8. Accessories, including the following:
 - a. 99-8100 – Braille label reading "Book Drop."
 - b. 99-8105 – Reading "Video Drop."
 - c. 99-1055A – Exterior locking cover plate.
 - d. Manufacturer's standard installation and operation hardware.
- B. Basis of design for interior, manual book drop inlet at the automated materials handling machine: Logi Tec "Interior Book Drop with Message Center", Model 45006796.

2.3 BOOK CARTS

- A. Kingsley aluminum "High Capacity Duralight Cushion Drop II Cart" No. 37-9040, including the following:
 - 1. 14-gage bottom with open bottom access.
 - 2. One-inch diameter steel handle.
 - 3. Standard float tray with 1/2-inch felt pad.
 - 4. Cart cover.
 - 5. Felt lining.
 - 6. Four 3-inch, plate-mounted ball-bearing casters, non-marring, 2 swivel and 2 locking types.
- B. Provide one cart for each exterior book drop.

2.4 MATERIALS

- A. Aluminum sheets and plates: ASTM B 209, with manufacturer's standard black textured powder coating.
- B. Stainless steel: ASTM A 240, Type 302/304, manufacturer's standard finish; do not use mild steel.
- C. Wood blocking and trim: As specified in Division 06.
- D. Sealants: As specified in Division 07.

PART 3 - INSTALLATION

3.1 EXAMINATION/COORDINATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.
- C. Coordinate installation of book drop assemblies with the work of related trades for necessary rough-in work, backing, supports, anchorage and connections to automated sorting system for the interior drop.
- D. Deliver backing and templates and instructions for their installations, to affected trades before related construction begins.

3.2 INSTALLATION

- A. Install book drop assemblies according to approved shop drawings and manufacturer instructions, plumb, level and secure.
- B. Install fasteners in precise position, flanges level, without excessive shims or calking.
- C. If necessary, make adjustments to ensure that operating devices are functioning properly and as intended.

3.3 FIELD QUALITY CONTROL

- A. After completing the installations, and in the presence of a City-designated representative, test moving components to ensure the proper operation of the book drop equipment and proper connection to the automated sorting equipment.
- B. Demonstrate the operation of the equipment and review the maintenance data specified above with the City's personnel.
- C. Instruct designated library staff members in proper use of the drop boxes, as well as providing an operator manual for staff reference.
- D. After installation, restore marred or abraded surfaces to original condition using same primer used for shop painting. Make adjustments necessary for the proper operations of the equipment.

END OF SECTION

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DIVISION 12

FURNISHINGS

SECTION 12 24 00 - WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes motorized room darkening shades and operators.
- B. Work furnished, but installed in other Sections:
 - 1. Metal shade pockets or housings recessed into ceiling systems, and extruded aluminum ceiling pocket trim (closure) assemblies.
 - 2. Electrical control components including switches and relays necessary for control characteristics specified.
- C. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 26 for electrical service and connections for motor operators, controls, limit switches, and other powered devices and for system disconnect switches for motorized shade operation.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org .

1.3 SUBMITTALS

- A. Data: Manufacturer product data for each type of product indicated. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions.
 - 1. Motorized shade operators: Include operating instructions.
 - 2. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.
- B. Shop drawings: Large scale, dimensioned drawings showing location and extent of roller shades, including the following:
 - 1. Elevations, sections, details, and dimensions not shown in product data.
 - 2. Installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
 - 3. Head, jamb and sill details as necessary to coordinate work with surrounding conditions and construction.
 - 4. Shade schedule coordinating room number, window type, opening size(s), quantities and key to details.
 - 5. Locations and details for installing operator components, switches, and controls. Indicate motor sizes, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - 6. Complete wiring diagrams including connection details for components furnished under this Section.
- C. Coordination drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following.
 - 1. Overall arrangement of shades and control locations.
 - 2. Ceiling suspension system members and attachment to building structure.

3. Ceiling-mounted or penetrating items including light fixtures, air outlets and inlets, speakers, sprinklers, recessed shades and special moldings at walls, column penetrations, and other junctures of shades with adjoining construction.
4. Shade mounting assembly and attachment.
5. Size and location of access to shade operator, motor, and adjustable components.

D. Selection samples:

1. Three-inch by 5-inch shade cloth fabric swatches for initial fabric color selection from manufacturer's full range of available fabrics.
2. Standard aluminum finish color samples from manufacturer's range of standard colors.

E. Verification samples:

1. One fully operational window shade assembly of each type required, 30-inch square complete with selected shade cloth including sample of seam/batten when applicable. Disassemble sample to demonstrate compliance with the requirements of this Section.
2. One complete set of all shade components, unassembled, demonstrating compliance with the specified requirements.

F. Design Data, Test Reports, and Certificates: Current reports from independent testing laboratories demonstrating specified requirements.

G. Manufacturers' instructions: Manufacturer standard installation instructions.

H. Qualification data: For Installer.

I. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:

1. Credit MR 4.1 & 4.2, Recycled Content.
2. Credit MR 5.1, Regional Materials, Manufactured Locally.
3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
4. Credit MR 6, Rapidly Renewable Materials.
5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
6. Credit EQ 4.1, Low Emitting Materials, Paints.

J. Maintenance data: Furnish maintenance manuals with the following information:

1. Methods for maintaining roller shades and finishes.
2. Precautions about cleaning materials and methods that could be detrimental to fabrics, finishes, and performance.
3. Operating hardware.
4. Motorized shade operator.

1.4 QUALITY ASSURANCE

- A. Manufacturer qualifications: Firm with minimum 5 years experience manufacturing products comparable to those specified.
- B. Installer qualifications: Firm with minimum 5 years experience, having completed installation of roller shades similar in material, design, and extent to that indicated for the Project and whose work has resulted in a record of successful in-service performance.
- C. Source limitations: Obtain roller shades through one source from a single manufacturer.
- D. Mockup: Build a full size shade mockup to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Build mockup in the location and of the size indicated or, if not indicated, as directed by the Design Consultant.

2. Approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 HANDLING

A. Storage and protection:

1. Do not deliver items to the Project until all wet work has been completed and is dry.
2. Deliver shades to Project site in labeled protective packaging, uniquely labeled to identify each shade for each opening, using same room designations indicated and scheduled.
3. Schedule delivery to prevent delays to completion of work but to minimize on site storage time.
4. Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic and all other potential damage.

1.6 PROJECT CONDITIONS

- ##### A. Environmental limitations: Do not install roller shades until construction and wet and dirty finish work in spaces, including painting, 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:

1. Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on shop drawings.
2. Allow clearances for operable glazed units' operation hardware throughout the entire operating range. Notify Design Consultant of discrepancies.

1.7 MAINTENANCE

- ##### 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.
- ##### B. Before installation begins, deliver full-size units equal to 5 percent of quantity installed for each size, color, texture, and pattern indicated.

1.8 WARRANTIES

- ##### A. Shade motors and motor control system electrical components: Warranty period shall be 5 years from Date of Substantial Completion for shade motors and 2 years for all other control components containing provisions that installation will remain operational without fault for the warranty period. Include all operating parts.
- ##### B. Shade cloth and all other components of shade system to be fit for the use intended for a minimum of 10 years.
- ##### C. In the event of a warranted product failure, the shade manufacturer shall, at no cost to the City, facilitate acquisition and delivery of all necessary components.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Draper Shade & Screen Co., Inc.
- B. Hunter Douglas Window Fashions.
- C. Levolor Contract; a Newell Company; Joanna.
- D. MechoShade (basis of design).

- E. Sol-R-Veil.
- F. Or equal.

2.2 ASSEMBLY

- A. Model: MechoShade "ElectroShade," 1/double shade with sunscreen and blackout cloth on a single bracket, meeting the following requirements:
 - 1. System shall allow for the following:
 - a. Removal of shade roller tube from brackets without removing hardware from opening or without requiring end or center support brackets to be removed.
 - b. Field adjustment of motor or replacement of operable hardware component without requiring removal of brackets regardless of mounting position (inside or outside mount).
 - c. Removable regular roll fascia(s) mounted continuously across two or more shades without requiring exposed fasteners.
 - d. Operation of multiple shade bands offset by a maximum of 12 degrees from the motor axis between shade bands, 6 degrees on each side of the radial line, by a single motor (multi-banded shades) subject to manufacturer's design criteria. Multi-banding shall occur throughout.
 - e. Positive mechanical engagement of drive mechanism to shade roller tube. Do not rely on friction fit connections for drive mechanism to shade roller tube.
- B. Materials, general:
 - 1. Flame-resistance ratings that pass NFPA 701, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Tested in accordance with University of Pittsburgh Toxicity Protocol including LC50 analysis and toxicity characteristics.
 - 3. 100 percentage polyester core yarn. Fiberglass content in shade cloth is unacceptable.
 - 4. ASTM G 22 results for ATCC6538 (*Staphylococcus aureus*) and ATCC13388 (*Pseudomonas aeruginosa*) indicating minimum 5mm 'No Growth Contact Area'.
 - 5. ASTM G 285 results for ATCC9642, ATCC9644, ATCC9348 and ATCC9645 indicating "No Growth."
 - 6. Antimicrobial without topical treatment. NY State Fire-Gas Toxicity Text: LC50 22.5 g.
 - 7. ASTM E 84: Flame Spread 17, Smoke Density Index 118, Shade cloth seconds are not acceptable.
 - 8. Total hanging weight of shade band shall not exceed 80 percentage of the rated lifting capacity of the shade motor and tube assembly.
- C. Sunscreen: ThermoVeil, 1000 series, visually transparent single-thickness fabric shade cloth: Non-raveling 0.030-inch thick vinyl fabric, woven from 0.018-inch diameter extruded vinyl yarn comprising of 15 percent polyester and 85 percent reinforced vinyl, complying with the following:
 - 1. Colors: White 0891 or pearl grey 0893.
- D. Blackout cloth: Acoustical Dimount 0890 series. Fiberglass coated fabric, 12 mils thick, 62 threads per square-inch minimum, 0.750 psi minimum, washable and colorfast, passed FR tests CCC-C-521E, ASTM E 84, ASTM E 162 and NFPA 701 Large-small scale.

E. Hembars and hempockets:

1. Seams: RF-welded (including welded ends) and concealed hemweights.
2. Hemweights of appropriate size and weight for shade band and must be continuous inside a sealed hempocket.
3. Match hempocket construction for all shades in same rooms.

F. Shade roller and shade cloth attachment:

1. Extruded aluminum shade roller tube of diameter and wall thickness required to support shade fabric without (excessive) deflection. Roller tubes less than 1-1/2-inches diameter are not acceptable.
2. Provide for positive mechanical engagement with drive / brake mechanism.
3. Provide for positive mechanical attachment of shade band without requiring use of adhesives, adhesive tape, staples or rivets. Two sided pressure sensitive adhesive tape is not acceptable.
4. Attach shade bands to tube such that removal and replacement of a shade band can be accomplished without removing either the tube from the brackets or without removing shade brackets. Shade bands must be replaceable on site.

2.3 SHADE MOTORS AND MOTOR CONTROL SYSTEM (IQ/MLC SYSTEM)

A. MechoShade Systems, Inc. IQ/MLC motor control system.

B. Electrical components, general: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Motors:

1. Tubular, asynchronous motors with built-in reversible capacitor operating at 110V AC (60hz), single phase, temperature Class A, thermally-protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
2. Conceal shade motors inside shade roller tube.
3. Each shade motor draws a maximum current of 2.3 amps.
4. Use motors rated at the same nominal speed for all shades in the same room.

D. Wall switches:

1. Three-button flush-mounted switches with metal cover plates and no exposed fasteners.
2. Connect local wall switches to control system components via low voltage (12V DC) 4 conductor modular cable equipped with RJ-11 type connectors specified in Division 16.
3. Connect master wall switches to control system components via low voltage (12V DC) 6-conductor modular cable equipped with RJ-12 type connectors specified in Division 16.

E. Motor control system:

1. Provide power to each shade motor via individual 3 conductor line voltage circuits connecting each motor to the relay based controllers (IQ/MLC).
2. Control system components provide appropriate (spike and brown out) over-current protection (plus or minus 10 percentage of line voltage) for each of the 4 individual motor circuits and shall be rated by UL or ETL as a component of this system.

3. Motor control system allows each group of four shade motors to be controlled by each of four local switch ports, with up to fourteen possible "sub-group" combinations via local 3 button wall switches and all at once via a master 3-button switch. System shall allow for overlapping switch combinations from 2 or more switches.
4. Multiple "sub-groups" from different IQ/MLC control components may be combined to form "groups" operated by a single 3-button wall switch.
5. Each shade motor shall be accessible (for control purposes) from up to four local switches and one master switch.
6. Control system shall allow for automatic alignment of shade hembars at 25 percent, 50 percent and 75 percent of opening heights, or up to 3 user defined intermediate stopping positions in addition to all up/all down positions regardless of shade height. Control system shall allow shades to be stopped at any point in the opening height.
7. Control system shall have 2 standard operating modes: "Normal Mode" allowing the shades to be stopped anywhere in the opening height and "Uniform Mode" allowing the shades to only be stopped at the predefined intermediate stop positions. Both modes shall allow for all up/all down positioning.
8. Control system components shall allow for interface with low voltage Audio Visual system components via a dry contact terminal block.
9. Control system components shall allow for interface with external analog input control devices such as solar activated controllers, wind activated controllers, 24-hour timers, etc. via a dry contact terminal block.
10. Reconfiguration of switchable groups, as specified above, shall not require rewiring of the hardwired line voltage motor power supply wiring or the low voltage control wiring.

2.4 ACCESSORIES

- A. Shade pockets for recessed mounting in acoustical ceilings:
 1. Extruded aluminum shade pocket with exposed extruded aluminum removable closure panel to provide access to shades and an exposed tile support (MechoShade 4123 pocket in manufacturer standard painted finish) for acoustical tile ceilings.

2.5 FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise. Comply with manufacturer's edge clearance standards and recommendations.
- B. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8-inch in either direction per 8 feet of shade height due to warp distortion or weave design.
- C. Provide battens in non-railroded shades to assure proper tracking and uniform rolling of the shade bands.
- D. Provide batten pockets utilizing self-colored fabric front and back, RF welded into the shade cloth. Provide a self-colored opaque liner front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches high and be totally opaque. Reinforce batten pockets using coil coated, roll formed spring steel to insure flatness of shade bands in accordance with manufacturer's standards. Design formed profile of batten stiffeners to be compatible with diameter of shade roller tube.

2.6 FINISHES

- A. Aluminum components: Clear, anodized, unless otherwise indicated otherwise.
- B. Steel components: Cadmium-plated, satin-finished, or bonderized prior to painting with Manufacturer's standard baked-enamel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A.
- B. Examine substrates, areas, and conditions for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance.
- C. Correct detrimental conditions before proceeding with installation.

3.2 SHADE INSTALLATION

- A. Install shades in accordance with the approved shop drawings and their manufacturer's instructions for the type of mounting and operation required.
- B. Mount units plumb, level, and securely anchored in place with recommended hardware and accessories to provide smooth operation without binding.
- C. Install units within the following tolerances:
 - 1. Maximum variation of gap at window opening perimeter: 1/4-inch, per 8 feet (plus or minus 1/8-inch) of shade height.
 - 2. Maximum offset from level: 1/16-inch per 5 feet of shade width.
- D. Allow clearances for window operation hardware.
- E. Connect motorized operators to building electrical system.

3.3 ADJUSTING

- A. Adjust and balance shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTING

- A. Clean shade surfaces after installation in compliance with their manufacturer's instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure that shades are without damage or deterioration at Substantial Completion.
- C. Replace damaged shades that cannot be repaired, in a manner approved by Design Consultant, before Substantial Completion.

3.5 FIELD QUALITY CONTROL

- A. Upon completion of installation, conduct tests to ensure the proper operation of the shades.
- B. Adjust and lubricate as required for safe and efficient operation.
- C. Review the maintenance data specified in Paragraph 1.2, B above with the City's representative.
- D. Restore marred or abraded surfaces to original condition using same primer used for shop painting.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City's maintenance personnel to adjust, operate, and maintain the assemblies.

END OF SECTION

SECTION 12 48 16 – WALK-OFF MATS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes entry mats with carpet inserts, recessed aluminum frames and accessories recessed in concrete floors and on access flooring.
- B. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 09 for access flooring.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer product data, including specifications, roughing-in diagrams, and installation instructions for the grilles.
- B. Samples: 12-inch square samples of carpet inserts in aluminum frame.
- C. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Tire-Tex.
- B. Or equal.

2.2 MATERIALS

- A. Frame: 3/8-inch deep, 6063-T6 aluminum alloy.
- B. Carpet inserts: 12-inch square by 3/8-inch carpet tiles consisting of recycled truck tires with reinforced rubber backing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, surfaces and supports under which the work of this Section will be installed.
- B. Correct conditions detrimental to the proper and timely completion of this work before proceeding with installation.

3.2 INSTALLATION

- A. Install recessed mat frames in accordance with manufacturer's instructions securely, square and level, with tight joints to frame. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.
- B. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
- C. On access flooring install frame and mats in accordance with the approved shop drawings, securely and straight, with mat surfaces flush and level with access flooring surface.
- D. On concrete floors install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.
- E. Coat aluminum surfaces that will be in contact with concrete with a heavy coating of bituminous paint.
- F. Floor mats shall remain immobile at each location under any traffic condition.
- G. Touchup minor damage or replace damaged parts as directed by the Design Consultant.

END OF SECTION

SECTION 129300- SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Trash receptacle
 - 2. Picnic table/bench sets
 - 3. Precast concrete bench with lumber top
- B. Related Sections include the following:
 - 1. Division 03 Section "Landscape Architectural Concrete" for [installation of pipe sleeves cast] [installation of anchor bolts cast] [formed voids] in concrete footings.
 - 2. Division 31 Section "Earth Moving" for excavation for installation of concrete footings.
 - 3. Division 32 Section "Decorative Concrete Paving"
 - 4. Division 32 Section "Decorative Concrete Paving"
 - 5. Division 32 Section "Lithocrete architectural concrete paving"
 - 6. Division 32 Section "Boulders" for benches to be installed on boulders
 - 7. Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS": LEED Requirements.

1.3 REFERENCES

- A. US Green Building Council (USGBC), www.usgbc.org

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For units with factory-applied color finishes.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Size: Not less than 6-inch- long linear components and 4-inch- square sheet components.
 - D. Product Schedule: For site furnishings. Use same designations indicated on Drawings.
 - E. Material Certificates: For site furnishings, signed by manufacturers.
 1. Wood Preservative Treatment: Include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 2. Sustainably Harvested Wood: Include certification by manufacturer and from sources that participate in sustained yield programs.
 3. Recycled plastic.
 - F. Maintenance Data: For site furnishings to include in maintenance manuals.
 - G. LEED certification product data as specified in Division 1, Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 1. Credit MR 4.1 & 4.2, Recycled Content
 2. Credit MR 5.1 & 5.2, Regional Materials, Manufactured & Harvested / Extracted Locally
 3. Credit MR 7, Certified Wood
 4. Low Emitting Materials, Paints 9if filed applied painting)
- 1.5 SITE CONDITIONS
- A. Prior to commencing with work, review on site grading conditions, including sub grade conditions, verify the elevations, and dimensions, and notify the Owner's Representative of unsatisfactory conditions. Proceeding with the work constitutes acceptance of existing or corrected conditions.
- 1.6 QUALITY ASSURANCE
- A. Source Limitations: Obtain each type of site furnishing(s) through one source from a single manufacturer.
- 1.7 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. Bench Replacement Slats: No fewer than two full-size units for each size indicated.
 2. Anchors: For each product specified.

PART 2 - PRODUCTS

- 2.1 Trash receptacle: See landscape drawings for type
- 2.2 Picnic table/bench sets: See landscape drawings for type
- 2.3 Precast concrete bench with lumber top: See landscape drawings for type

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. 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, with top smoothed and shaped to shed water.
- F. Pipe Sleeves: 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, with top smoothed and shaped to shed water.

3.3 ACCEPTANCE

- A. Inspection for acceptance of the placement and installation of the furnishings and equipment shall be performed by the Owner's Representative. Provide notification at least forty (48) hours prior requested inspection time and date.

3.4 CLEANING

- A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

SECTION 12 93 13 - BICYCLE PARKING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Free-standing bicycle rack.
 - 2. Steel tube loops.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data:
 - 1. Manufacturer product data for each device, including finish. and including test results for anchors in concrete and at vertical canopy supports.
 - 2. Samples of sufficient size showing proposed finish on base metal.
- B. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Paints.

PART 2 - PRODUCTS

2.1 BICYCLE RACK

- A. Manufacturers:
 - 1. Kay Park Recreation Corp. (basis of design.)
 - 2. Porter.
 - 3. LA Steelcraft Products.
 - 4. Or equal.
- B. Model: Kay Park 625CIG:
 - 1. Mounting: In-ground.
 - 2. Materials: 2-3/8-inch o.d., schedule 40 pipe.
 - 3. Finish: Powder coated, color No. 7039.
 - 4. Number of loops: 5
 - 5. Number of spaces: 7

- C. Anchors: Select anchors with capability to sustain, without failure, a load equal to 4 times the load imposed when installed in concrete, as determined by testing per ASTM E 488.
 - 1. Drilled-in expansion anchors: Expansion anchors complying with FS FF-S-325, Group VIII (anchors, expansion, [non-drilling]), Type I (internally threaded tubular expansion anchor); and machine bolts complying with FS FF-B-575, Grade S, by Hilti, Inc., ITW Ramset/ Red Head, Star Expansion Co. or The Rawlplug Co., Inc.
- D. Chemical anchors: Chem-Stud by Rawlplug Co., Inc. HIT C-100 System by Hilti, or equal, used with machine bolts complying with FS FF-B-575, Grade S.

2.2 STEEL TUBE LOOPS

- A. 1-1/2-inch galvanized, steel tube loops welded to canopy supports, painted to match vertical canopy supports.
 - 1. Shape and height: As indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify conditions and measurements affecting the work of this Section at site.
- B. Correct detrimental conditions before proceeding with installation.

3.2 INSTALLATION

- A. Coordinate installation of bike racks with the work of Section 03 30 00.
- B. Coordinate welding of steel tube loops to vertical canopy supports with Division 05 requirements.
- C. Install parking devices at locations indicated on Drawings in compliance with their manufacturer's instructions and recommendations, plumb, level and securely anchored.

END OF SECTION

SECTION 12 93 15 - BICYCLE LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes exterior metal bicycle storage units.
- B. Related requirements: Division 01 for LEED requirements.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 SUBMITTALS

- A. Data: Manufacturer's product data for the lockers.
- B. Shop Drawings: Show assembly and installation details. Include physical characteristics such as shape, dimensions, bicycle parking capacity and finish.
- 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. Samples: Locker manufacturer's standard size custom color samples representing actual product, color and texture, including clear graffiti-resistant coating. Approved sample will serve as Design Consultant's control sample.
- E. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.
- F. Maintenance Data: Recommended methods for repairing damage to the powder coat finish.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing bicycle lockers similar to those required for this project and with a record of successful in-service performance.
- B. Installer Qualifications: A licensed and experienced installer who has completed installation of bicycle lockers similar in material, design and extent to those indicated for this project and whose work has resulted in construction with a record of successful in-service performance.
- C. Source Limitations: Obtain bicycle lockers from a single source with resources to provide components of consistent quality in appearance and physical properties.
- D. Mock-Up: Provide a mock-up for evaluation of materials and application workmanship.
 - 1. Install in area designated by Design Consultant.
 - 2. Do not proceed with remaining work until workmanship is approved by Design Consultant.
 - 3. Refinish mock-up installation as required to produce acceptable work.

1.5 HANDLING

- A. Deliver in original, unopened packaging. Protect from damage and dampness.
- B. Deliver materials to the site in undamaged condition. Store materials to protect materials against damage from moisture, heat, cold, direct sunlight or other damaging causes.
- C. Store products in manufacturer's unopened packaging until ready for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Belson Outdoors, Inc.
- B. DuraBike Locker Co., Division of Hannan Specialties, Inc.
- C. Or equal.

2.2 MODEL

- A. Design is based on Dura Bike Locker DL100-2, standard locker with divider panel and 2-doors, factory-painted.

2.3 COMPONENTS/MATERIALS

- A. Exterior walls, tops and doors (ASTM A 591): 16 gage galvanized steel with 16- gage horizontal galvanized steel stiffener for doors.
- B. Full length door hinge (ASTM A 314): 16-gage stainless steel.
- C. Corners and floors (ASTM A 591): 14 gage galvanized steel, with 6 punched-in louvered vents at corners. Floors shall have built-in longitudinal roll-formed stiffeners at 13 inches o.c.
- D. Latch corner gusset: Punched-in ringlet for cable chain.
- E. Divider panels (ASTM A 591): 18-gage galvanized steel.
- F. Include interior hangers for riding gear.
- G. Locking bar mechanism (ASTM A 1018): One inch wide by 1/4 inch thick zinc-plated steel flat bar running beyond the full length of the door and into the top, floor and jamb. (3-Points to insure Maximum Security.)
- H. Fasteners: Zinc-coated steel, applied from the inside.
- I. Custom finish: Locker unit manufacturer's custom color with a clear graffiti-resistant coating, color to match Design Consultant's control sample.

PART 3 - EXECUTION

3.1 EXAMINATION/PREPARATION

- A. Examine conditions and measurements affecting the work of this Section at site.
- B. Correct conditions detrimental to the proper and timely completion of this work before proceeding with installation.

3.2 INSTALLATION

- A. Install lockers where indicated in accordance with their manufacturer's instructions plumb, level and solidly anchored.

3.3 FIELD QUALITY CONTROL

- A. Protect installation against damage and staining during subsequent construction operations until Substantial Completion.
- B. Touch-up damaged surfaces to the Design Consultant's satisfaction, or return the damaged item to the factory for repair or replacement before Substantial Completion.

END OF SECTION

DIVISION 13

SPECIAL CONSTRUCTION

SECTION 13 31 23 - FABRIC CANOPY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes design/build exterior fabric canopy.
 - 1. Design (within the sizes and profiles limitations shown), fabrication, assembly and installation of fabric structure, including primary supports and foundations.
 - 2. The intent of this specification is to establish an undivided, single-source responsibility for the above functions.
- B. Work includes, but is not necessarily limited to the following:
 - 1. Architectural membrane.
 - 1. Cables and end fittings.
 - 2. Perimeter, catenary, and sectionalized clamping system.
 - 3. Structural steel supports as indicated on the drawings.
 - 4. Fasteners and gasketing.
- C. Related requirements:
 - 1. Division 01 for LEED requirements.
 - 2. Division 03 for concrete embeds of steel supports.

1.2 SUSTAINABLE DESIGN REFERENCE

- A. USG Green Building Council (USGBC), www.usgbc.org.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Prepare structural calculations and other submittals required by authorities having jurisdiction, and these Specifications.
- B. Filing shop drawings and other documents and obtaining necessary permits from the Building Department, and paying all fees therefore.

1.4 SUBMITTALS

- A. Data: Include manufacturer's specifications for materials, fabrication, installation, and recommendations for maintenance.
 - 1. Include test reports showing compliance with project requirements where test method is indicated.
 - 5. Include preliminary reaction loads imparted by the fabric canopy to its attachment points.
- B. Shop drawings:
 - 1. Large scale, dimensioned shop drawings for the fabric structure. Include complete details and schedules for fabrication and shop assembly.
 - 2. Procedures and diagrams showing the sequence of erection.
 - 3. Seaming methods and diagrams.

- C. Samples: Of fabric, minimum 36-inch square, and full size samples of each type of hardware and accessory.
- D. Structural calculations: Signed and sealed by a California-registered structural engineer specializing in fabric structure design and engineering.
- E. Certificates: Full certification, including cable physical data, mill test reports, and reports from pre-stretching and end fitting testing.
- F. LEED: Leed certification product data as specified in Section 01 81 13, "SUSTAINABLE DESIGN REQUIREMENTS", for the following LEED credits:
 - 1. Credit MR 4.1 & 4.2, Recycled Content.
 - 2. Credit MR 5.1, Regional Materials, Manufactured Locally.
 - 3. Credit MR 5.2, Regional Materials, Harvested / Extracted Locally.
 - 4. Credit MR 6, Rapidly Renewable Materials.
 - 5. Credit EQ 4.1, Low Emitting Materials, Adhesives & Sealants.
 - 6. Credit EQ 4.1, Low Emitting Materials, Paints.

1.5 QUALITY ASSURANCE

- A. Design criteria: Design the structure to withstand the loads prescribed by Code.
 - 1. Life safety: All tensile membrane structures shall be designed so that no life safety issue is created in the event of a loss of a part of the membrane. The tensile membrane structure shall not rely on the membrane for structural stability.
- B. Source quality control:
 - 1. Materials and fabrication procedures are subject to inspection and tests in the mill, shop or yard at the Design Consultant's option. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - 2. Materials and fabrication procedures shall comply with Code and regulations of authorities having jurisdiction.
 - 3. Obtain primary membrane materials from one manufacturer.
 - 6. Fabricator/installer qualifications: Fabricator/installer shall demonstrate that it has a fabrication facility of adequate capacity and has maintained a staff experienced in the fabrication of tensile membrane structures who will undertake the fabrication of this project.

1.6 HANDLING

- A. Protected materials from damage and defacement.

PART 2 - PRODUCTS

2.1 FABRIC CANOPY ASSEMBLY

- A. Steel-supported fabric structure complying with the following requirements:
 - 1. Fire resistance of roof coverings (ASTM E 108):
 - a. Spread of flame: Class A.
 - b. Intermittent flame: Class A.
 - c. Burning brand: Class A.

2. Incombustibility of substrates (ASTM E 136):
 - a. Substrate noncombustible: Pass.
3. Flame resistance (NFPA 701 Small Scale, UL 94):
 - a. Flame out: One second after.
 - b. Char length: 0.25-inch maximum.

2.2 MANUFACTURERS

- A. ACS Productions, Inc.
- B. Eide Industries, Inc.
- C. FabriTec (basis of design.)
- D. Ronstan International.
- E. Shade Sails LLC.
- F. Span Systems, Inc.
- G. Taiyo Birdair.
- H. Or equal.

2.3 MATERIALS

- A. Structural supports and anchors: As specified in Section 05 20 00.
- B. Fabric: Ferrari Soltis 92, Twitchell Textilene 90, or equal PVC-coated polyester.
 7. Color: Custom color TBD.
 8. Shape: flat "hypar style."
- C. Hardware and accessories: Type 302/3-304, polished stainless steel components consisting of cables clamps, fittings, fasteners and gasketing, and meeting the following requirements:
 1. Structural wire rope cables: ASTM A 603.
 2. Structural strand cables: ASTM A 586.

2.4 FABRICATION

- A. Membrane:
 1. Take necessary care to plan and assemble the fabricated sections such that the assembly has no shop patches. Splices, if any, shall be patterned into a symmetrical and repetitive geometric arrangement within the assembly, shown on the shop drawings and, where feasible, hidden by structural members.
 2. Fabricated joints shall have a minimum of 90% of the total strength of the coated membrane in strip tensile testing. Structural joints shall be fused in accordance with industry standards and shall maintain the integrity of the coating.
 3. Biaxial test: At least one representative sample of the outer membrane shall be biaxially test loaded. Membrane compensation in patterning shall be based upon the results of the biaxial test loading.
- B. Metal members: Members, when finished, shall be true and free of twists, bends, and open joints between the component parts. Members shall be thoroughly straightened in the shop by methods that will not injure them, before being worked on in any way.
 1. Permanently mark end fittings with the mark number and "X" and "Y" end designations.

2. Attach a metal tag indicating the cable length and mark number to each cable assembly.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the conditions under which this work is to be performed and correct unsatisfactory conditions.
- B. Correct unsatisfactory conditions before proceeding with installation.

3.2 ERECTION

- A. Comply with the membrane manufacturer's recommendations, the approved shop drawings and the applicable requirements of authorities having jurisdiction.
- B. Erect the tensile membrane structure free of any areas where membrane prestress is not induced.
- C. Erection tolerances shall be specified in the AISC "Code of Standard Practice for Steel Buildings and Bridges", unless otherwise indicated,
- D. After installation, restore marred or abraded surfaces to original condition using same paint or coating as factory-applied finishes, when the results are acceptable to the Design Consultant, otherwise replace damaged materials.

END OF SECTION