

**Project Manual
Volume 1 of 2**

Fontana City Hall – Phase II

8353 Sierra Avenue,
Fontana, CA 92335

SILLMAN Project Number: 24013

BID SET

15 December 2025

Developed for:



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SECTION 00 01 10

TABLE OF CONTENTS

SECTIONS	PAGES
VOLUME 01 – DIVISION 01 – 14	
DIVISION 01 — GENERAL REQUIREMENTS	
01 11 00 - SUMMARY OF WORK.....	8
01 11 50 - ELECTRONIC DRAWINGS	3
01 25 00 - SUBSTITUTION PROCEDURES	11
01 31 00 - PROJECT MANAGEMENT & COORDINATION	12
01 33 00 - SUBMITTAL PROCEDURES	13
01 40 00 - QUALITY REQUIREMENTS	10
01 42 00 - REFERENCES	13
01 43 39 - MOCKUP REQUIREMENTS	6
01 45 53.00 - BUILDING ENCLOSURE TESTING	9
01 45 53.01 - BUILDING ENCLOSURE TESTING FORM	1
01 50 00 - TEMPORARY FACILITIES AND CONTROLS	11
01 56 39 - TREE PROTECTION	4
01 57 23 - TEMPORARY STORM WATER POLLUTION CONTROL	24
01 60 00 - PRODUCT REQUIREMENTS	6
01 73 00 - EXECUTION	11
01 74 19 - CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT	7
01 77 00 - CLOSEOUT PROCEDURES	6
01 78 23 - OPERATION AND MAINTENANCE DATA	8
01 78 39 - PROJECT RECORD DOCUMENTS	5
01 79 00 - DEMONSTRATION AND TRAINING	6
01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS	3
01 81 19 - INDOOR AIR QUALITY (IAQ) MANAGEMENT	7
DIVISION 02 — EXISTING CONDITIONS	
02 41 00 - DEMOLITION.....	8
DIVISION 03 — CONCRETE	
03 30 00 - CAST-IN-PLACE CONCRETE	19
03 35 00 - CONCRETE FINISHING	4
03 35 13 - CONCRETE SEALING	5
03 53 00 - CONCRETE TOPPING	7
DIVISION 04 — MASONRY	
04 22 00 - CONCRETE UNIT MASONRY	10
DIVISION 05 — METALS	
05 12 00 - STRUCTURAL STEEL FRAMING	9
05 12 13 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING	8
05 31 00 - STEEL DECKING	6
05 40 00 - COLD-FORMED METAL FRAMING	8
05 50 00 - METAL FABRICATIONS	12
05 51 13 - METAL PAN STAIRS	3
05 52 13 - PIPE AND TUBE RAILINGS	9
05 73 13 - GLAZED DECORATIVE METAL RAILINGS	9

TABLE OF CONTENTS

00 01 10 - 1

Fontana City Hall – Phase II

DIVISION 06 — WOOD, PLASTICS, AND COMPOSITES

06 10 53 - MISCELLANEOUS ROUGH CARPENTRY	7
06 16 00 - SHEATHING	5
06 20 23 - INTERIOR FINISH CARPENTRY	6
06 41 13 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS	11
06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS	8
06 42 00 - WOOD PANELING	6
06 60 00 - ACRYLIC PANELING	5
06 64 00 - FIBERGLASS REINFORCED PLASTIC WALL PANELS (FRP)	4

DIVISION 07 — THERMAL AND MOISTURE PROTECTION

07 05 43 - CLADDING SUPPORT SYSTEMS	7
07 13 26 - SELF-ADHERING SHEET WATERPROOFING	6
07 14 16 - COLD FLUID-APPLIED WATERPROOFING	8
07 18 00 - TRAFFIC COATINGS	7
07 21 00 - THERMAL INSULATION	6
07 25 00 - WEATHER BARRIERS	7
07 26 00 - VAPOR RETARDERS	5
07 26 33 - MOISTURE MITIGATION CONTROL COATING	11
07 42 13.23 - METAL COMPOSITE MATERIAL WALL PANELS	11
07 42 43 - COMPOSITE WALL PANELS	6
07 54 23 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING	20
07 62 00 - SHEET METAL FLASHING AND TRIM	13
07 71 00 - ROOF SPECIALTIES	8
07 72 00 - ROOF ACCESSORIES	9
07 81 00 - APPLIED FIRE PROTECTION	11
07 81 23 - INTUMESCENT FIRE PROTECTION	7
07 84 13 - PENETRATION FIRESTOPPING	7
07 84 43 - JOINT FIRESTOPPING	4
07 92 00 - JOINT SEALANTS	8

DIVISION 08 — OPENINGS

08 11 13 - HOLLOW METAL DOORS AND FRAMES	9
08 14 16 - FLUSH WOOD DOORS	8
08 18 16.13 - SLIDING ALUMINUM-FRAMED GLASS DOOR	12
08 31 13 - ACCESS DOORS AND FRAMES	5
08 34 73.16 - WOOD SOUND CONTROL DOOR ASSEMBLIES	10
08 34 81 - ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM	10
08 35 13 - FOLDING DOORS	3
08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS	10
08 44 13 - GLAZED ALUMINUM CURTAIN WALLS	14
08 71 00 - DOOR HARDWARE	31
08 80 00 - GLAZING	12

DIVISION 09 — FINISHES

09 05 11 - CONCRETE FLOOR PREPARATION	4
09 05 12 - CONCRETE FLOOR MOISTURE CONTENT AND PH TESTING	4
09 29 00 - GYPSUM BOARD	10
09 30 13 - CERAMIC TILING	15
09 51 23 - ACOUSTICAL TILE CEILINGS	10
09 54 26 - SUSPENDED WOOD CEILINGS	10
09 65 13 - RESILIENT BASE AND ACCESSORIES	4

TABLE OF CONTENTS**00 01 10 - 2****Fontana City Hall – Phase II**

09 65 19 - RESILIENT TILE FLOORING	6
09 68 13 - TILE CARPETING	7
09 75 13 - STONE WALL FACING	11
09 77 13 - STRETCHED-FABRIC WALL SYSTEMS	5
09 78 00 - INTERIOR WALL PANELING	4
09 84 33 - SOUND-ABSORBING WALL UNITS	6
09 84 36 - SOUND-ABSORBING CEILING UNITS	5
09 91 23 - INTERIOR PAINTING	18
09 96 00 - HIGH-PERFORMANCE COATINGS	7

DIVISION 10 — SPECIALTIES

10 14 00 - SIGNAGE	8
10 14 19 - DIMENSIONAL LETTER SIGNAGE	6
10 21 13 - STAINLESS STEEL TOILET COMPARTMENTS	5
10 28 13 - TOILET ACCESSORIES	5
10 44 13 - FIRE PROTECTION CABINETS	5
10 44 16 - FIRE EXTINGUISHERS	4
10 71 00 - EXTERIOR SUN CONTROL DEVICES	7

DIVISION 11 — EQUIPMENT

11 12 00 - PARKING CONTROL EQUIPMENT	6
--	---

DIVISION 12 — FURNISHINGS

12 24 13 - ROLLER WINDOW SHADES	10
12 36 61 - SIMULATED STONE COUNTERTOPS	6
12 48 16 - ENTRANCE FLOOR GRILLES	4
12 61 00 - FIXED AUDIENCE SEATING	7

DIVISION 14 — CONVEYING EQUIPMENT

14 21 24 - MACHINE ROOM-LESS TRACTION ELEVATORS	12
---	----

VOLUME 02 – DIVISION 21 – 33 AND APPENDICES

DIVISION 21 — FIRE SUPPRESSION

21 11 19 - PRIVATE FIRE MAIN SYSTEM	10
21 13 13 - WET PIPE FIRE SPRINKLER PERFORMANCE	10

DIVISION 22 — PLUMBING

22 05 13 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT	3
22 05 16 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING	4
22 05 17 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING	4
22 05 18 - ESCUTCHEONS FOR PLUMBING PIPING	2
22 05 19 - METERS AND GAUGES FOR PLUMBING PIPING	6
22 05 23.12 - BALL VALVES FOR PLUMBING PIPING	4
22 05 23.13 - BUTTERFLY VALVES FOR PLUMBING PIPING	4
22 05 23.14 - CHECK VALVES FOR PLUMBING PIPING	6
22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT	12
22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT	6
22 05 93 - TESTING, ADJUSTING, AND BALANCING FOR PLUMBING	10
22 07 19 - PLUMBING PIPING INSULATION	19
22 08 00 - COMMISSIONING OF PLUMBING	6
22 11 16 - DOMESTIC WATER PIPING	10
22 11 23.21 - INLINE, DOMESTIC-WATER PUMPS	6
22 13 16 - SANITARY WASTE AND VENT PIPING	10

TABLE OF CONTENTS

00 01 10 - 3

Fontana City Hall – Phase II

22 13 19 - SANITARY WASTE PIPING SPECIALTIES	5
22 13 19.13 - SANITARY DRAINS	4
22 14 14 - STORM DRAINAGE PIPING	9
22 14 23 - STORM DRAINAGE PIPING SPECIALTIES	5
22 21 13 - CONDENSATE DRAIN PIPNG	5
22 33 00 - ELECTRIC, DOMESTIC-WATER HEATERS	7
22 42 13.13 - COMMERCIAL WATER CLOSETS	5
22 42 13.16 - COMMERCIAL URINALS	5
22 42 16.13 - COMMERCIAL LAVATORIES	7
22 42 16.16 - COMMERCIAL SINKS	6
22 47 16 - PRESSURE WATER COOLERS	4

DIVISION 23 — HEATING VENTILATING AND AIR CONDITIONING

23 00 00 - GENERAL MECHANICAL REQUIREMENTS	10
23 05 00 - COMMON WORK RESULTS FOR HVAC	4
23 05 13 - COMMON MOTOR REQUIREMENTS	2
23 05 17 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING	3
23 05 23 - GENERAL DUTY VALVES FOR HVAC PIPING	4
23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT	9
23 05 48 - VIBRATION AND SEISMIC CONTROLS FOR HVAC	10
23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT	6
23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC	16
23 07 13 - DUCT INSULATION	10
23 07 16 - HVAC EQUIPMENT INSULATION	14
23 07 19 - HVAC PIPING INSULATION	9
23 09 00 - BUILDING AUTOMATION SYSTEM	28
23 21 13 - HYDRONIC PIPING	9
23 21 16 - HYDRONIC PIPING SPECIALTIES	10
23 21 23 - HYDRONIC PUMPS	6
23 23 00 - REFRIGERANT PIPING	10
23 31 13 - METAL DUCTS	14
23 33 00 - AIR DUCT ACCESSORIES	14
23 34 23 - HVAC POWER VENTILATORS	5
23 36 00 - AIR TERMINAL UNITS	6
23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES	4
23 64 23 - AIR SOURCE HEAT PUMPS	8
23 74 00 - PACKAGED ROOFTOP OUTDOOR HVAC EQUIPMENT	13
23 81 23 - DUCTLESS SPLIT SYSTEM AIR CONDITIONERS	8
23 81 23.13 - COMPUTER-ROOM AIR-CONDITIONERS	6
23 81 26 - SPLIT SYSTEM AIR CONDITIONERS	7

DIVISION 26 — ELECTRICAL

26 00 00 - GENERAL ELECTRICAL SPECIFICATIONS	29
--	----

DIVISION 27 — COMMUNICATIONS

27 41 00 - AUDIO VISUAL SYSTEMS	39
27 51 00 - ASSISTIVE LISTENING SYSTEMS	6

DIVISION 31 — EARTHWORK

31 10 00 - SITE CLEARING	7
31 22 00 - GRADING	22

DIVISION 32 — EXTERIOR IMPROVEMENTS

32 05 10 - IMPORTED SOIL & ROCK	6
32 12 16 - ASPHALT PAVING	13
32 13 13 - CONCRETE PAVING	21
32 84 00 - IRRIGATION	18
32 90 00 - LANDSCAPING	8
32 91 13 - SOIL PREPARATION	16

DIVISION 33 — UTILITIES

33 30 00 - SANITARY SEWERAGE UTILITIES	19
33 40 00 - STORM DRAINAGE UTILITIES	13
33 46 00 - SUBDRAINAGE	5

APPENDICES

APPENDIX A – PLUMBING CUT SHEETS	39
APPENDIX B – LIGHT FIXTURE CUT SHEETS.....	313

END OF TABLE OF CONTENTS

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SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. 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.

1.3 RELATED REQUIREMENTS

- A. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.4 PROJECT INFORMATION

- A. Project Identification: Fontana City Hall
 - 1. Project Location: 8353 Sierra Ave., Fontana, CA 92335
- B. Owner: City of Fontana
 - 1. Address: 8353 Sierra Ave., Fontana, CA 92335
- C. Architect: SILLMAN
 - 1. Address: 7515 Metropolitan Dr., Suite 400, San Diego, CA 92108
 - 2. Contact: Katy Hamilton

a. Email: khamilton@sillmanarch.com

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists generally of the following:
 - 1. The proposed project entails the demolition of existing building and development of a core and shell of a two-story building over on grade parking in addition to associated sitework, landscaping and utilities.
- B. Type of Contract: Project will be constructed under a single prime contract.
- C. The Work includes all labor, materials and equipment necessary for the Contractor to fulfill all of its obligations pursuant to the Contract Documents, including but not limited to:
 - 1. Home office overhead.
 - 2. Off-site supervision.
 - 3. Project administration including preparation, research and distribution of project correspondence and submittals.
 - 4. Schedule preparation and maintenance.
 - 5. Guarantees and warranties.
 - 6. Temporary protection.
 - 7. Temporary utilities and facilities, including mobilization and demobilization.
 - 8. Material handling and storage.
 - 9. Safety equipment.
 - 10. Travel time to and from the Site to the Contractor's home office.
- D. Sequence the Work subject to the Owner's use of the site, the requirements of the Construction Phasing, Technical Specifications and the Contract provisions for Time of Completion found elsewhere in these documents.
- E. Provide materials and perform work indicated or required to produce finished results shown.
- F. Contractor shall coordinate all work and shall be responsible for division of work among the various subcontractors.
 - 1. Coordinate the work of this Contract with the activities of the Owner, local agencies and serving utilities.
- G. Laws, Codes and Regulations: Intent of the Contract Documents is to construct the Work shown therein, in accordance with applicable laws, codes and regulations.
- H. Entitlement Conditions: Refer to entitlement conditions of approval for Fontana City Hall for any additional requirements.

1.6 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.7 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. Owner reserves the right to issue other contracts for work on the site which may be constructed concurrently with these Contracts.
- C. Hazardous materials removal or abatement will be performed by the Owner's separate contractor.
 - 1. This work will be performed concurrently with this contract in the event that hazardous materials are encountered.
 - 2. Notify the Owner as described in the General Conditions.
 - 3. These Contract Documents do not contain necessary components for removal or abatement of hazardous material.

1.8 ACCESS TO SITE

- A. General: Contractor will have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Contractor shall be cognizant of parking and shall not inhibit the use of parking stalls within the civic campus unless necessary for that phase of work.
- C. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to area approved by the Architect. If additional storage is necessary, Contractor shall obtain and pay for such storage off site without additional expense to the Owner.
 - 1. Move stored products, temporary facilities, controls or fencing, under Contractor's control, which interfere with operations of the Owner or separate contractors, on or off the site, without cost to the Owner.
 - 2. Do not overload structures with weight that will endanger them.
- D. Assume full responsibility for protection and safekeeping of materials and tools stored at the site. Lock vehicles such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.
- E. Perform site access activities, including arrival and departure of workers, deliveries, storing, handling and removal of materials, equipment, and debris to minimize dust, mud or accumulated debris, or undue interference with the convenience, sanitation or routine of Owner's activities.
- F. Time and coordinate cutovers and connection of new utilities to existing systems and other similar activities to avoid interference with or interruption of Owner's activities.
- G. Protect existing finished work remaining in place from damage due to construction activities. Repair and replace finished work damaged by activities of this contract to match adjacent undamaged work to the satisfaction of Owner and Architect at no extra cost to the Owner.
 - 1. Protect improvements on adjoining properties as well as those on the Owner's property.

2. Restore all improvements damaged by this work to their original condition as acceptable to the owner of the improvement
- H. Assume responsibility for safety and support of structures. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored. Assume liability for such movement, settlement, damage or injury.
- I. Provide, erect and maintain barricades and guard rails as required by governing regulatory agencies to protect workers. Refer to other pertinent sections of Division 01.
- 1.9 COORDINATION WITH OCCUPANTS
- A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.
- 1.10 CORRELATION AND INTENT
- A. Correlation and Intent: Contract Documents are Complementary and Inclusive.
1. The Contract Documents are complementary and are intended to include all items required for the proper execution and completion of the Work.
 2. All items of work mentioned in the Specifications and not shown on the Drawings, or shown on the Drawings and not mentioned in the Specifications, shall be provided by Contractor as if shown or mentioned in both.
- B. Coverage of the Drawings and Specifications:
1. The Drawings and Specifications generally describe the work to be performed by Contractor. Generally, the Specifications describe work which cannot be readily indicated on the Drawings and indicate types, qualities, and methods of installation of the various materials and equipment required for the Work.
 2. It is not intended to mention every item of Work in the Specifications, which can be adequately shown on the Drawings, or to show on the Drawings all items of Work described or required by the Specifications even if they are of such nature that they could have been shown.

- C. Provide all materials or labor for Work, which is shown on either by the Drawings or the Specifications (or is reasonably inferable as necessary to complete the Work), whether or not the Work is expressly covered in either the Drawings and/or the Specifications.
- D. Work is intended to be of sound, quality construction. Include adequate amounts to cover installation of all items indicated, described, or implied in Contract Documents.
- E. Conflicts. In the event there is a discrepancy between the various Contract Documents, the Owner/Contractor Agreement shall control. Without limiting Contractor's obligation to identify conflicts for resolution by the Architect identified elsewhere in this Article it is intended that the more stringent, higher quality, and greater quantity of Work shall apply.
- F. Conformance with Laws:
 - 1. Each and every provision of law required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise any such provision is not inserted, or is not correctly inserted, then upon application of either party the Contract shall be amended in writing to make such insertion or correction.
 - 2. Before commencing any portion of the Work, Contractor shall check and review the Contract Documents for such portion for conformance and compliance with all laws, ordinances, codes, rules and regulations of all governmental authorities and public utilities affecting the construction and operation of the physical plant of the Project, all quasi-governmental and other regulations affecting the construction and operation of the physical plant of the Project, and other special requirements, if any, designated in the Contract Documents.
 - 3. In the event Contractor observes any violation of any law, ordinance, code, rule or regulation, or inconsistency with any such restrictions or special requirements of the Contract Documents, Contractor shall immediately notify Architect in writing of same and shall cause to be corrected any such violation or inconsistency in the manner provided hereunder.
- G. Ambiguity:
 - 1. Before commencing any portion of the Work, carefully examine all Drawings and Specifications and other information as to materials and methods of construction and other Project requirements.
 - 2. Immediately notify Owner and Architect of any perceived or alleged error, inconsistency, ambiguity, or lack of detail or explanation in the Drawings and Specifications in the manner provided herein.
 - 3. If the Contractor or its Subcontractors, material or equipment suppliers, or any of their officers, agents, and employees performs, permits, or causes the performance of any Work under the Contract Documents, which it knows or should have known to be in error, inconsistent, or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all costs arising, including, without limitation, the cost of correction without increase or adjustment to the Contract Price or the time for performance.
 - 4. If Contractor performs, permits, or causes the performance of any Work under the Contract Documents prepared by or on behalf of Contractor which is in error, inconsistent or ambiguous, or not sufficiently detailed or explained, Contractor shall bear any and all resulting costs, including, without limitation, the cost of correction, without increase to or adjustment in the Contract Price or the time for performance.
 - 5. In no case shall any Subcontractor proceed with the Work if uncertain without the Contractor's written direction and/or approval.

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.
 3. Titles. The Specifications are separated into titled sections for convenience only and not to dictate or determine the trade or craft involved.
 4. As Shown, Etc. Where "as shown," "as indicated," "as detailed," or words of similar import are used, reference is made to the Drawings accompanying the Specifications unless otherwise stated. Where "as directed," "as required," "as permitted," "as authorized," "as accepted," "as selected," or words of similar import are used, the direction, requirement, permission, authorization, approval, acceptance, or selection by Architect is intended unless otherwise stated.
 5. Provide. "Provide" means "provided complete in place," that is, furnished, installed, tested, and ready for operation and use.
 6. General Conditions. The General Conditions and supplementary general conditions are a part of each and every section of the Specifications.
 7. Abbreviations.
 - a. In the interest of brevity, the Specifications are generally written in an abbreviated form in the imperative tense and may not include complete sentences.
 - b. Omission of words or phrases such as "Contractor shall," "shall be," etc., are intentional. Nevertheless, the requirements of the Specifications are mandatory and directed to the Contractor.
 - c. Omitted words or phrases shall be supplied by inference in the same manner as they are when a "note" occurs on the Drawings.
 8. Plural. Words in the singular shall include the plural whenever applicable or the context so indicates.
 9. Metric. The Documents may indicate metric units of measurement as a supplement to U.S. customary units. When indicated thus: 1 inch (25 mm), the U. S. customary unit is specific, and the metric unit is nonspecific. When not shown with parentheses, the unit is specific. The metric units correspond to the "International System of Units" (SI) and generally follow ASTM E 380, "Standard for Metric Practice."
 10. Reference Standard Specifications. All references to standard specifications of a society, institute, association, or governmental authority is a reference to the organization's reference standard specifications, which are in effect at the date of the Contractor's proposal, or effective date as required by governing codes.
 - a. If applicable specifications are revised prior to completion of any part of the Work, the Contractor may, if acceptable to Architect, perform such Work in accordance with the revised specifications.
 - b. The standard specifications, except as modified in the Specifications for the Project, shall have full force and effect as though printed in the Specifications. Architect will furnish, upon request, information as to how copies of the standard specifications referred to may be obtained.
 - c. Procurement of reference standards and standard specifications is the sole responsibility of the Contractor.

11. Absence of Modifiers. In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another shall not affect the interpretation of either statement.

B. Rules of Document Interpretation

1. In the event of conflict or ambiguity within the drawings, the following rules shall apply:
 - a. General Notes, when identified as such, shall be incorporated into other portions of Drawings.
 - b. Schedules, when identified as such, are complementary with other notes and other portions of Drawings including those identified as General Notes.
 - c. Larger scale drawings shall take precedence over smaller scale drawings.
 - d. General or Typical Details and Symbols apply at all locations where specifically noted; at all locations conforming to the title of the Detail; at all locations of similar or identical graphic indication; at all locations where similar conditions are not fully or specifically shown or identified and complement similar details of specific conditions.
 - e. Details and Notes apply at all locations of similar or identical graphic indications and at all locations where similar conditions are not fully or specifically shown or identified.
 - f. Limitation of Indication does not affect Extent of Application: Indications of notes, details, and symbols may be limited to promote clarity. No limitation of application is intended nor shall be construed unless specifically noted.
2. Figured, derived, or numerical dimensions shall govern. At no time shall the Contractor base construction on scaled drawings.
3. Specifications shall govern as to materials, workmanship, and installation procedures.
4. In the case of disagreement or conflict between or within standards, specifications, and drawings, the more stringent, higher quality, and greater quantity of Work shall apply.

C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

D. 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 on Drawings may be identified by abbreviations scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers or terminology found in this Project Manual.
4. The Drawings, General provisions of the Contract, including General and Supplementary Conditions and other Division 01 specifications apply to the Work of all specifications sections as if specifically reproduced therein.

1.12 EXISTING CONDITIONS

- A. Intent of the Drawings is to show existing conditions with information developed from field surveys and Owner's records, and to generally show the extent and type of work required to prepare the

existing areas for new work. The information shown on the Drawings is not a guarantee of existing conditions.

1.13 CONTRACT COMPLETION

- A. Date of Completion and Beneficial Occupancy is defined as the Date of Completion of all punch list items, including, but not limited to the following:
 - 1. Confirmation of mechanical and electrical systems testing and balancing, control sequences and operations.
 - 2. Completion of final cleaning, paint touch-up and adjusting.
 - 3. Adjustment and Contractor's certification of the finish hardware operation.
 - 4. Removal of Contractor's temporary facilities and materials.
 - 5. Owner's acceptance of the Work.
 - 6. Certificate of Occupancy issued by the Authority Having Jurisdiction.
- B. Owner's occupancy prior to completion of any or all of the above items, or other such missing or incomplete work as may occur, shall not be construed as acceptance of the Work or as Completion.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 11 00

SECTION 01 11 50
ELECTRONIC DRAWINGS

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. The Architect-Engineer, if requested with a completed Electronic Document Request Confirmation Form, will provide the General Contractor with a one-time electronic copy of the Contract Document Drawings limited to Plan sheets and Exterior Building Elevations for distribution to subcontractors and suppliers. Release of other sheets will be at the sole discretion of the Architect.
 - 1. The Architect nor its' consultants assume any liability for such usage of these electronic files.

1.3 REFERENCES

- A. A copy of the Electronic Document Request Confirmation Form (Exhibit A) is attached at the end of this Section.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 EXECUTION

- A. Contractor shall provide signed Form to the Architect prior to receiving delivery of the electronic drawing files.

END OF SECTION 01 11 50

EXHIBIT A

ELECTRONIC DOCUMENT REQUEST CONFIRMATION FORM

From (Requestor):	DRC NO.:	Date:
	Project: Fontana City Hall – Phase II	
	SILLMAN Project No: 24013	
	Location:	
Attn:	Description:	
Phone:		
Fax:		

Execution of this document will confirm your request for copies of documentation related to the above referenced project. Please complete the following section and return a signed copy of this form via fax or mail with payment to SILLMAN.

DESCRIPTION OF DOCUMENTATION REQUESTED:

Type of Files Needed:

- DWG (AutoCAD Native)
- DWF (AutoCAD Design Web)
- DXF (AutoCAD Drawing Exchange)

Purpose of Request:

If Requestor is a subcontractor to the Project's General Contractor, please indicate the name and phone number of contact at General Contractor's office:

Name: _____ Number: _____

If Requestor is a consultant to the project's owner, please indicate the name and phone number of contact at owner's office:

Name: _____ Number: _____

SILLMAN can only release electronic files to the Project's Owner, consultants to the Project's Owner and/or the Project's General Contractor. A written statement by the Project's General Contractor authorizing SILLMAN to release documentation to a subcontractor of the General Contractor must accompany this request. Please be advised that, in case of existing construction, the documents requested are reproductions of documentation on file and do not necessarily represent as-built or existing conditions. SILLMAN does not warrant in any way the accuracy of this information and shall not be responsible for any discrepancy between this documentation and the existing conditions. In the case of projects which are currently being designed and/or under construction, the electronic documentation are reproductions of the documentation on file and may be subject to change due to owner, field and/or coordination revisions. SILLMAN shall not be responsible for reissuing files which may be revised after issuance of these requested files and shall not be responsible for advising other parties as to the status of document revisions. Also, please be advised that the requested documents are instruments of service and, as such, remain the property of SILLMAN and/or the respective consultant. Any unauthorized re-use of these documents without the written authorization of SILLMAN and/or consultant is strictly prohibited. Please note all disclaimers and warnings printed on electronic media labels. Electronic media may contain undetected viruses. It is always recommended that disks be checked prior to use. SILLMAN assumes no liability or responsibility for damage to user's property as a result of using this request may include archive storage and retrieval, charges, reproduction and handling expenses, etc., which are estimated to be, but may exceed \$0.00. The exact cost will be determined by SILLMAN upon execution of this request confirmation

The basic charge for copying/translating DWG (AUTOCAD), DWF or DXF files is \$100 per drawing.

— Payment of these costs must be made by the requestor to SILLMAN prior to release of the documents.

— The requested files shall be provided at the direction of the Owner. No charge to Requestor.

By signing this Request, the Requestor agrees to the conditions for reimbursement to SILLMAN as stated above.

Authorized Signature:

Date:

Please return one fully executed copy of this form to: SILLMAN
(Offices in Mission Valley and Temecula, CA)

TERMS AND CONDITIONS:

1. AER makes no representation as to the compatibility of the CAD files with any hardware or software.
2. Since the information set forth on the CAD files can be modified unintentionally or otherwise, the AER reserves the right to remove all indicia of its ownership and/or involvement from each electronic display. This media should not be considered a certified document.
3. All information on the CAD files is considered instruments of service of the AER and shall not be used for other projects, for additions to this project, or completion of this project by others. CAD files shall remain the property of the AER, and in no case shall the transfer of these files be considered a sale.
4. AER makes no representation regarding the accuracy, completeness, or permanence of CAD files, nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on the CAD files may not have been incorporated. In the event of a conflict between the AER's sealed Contract Drawings and CAD files, the sealed Contract Drawings shall govern. It is the Contractor's responsibility to determine if any conflicts exist. The CAD files shall not be considered to be Contract Documents as defined by the General Provisions of the Contract for Construction.
5. The use of CAD files prepared by the AER shall not in any way obviate the Contractor's responsibility for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.
6. The Contractor shall, to the fullest extent permitted by law, indemnify, defend and hold harmless the AER, and its sub-consultants from all claims, damages, losses, expenses, penalties and liabilities of any kind, including attorney's fees, arising out of or resulting from the use of the CAD files by the Contractor, or by third party recipients of the CAD files from the Contractor.
7. The AER believes that no licensing or copyright fees are due to others on account of the transfer of the CAD files, but to the extent any are, the Contractor will pay the appropriate fees and hold the AER harmless from such claims.
8. Any purchase order number provided by the Contractor is for Contractor's accounting purposes only. Purchase order terms and conditions are void and are not a part of this Agreement.
9. This Agreement shall be governed by the laws of the principal place of business of the AER.

The logo consists of a solid red square with the word "SILLMAN" in white, uppercase, sans-serif font centered within it.

SILLMAN

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SECTION 01 25 00
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 RELATED REQUIREMENTS

- A. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.4 DEFINITIONS

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

1.5 ACTION SUBMITTALS

- A. Substitution Requests: Submit three 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 facsimile of forms provided at the end of this Section.
 - a. Submit Substitution Request – Form "A" for requests during bidding period.
 - Submit Substitution Request – Form "B" for requests after execution of contract.
 - 2. 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. List all the locations where the materials to be substituted applies. Provide drawings and markups of the locations.
 - e. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - f. Samples, where applicable or requested.
 - g. Certificates and qualification data, where applicable or requested.
 - h. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - i. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - j. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - k. 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.
 - l. Cost information, including a proposal of change, if any, in the Contract Sum.
 - m. 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.
 - n. 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.
 - o. Written certification by the proposer that the Substitution is equal or better in every respect to that required by the contract Documents and that substitution will perform adequately in the application intended.
 - p. Written certification that the proposer will pay for all permits, fees, and costs required to implement the substitution, and including waiver of all claims for additional costs or time extension which may subsequently become apparent, and reimbursement of Owner and Architect for review or redesign services associated with re-approval by authorities.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven 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.
 - b. If a decision on a substitution cannot be made within the time allocated, the substitution shall be sent directly to City for review or the Architect for re-review.

1.6 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.

1.7 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 - 1. Conditions of Consideration: Architect will consider requests for substitution for cause only when one or more of the following conditions are met and documented:
 - a. Specified item fails to comply with regulatory requirement.
 - b. Specified item is no longer manufactured.
 - c. Specified item, through no fault of the Contractor, unavailable in the time frame required to meet project schedule.
 - d. Specified item, through subsequent information disclosure, will not perform properly or fit in designated space.
 - e. Manufacturer declares specified product to be unsuitable for use intended or refuses to warrant installation of product,
 - f. Substitution would be, in the sole judgment of the Architect, a substantial benefit to the Owner in terms of cost, time, energy conservation, or other consideration of merit.
 - 2. Conditions of Review: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided for achieving required prerequisites and credits.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. 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.

SUBSTITUTION PROCEDURES

01 25 00 - 3

Fontana City Hall – Phase II

- B. Substitutions for Convenience: Architect will consider requests for substitution. Requests received may be considered or rejected at discretion of Architect.
1. Conditions of Review: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided for achieving required prerequisites and credits.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION

3.1 LIMITATIONS ON SUBSTITUTIONS SUBMITTED PRIOR TO THE RECEIPT OF BIDS

- A. Architect will consider requests for substitutions of specified equipment and/or materials only when requests are received by Architect within fourteen (14) days prior to the date established for the receipt of bids.
- B. Architect will consider a substitution request only if request is made in strict conformance with provisions of this Section. Request shall be fully responsive to all product requirements of the specified product, including those requirements noted in this section in the article titled PRODUCTS.
- C. Burden of proof of merit of requested substitution is the responsibility of the proposer requesting the substitution.
- D. It is the sole responsibility of the proposer requesting the substitution to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.
- E. When substitution is not accepted, provide specified product.
- F. Substitute products shall not be included within the bid without written acceptance by Addendum.

- G. No material changes permitted after the bid opening date. All alternate manufacturers and/or materials shall be submitted and approved in writing by the Architect prior to bid due date, except as otherwise provided in this section. Failure to comply with this requirement is grounds for disqualification of substitution.

3.2 LIMITATIONS ON SUBSTITUTIONS SUBMITTED AFTER THE AWARD OF THE CONTRACT

- A. The Contract is based upon the standards of quality established by those items of equipment and/or materials which are indicated in the Contract Documents, including those products designated in the Notice Inviting Bids as "District Standards".
- B. Notwithstanding other provisions of this section and the above, the Architect may consider a request for substitution after the date of the receipt of bids or contract award, if in the sole discretion of the Architect, there appears to be just cause for such a request. The acceptance of such a late request does not waive any other specified requirement.
- C. Architect will consider a request for substitution only if request is made in strict conformance with provisions of this section. Request shall be fully responsive to all product requirements of the specified product, including those requirements noted in related section 01 60 00.
- D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- E. Review of submittals does not constitute acceptance of substitutions indicated or implied on submittals.
- F. Substitutions will not be considered when requested or submitted directly by subcontractor or supplier.
- G. Contractor's failure or inability to pursue the work promptly or coordinate activities properly shall not establish a cause for consideration of Substitutions.
- H. Burden of proof of merit of requested substitution is the responsibility of the Contractor.
- I. It is the sole responsibility of the Contractor to establish proper content of submittal for requests for substitutions. Incomplete submittals will be rejected.
- J. When substitution is not accepted, provide specified product.
- K. Substitute products shall not be provided without written acceptance by Change Order.

3.3 SUBSTITUTION PROCEDURES

- A. Instructions to Bidders and General Conditions of the Contract may specify time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements in related documents and procedures specified in this section.
- B. Do not request substitutions after expiration of specified periods.
- C. Substitutions may be considered when a product becomes unavailable through no fault of the Contractor. Long lead times do not qualify as unavailable.

- D. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
 - 1. All Performance Requirements listed in Articles titled QUALITY ASSURANCE, DESIGN CRITERIA, PERFORMANCE REQUIREMENTS and WARRANTY must be met and provided with the Request for Substitution.
 - 2. All Salient Physical Attributes must be met and documented with the Request for Substitution.
 - 3. Document each request on Architect's Request for Substitution (RFS) form with complete data substantiating compliance of proposed substitution with Contract Documents. All requests for substitution must be submitted on the specified form which may be obtained from the Architect. Requests received without the Request Form will be rejected.
- E. A request for substitution constitutes a representation that the submitter or contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 - 2. Will provide the same warranty for the substitution as for the specified product.
 - 3. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives all claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- F. Regulatory Requirements: Proposer requesting the substitution shall be responsible for obtaining all regulatory approvals required for proposed substitutions.
- G. All regulatory approval shall be obtained for proposed substitutions prior to submittal of substitution request to Architect.
- H. All costs incurred by the Owner in obtaining regulatory approvals for proposed substitutions, including the costs of the Architect and any authority having jurisdiction over the project shall be reimbursed to the Owner by the Contractor. Costs of these services shall be reimbursed regardless of final acceptance or rejection of substitution.
- I. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

3.4 ARCHITECT'S REVIEW OF SUBSTITUTIONS

- A. The Architect will accept or reject proposed substitutions within fourteen (14) days of receipt of request.
- B. If a decision on a substitution cannot be made within the time allocated, the substitution shall be sent directly to City for review or the Architect for re-review.
- C. No extension of bid period or contract time will be made for substitution review.
- D. Final acceptance of a substitution submitted prior to the date established for the receipt of bids will be in the form of an Addendum.

- E. Final acceptance of a substitution submitted after the award of the contract will be in the form of a Change Order.
- F. Architect/Engineer shall be the judge of the acceptability of the proposed substitution. Architect's decision on substitution requests is final and does not require documentation or justification.
- G. Rejection of Substitution Request: Any of the following reasons shall be cause for rejection, all as determined by the Architect;
 - 1. Vagueness or incompleteness of Substitution submittal,
 - 2. Insufficient data, failure to meet specified requirements, (including warranty).
 - 3. Qualification of the requirements of the Substitution Form, including modification of any of the requirements.
- H. The Architect/Engineer will notify Contractor in writing of decision to accept, accept as noted, or not accept the request for substitution.
- I. Substitute products shall not be ordered or installed without written acceptance.
- J. Owner shall receive full benefit of any cost reduction as a result of any request for substitution.
- K. Provide submittals for accepted substitutions in accordance with specified requirements of the respective section and provisions of Section 01 33 00.
- L. An accepted substitution is not acceptable as a submittal. Provide separate submittals for each review.

END OF SECTION 01 25 00

EXHIBIT A

SUBSTITUTION REQUEST – FORM “A” - For use during BIDDING period -

Project Name: Fontana City Hall – Phase II		SILLMAN Job No.: 24013	
		Date:	
To: Architect: SILLMAN		Contractor:	
Specified Item:			
Specification Section	Paragraph No.	Drawing No.	Detail No.
Contractors Proposed Substitution:			
Reason for Request: _____ _____			
Manufacturer: _____			
Manufacturer Contract: _____			
Trade Name and Model: _____			
History: <input type="checkbox"/> New Product <input type="checkbox"/> 1-4 Years in market <input type="checkbox"/> 5-10 years in Market <input type="checkbox"/> Over 11 years in market			
Mandatory for Consideration: Specification Section 01 25 00 – Substitution Procedures			
<input type="checkbox"/> Drawings <input type="checkbox"/> Product Data and warranty <input type="checkbox"/> Samples <input type="checkbox"/> Test Data <input type="checkbox"/> Report <input type="checkbox"/> Other _____			
Attach a Point by Point Comparison between proposed product and product indicated. Provide complete data for proposed product, including product/material descriptions, specifications, drawings, photographs, performance, MSDS data sheet and test data adequate for evaluation of the request. Clearly annotate applicable portions of the data. Include ICC Evaluation Service (ICC ES) Evaluation Report, if applicable.			

SUBSTITUTION REQUEST – FORM “A”

- For use during BIDDING period -

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equivalent or superior in all respects to specified product.
- Proposed substitution complies with applicable Codes, ordinances and standards.
- Proposed substitution complies with Contract requirements.
- Same warranty will be furnished for proposed substitution as specified products.
- Same maintenance service and source of replacement parts, as applicable, are available.
- 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.

Submitted by: (name) _____ Title: _____

Signed: _____ Date: _____

Architect's Recommended Action:

Specified Item:

- ☐ **Approved.** Refer to Addendum # _____.
- ☐ **Approved.** Refer to Addendum # _____.
- ☐ **Rejected – Use specified product/material.**
- ☐ **Rejected received too late - Use specified product/material.**
- ☐

Name: _____ Date: _____

Remarks: _____

SUBSTITUTION PROCEDURES

01 25 00 - 9

Fontana City Hall – Phase II

EXHIBIT B

SUBSTITUTION REQUEST – FORM “B” - For use AFTER execution of Contract -

Project Name: Fontana City Hall – Phase II		SILLMAN Job No.: 24013	
		Substitution No.:	
To: Architect: SILLMAN		Contractor:	
Specified Item:			
Specification Section	Paragraph No.	Drawing No.	Detail No.
Contractors Proposed Substitution:			
Reason for Request: _____ _____			
Manufacturer: _____			
Manufacturer Contract: _____			
Trade Name and Model: _____			
Mandatory for Consideration: Specification Section 01 25 00 – Substitution Procedures			
<input type="checkbox"/> Drawings <input type="checkbox"/> Product Data <input type="checkbox"/> Samples <input type="checkbox"/> Test Data <input type="checkbox"/> Reports <input type="checkbox"/> Other _____			
Attach a Point by Point Comparison between proposed product and product indicated. Provide complete data for proposed product, including product/material descriptions, specifications, drawings, photographs, performance, MSDS data sheet and test data adequate for evaluation of the request. Clearly annotate applicable portions of the data. Include ICC Evaluation Service (ICC ES) Evaluation Report, if applicable.			

SUBSTITUTION REQUEST – FORM “B”

- For use AFTER execution of Contract-

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equivalent or superior in all respects to specified product.
- Proposed substitution complies with applicable Codes, ordinances and standards.
- Proposed substitution complies with Contract requirements.
- Same warranty will be furnished for proposed substitution as specified products.
- Same maintenance service and source of replacement parts, as applicable, are available.
- 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.

Submitted by: (name) _____ Title: _____

Signed: _____ Date: _____

Architect's Recommended Action:

Specified Item:

☐ **Approved.** Refer to Change Order # _____.

☐ **Approved.** Refer to Change Order # _____.

☐ **Rejected – Use specified product/material.**

Name: _____ Date: _____

Remarks: _____

SUBSTITUTION PROCEDURES

01 25 00 - 11

Fontana City Hall – Phase II

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SECTION 01 31 00
PROJECT MANAGEMENT & COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
 - 4. Project meetings.

1.3 RELATED REQUIREMENTS

- A. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
- B. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.4 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information or interpretation required by or clarifications of the Contract Documents.

1.5 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 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.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 GENERAL COORDINATION PROCEDURES

- 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 to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 1. Prepare similar memoranda for Owner 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. Project closeout activities.
 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.7 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings for Facilities Services Utilities (Mechanical, Electrical, Plumbing, Telecom/Data and Electronic Safety and Security) throughout the project as limited space availability necessitates increased coordination, and in all locations where coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately in AutoCAD format to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. General Contractor is responsible for coordination of the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 - h. Prepare coordination drawings at full scale (life size) at locations requested by Architect, demonstrate conflict resolution in mockups and on in-situ construction.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.

PROJECT MANAGEMENT & COORDINATION

01 31 00 - 3

Fontana City Hall – Phase II

- c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 - 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 - 9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
 - 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."
- C. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
- 1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 - 2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format and Portable Data File (PDF) format.
 - 3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files as specified in related Section 01 11 50 "Electronic Drawings"
 - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Digital Data Software Program: Drawings are available in AutoCAD Format.
 - c. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual or an Agreement form acceptable to Owner and Architect.
- D. Coordination Meetings: As described below in PROJECT MEETINGS Article.
- 1.8 REQUEST FOR INTERPRETATION (RFI)
- A. An RFI is a written request prepared by the Contractor asking the Architect to provide additional information necessary to clarify an item which the Contractor feels is not clearly shown or called for in the drawings or specifications, or to address questions which have arisen under field conditions.
 - B. An RFI cannot modify the Contract Cost, Contract Time, or the Contract Documents.
 - C. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
 - 3. Submit RFIs to Architect on the form included in the project manual. Submittals not conforming to this requirement will be returned.

- D. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as needed to describe the request.
 9. Drawing number and detail references, as needed to describe the request.
 10. Field dimensions and conditions, as needed to describe the request.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- E. RFI Forms: Form bound in Project Manual or a Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- F. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow five (5) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. from Monday to Thursday and after 10 a.m. on Friday will be considered as received the following working day. If the Architect cannot respond to the RFI within ten (10) working days, the Architect shall notify the Contractor and the Owner, of the estimated amount of time that will be required to respond.
1. The following Contractor-generated RFIs will be returned without action. Time spent by the Architect in identifying and managing the following will be compensable as described below for frivolous RFIs:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Frivolous RFIs: The Contractor may be invoiced by the Owner for any costs incurred for professional services, which shall be deducted from the next progress payment, for each RFI requesting an interpretation or decision of a matter where the information sought is equally available to the party making such request, or as otherwise defined in this section as frivolous.

4. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.
 - G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:
 1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 - H. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- 1.9 ARCHITECT'S SUPPLEMENTAL INSTRUCTIONS (ASI)
- A. An ASI is a written supplemental instruction issued and signed by the Architect for minor changes to the Work, without change in Contract Sum or Contract Time.
 - B. An ASI cannot modify the Contract Cost, Contract Time, or the Contract Documents.
 - C. Architect Authority:
 1. The Architect has authority to order minor changes in the Work not involving any adjustment in the Contract Sum, an extension of the Contract Time, or a change which is inconsistent with the intent of the Contract Documents.
 2. The Contractor shall carry out such written orders promptly.
- 1.10 PROJECT MEETINGS
- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.
 - k. Submittal procedures.
 - l. Sustainable design requirements.
 - m. Preparation of record documents.
 - n. Use of the premises.
 - o. Work restrictions.
 - p. Working hours.
 - q. Owner's occupancy requirements.
 - r. Responsibility for temporary facilities and controls.
 - s. Procedures for moisture and mold control.
 - t. Procedures for disruptions and shutdowns.
 - u. Construction waste management and recycling.
 - v. Parking availability.
 - w. Office, work, and storage areas.
 - x. Equipment deliveries and priorities.
 - y. First aid.
 - z. Security.
 - aa. Progress cleaning.
 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Coordination Conferences: Conduct a minimum of three Coordination Conferences at Project site to review Coordination Drawings specified in COORDINATION DRAWINGS Article of this Section for construction activity that requires coordination with other construction. Coordination Conferences are separate from and do not substitute for Pre-Construction Conferences which may be described in various Sections.
1. Attendees: Facilities Services Utilities (Mechanical, Electrical, Plumbing, Telecom/Data and Electronic Safety and Security) subcontractors.
 2. Installer and representatives of manufacturers and fabricators involved in or affected by coordination or integration with materials and installations that have preceded or will follow, shall attend the meeting.
 3. Advise Architect and Owner's Commissioning Authority of scheduled meeting dates.
 4. Optional Attendance: The Architect.

5. Agenda: Review progress of construction coordination activities and preparations for the future activities under consideration, including requirements for the following:
 - a. Submittals.
 - b. Sustainable design requirements.
 - c. Review of Coordination Drawings, including posting of full-scale (life-size) plots to determine or demonstrate acceptable coordination requirements.
 - d. Review of mockups.
 - e. Possible conflicts.
 - f. Aesthetic Appearance.
 - g. Compatibility requirements.
 - h. Time schedules.
 - i. Compatibility of materials.
 - j. Acceptability of substrates.
 - k. Space and access limitations.
 - l. Regulations of authorities having jurisdiction.
 - m. Installation procedures.
 - n. Coordination with other work.
 - o. Required performance results.
 6. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 7. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 8. 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.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
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, shall attend the meeting. Advise Architect and Owner's Commissioning Authority of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Sustainable design requirements.
 - i. Review of mockups.
 - j. Possible conflicts.
 - k. Compatibility requirements.
 - l. Time schedules.
 - m. Weather limitations.
 - n. Manufacturer's written instructions.
 - o. Warranty requirements.
 - p. Compatibility of materials.
 - q. Acceptability of substrates.
 - r. Temporary facilities and controls.
 - s. Space and access limitations.

PROJECT MANAGEMENT & COORDINATION

01 31 00 - 8

Fontana City Hall – Phase II

- t. Regulations of authorities having jurisdiction.
 - u. Testing and inspecting requirements.
 - v. Installation procedures.
 - w. Coordination with other work.
 - x. Required performance results.
 - y. Protection of adjacent work.
 - z. 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 other parties requiring information.
 - 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.
- E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of record documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for completing sustainable design documentation.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Coordination of separate contracts.
 - l. Owner's partial occupancy requirements.
 - m. Installation of Owner's furniture, fixtures, and equipment.
 - n. Responsibility for removing temporary facilities and controls.
 - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- F. Progress Meetings: Conduct progress meetings at regular intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
 - 2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. 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) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site utilization.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of proposal requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

3.1 FORMS

- A. Attached to the end of this Section are the following forms for the Contractors use.
 1. Request for Interpretation form (Exhibit A).

END OF SECTION 01 31 00

EXHIBIT A

REQUEST FOR INTERPRETATION

Project Name: Fontana City Hall – Phase II		SILLMAN Job No.: 24013	
		RFI No:	
To: Architect: SILLMAN		Contractor:	
Subject:			
Specification Section	Paragraph No.	Drawing No.	Detail No.
Category: <input type="checkbox"/> Need for Clarification. <input type="checkbox"/> Unforeseen Condition. <input type="checkbox"/> Conflict Within Documents.		<input type="checkbox"/> Coordination Problem. <input type="checkbox"/> Other.	
Description:			
Contractor's Proposed Resolution:			
<input type="checkbox"/> Attachments: <input type="checkbox"/> Estimated Cost Impact" \$ <input type="checkbox"/> Estimated Time Impact:			
Contractor Signature:		Date:	
Architect's Response:			
Refer to RFI procedures specified in Section 01 31 00 – Project Management and Coordination. This RFI, when completed is not authorization for change to the Contract Documents. Changes to the Contract Documents are authorized only by properly executed Construction Change Directives or Change Order.			
<input type="checkbox"/> Attachments:			
Architect's Signature:		Date:	

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.3 RELATED REQUIREMENTS

- A. Section 01 11 50 "Electronic Drawings."
- B. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- C. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- D. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.4 WORK NOT INCLUDED

- A. Submittals which are not required will not be reviewed by the Architect.
- B. The Contractor may require subcontractors to provide drawings, setting diagrams or similar information as part of the coordination of the Work. The Architect will not review this data.
- C. Material Safety Data Sheets (MSDS) - Limitation of Review: Certain Submittals require provision of these documents by the Contractor. These documents contain information necessary for operation of the facility. The Architect's review of these submittals is limited to noting inclusion of the document for the Owner's use. No further review or comment on MSDS documents by Architect shall be performed or inferred.

1.5 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.6 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 - 3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.7 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Prior to ordering materials, Contractor to verify with Owner additional stock requirements noted in applicable specification sections.

- B. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals as specified in Section 01 11 50 "Electronic Drawings".
- C. 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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. 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.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 working days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow same period as for initial review.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 15 working days for initial review of each submittal by Architect and one additional party and 5 additional working days for each additional party review required.
 5. Submittal review durations may exceed these minimum durations in the event that submittals are incomplete or otherwise deficient.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package incorporating submittal requirements of a single Specification Section and transmittal form.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use Spec Section Number followed by a dash, then a sequential number, followed by a submittal description. (e.g. 142413-001 Hydraulic Freight Elevator Shop Drawings) Resubmittals shall include the letter "R" then the resubmittal number (e.g. 142413-001R1 Hydraulic Freight Elevator Shop Drawings).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software or other electronic form acceptable to Owner, containing the following information:

SUBMITTAL PROCEDURES

01 33 00 - 3

Fontana City Hall – Phase II

- a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Contractor.
 - e. Name of firm or entity that prepared submittal.
 - f. Names of subcontractor, manufacturer, and supplier.
 - g. Category and type of submittal.
 - h. Submittal purpose and description.
 - i. Specification Section number and title.
 - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - k. Drawing number and detail references, as appropriate.
 - l. All Location(s) where product is to be installed, as appropriate.
 - m. Related physical samples submitted directly.
 - n. Indication of full or partial submittal.
 - o. Transmittal number.
 - p. Submittal and transmittal distribution record.
 - q. Other necessary identification.
 - r. Remarks.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
- 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Action Submittals: Submit number of paper copies of each submittal required for Contractor's use, but not more than seven (7). Architect will retain two copies, Architect's consultants will each retain one copy. Additional copies beyond seven will be discarded by the Architect.
 - 3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Architect will not return copies.
 - 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each copy of each submittal to show which products and options are applicable. Modify standard data to delete information or products which are not pertinent.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data concurrent with Samples.
 - 6. Submit Product Data in the following format:

SUBMITTAL PROCEDURES

01 33 00 - 5

Fontana City Hall – Phase II

- a. PDF electronic file.
- 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, unless submittal based on Architect's digital data drawing files is otherwise permitted.
- 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
 - 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Drawing's legend finish identification name.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.
 - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information and labels for record.
 - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

SUBMITTAL PROCEDURES

01 33 00 - 6

Fontana City Hall – Phase II

- a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 - 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit maximum of seven sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Colors and Patterns:
- 1. Submit color and pattern selections for all products offering a choice of these attributes unless a specific color or pattern is referenced in the Contract Documents.
 - 2. Submit within 35 days of Notice of Award a list of all required color selections organized by product, including manufacturer and model. Include samples of manufacturer's complete color range for all products.
 - 3. Architect will not select colors or patterns until samples of all items requiring selections have been submitted. Architect will not make partial color selections.
 - 4. Failure to submit all color selections as specified above, thus requiring additional unanticipated time for the Architect to make selections will not be basis for extension of Contract Time.
 - 5. Architect will make color selections within 30 working days following complete submittal of samples. This period will commence with the receipt of the latest incremental submittal, as applicable.
 - 6. Architect will issue Color Schedule.
- F. Product Schedule: As required in individual Specification Sections, 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 indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
 - 5. Submit product schedule in the following format:
 - a. PDF electronic file.

- G. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. 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.

- T. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- U. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- V. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- W. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. Contractor is notified that significant lead time is required for delegated design review by Agency or Authority Having Jurisdiction and shall schedule work accordingly. No extension of Contract Time will be allowed for delays incurred by delegated design review.
 - 1. The Architect is not responsible for Agency or Authority Having Jurisdiction delays in delegated design review.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

1. Assume full responsibility for coordinating and verifying information, quantities and dimensions shown in submittals.
 2. Note all deviations from the Contract Documents in writing and request Architect approval of deviation in writing.
 3. Direct Architect's attention in writing to all changes made in submittals other than those specifically requested by Architect. Changes not so noted will be considered unreviewed.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
- D. Transmit submittals in groups containing all associated items to ensure availability of information during review. Refer to more specific requirements in the technical divisions.
1. Do not submit partial submittals.
 2. Incomplete or partial submittals may be returned for enhancement. No extension of time will be allowed for delays related to incomplete submittals.
- E. Stagger submittals for items or products with shorter lead times, reduced coordination needs with other work, or which will be needed later in the construction schedule. Prioritize and coordinate submittals only according to jointly-agreed initial list. Items requiring longer lead times shall be submitted first.
- F. Do not provide submittals out-of-sequence. Submittals forwarded earlier than indicated on the jointly agreed schedule may be retained by the Architect for later processing. Required submittals which are not shown on the jointly-agreed schedule, or forwarded at times varying from the agreed schedule will be processed at the Architect's option. Minimum review period may be extended by the Architect for early or out-of-sequence submittals.
- G. Accept reviewed submittals in the conditions delivered by the Architect. Architect reserves right to manage submittal review and stamping in any manner deemed expedient by the Architect and acceptable to the Owner and Authority Having Jurisdiction. These conditions of distribution may include, but not be limited to:
1. Retention of all original documentation submitted and distribution of copies only, including original signatures of Agency reviewers, other Authorities Having Jurisdiction, Contractor's Design Professionals.
 2. Stamping/signature of the cover page only, not each drawing, document or item submitted.
 3. Summarizing complex comments in the form of memo or summary notation, without copying or enumeration of each and every occurrence of a comment. Such copying and enumeration, if required, shall be performed by the Contractor.
 4. Conditional or limited degree of approval/acceptance such as "Color/Texture Only" and similar reservations.
- H. Distribute only submittals with Architect/Engineer (and Authority Having Jurisdiction as applicable) stamps of review. Contractor is responsible for coordination of submittals and comments following review. Contractor to provide all additional reproduction costs for copies required by the Contractor at his expense. No additional costs will be authorized for Contractor costs pertaining to submittals.

SUBMITTAL PROCEDURES

01 33 00 - 10

Fontana City Hall – Phase II

- I. Ensure that all reviewed Submittals are distributed intact with all comments, memos and attachments in place as received from the Architect. Owner and Architect will not be responsible for errors due to Contractor failure to transmit, coordinate or record Architect or Engineer comments.

3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.
- F. Architect will respond in writing to Contractor's written notifications of deviations from Contract Documents. No deviations from Contract Documents will be covered by the Architect's review unless requested by the Contractor in writing and approved by the Architect in writing.
 1. Do not process deviation from the contract or substitution request through regular submittals. Do not incorporate changes of the contract documents, including but not limited to details, materials and finishes inside submittals without receiving Architect's written acknowledgement and authorization. Use appropriate forms and communication procedures.
- G. Submittals reviewed by the Architect which have been stamped shall be deemed to have the action stamp language affixed and made a part thereof, regardless of the initial or subsequent readability of the actual stamp.
- H. Architect's review of submittals has, as a primary objective, to assist in the completion of the project on time and in conformance with the Contract requirements by permitting review of material and fabricated items prior to ordering. Architect's review of submittals is based only on the data presented and extends only to conformance with general design intent and information contained in the Contract Documents.
- I. Architect's review of submittals does not constitute final acceptance or unqualified approval of items or work proposed or put in place, nor does it constitute acceptance of responsibility for the accuracy, coordination or completeness of submittals. Architect's review of submittals does not relieve the Contractor from the responsibility for errors, omissions, or compliance with all the requirements of the Contract Documents.
- J. Contractor shall accept reviewed submittals in the conditions delivered by the Architect. Architect reserves right to manage submittal review and stamping in any manner deemed expedient by the Architect and acceptable to the Owner and Authorities Having Jurisdiction. These conditions of distribution may include, but not be limited to:

SUBMITTAL PROCEDURES

01 33 00 - 11

Fontana City Hall – Phase II

1. Retention of all original documentation submitted and distribution of copies only, including original signatures of Agency review, other Authorities Having Jurisdiction, Design Professionals retained by the Contractor.
2. Stamping/signature of the cover page only, not each drawing, document or item submitted.
3. Summarizing complex comments in the form of memo or summary notation, without copying or enumeration of each and every occurrence of a comment. Such copying and enumeration shall be performed by the Contractor.
4. Conditional or limited degree of approval/acceptance such as "Color/Texture Only" and similar reservations.
5. Contractor shall ensure that all reviewed Submittals are distributed intact with all comments, memos and attachments in place as received from the Architect. Owner nor Architect will not be responsible for errors due to failure to coordinate or record A/E comments.

END OF SECTION 01 33 00

EXHIBIT A**SUBMITTAL COVER SHEET**

Project Name: Fontana City Hall – Phase II	Resubmittal <input type="checkbox"/> Yes Add "letter" to original number	Submittal No:
SILMAN Project No.: 24013		
SUBCONTRACTOR: Name: Address: Phone: Contact:	CONTRACTOR: Name: Signed: Dates: I hereby certify that I have reviewed the attached, have verified requirements and compliance with the Contract Documents.	
Submittal Description:	Specification Section:	
Date Received From Contractor:	Specification Section:	
Consultant Review: <input type="checkbox"/> Civil <input type="checkbox"/> Electrical <input type="checkbox"/> Mechanical <input type="checkbox"/> Structural <input type="checkbox"/> Other: _____ Date sent to consultant: _____ Date received from consultant: _____	Copies: <input type="checkbox"/> Contractor <input type="checkbox"/> Inspector <input type="checkbox"/> SILLMAN File <input type="checkbox"/> Owner <input type="checkbox"/> Other: _____	
<p>Review and commentary noted below are only for general conformance with (1) The design concept of the project and (2) The information given in the contract documents and for no other purpose. Commentary below is subject to the requirements of the contract documents. The contractor is not relieved from responsibility for any deviation from the requirements of the contract documents, errors or omissions in drawings, calculations or samples, confirmation and correlation of dimensions at the job site, fabrication process and techniques of construction, coordination of his work with that of all other trades and satisfactory performance of his work.</p>		
<input type="checkbox"/> Reviewed <input type="checkbox"/> Furnish as corrected <input type="checkbox"/> Revise and Resubmit	<input type="checkbox"/> Contractor <input type="checkbox"/> Inspector	
Reviewed by:	Date:	
Remarks:		

SUBMITTAL PROCEDURES

01 33 00 - 13

Fontana City Hall – Phase II

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SECTION 01 40 00
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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 substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.

2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
 - E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
 - F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
 - G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
 - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
 - I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
 - J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, send RFI to Architect for a decision before proceeding. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

QUALITY REQUIREMENTS

01 40 00 - 2

Fontana City Hall – Phase II

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior and laboratory mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Entity responsible for performing tests and inspections.
 - 3. Description of test and inspection.
 - 4. Identification of applicable standards.
 - 5. Identification of test and inspection methods.
 - 6. Number of tests and inspections required.
 - 7. Time schedule or time span for tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

QUALITY REQUIREMENTS

01 40 00 - 3

Fontana City Hall – Phase II

1. Project quality-control manager may also serve as Project superintendent shall not have other Project responsibilities.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

QUALITY REQUIREMENTS

01 40 00 - 4

Fontana City Hall – Phase II

1. Name, address, and telephone number of technical 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.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

QUALITY REQUIREMENTS

01 40 00 - 5

Fontana City Hall – Phase II

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: 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 Architect.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.

QUALITY REQUIREMENTS

01 40 00 - 6

Fontana City Hall – Phase II

4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.
- N. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished according to requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 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: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

QUALITY REQUIREMENTS

01 40 00 - 7

Fontana City Hall – Phase II

6. 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 as specified in Section 01 33 00 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- G. 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 Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

QUALITY REQUIREMENTS

01 40 00 - 8

Fontana City Hall – Phase II

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

1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Architect, Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect and Commissioning Authority with copy to Contractor and to authorities having jurisdiction.
 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.

3.2 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 Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution".

QUALITY REQUIREMENTS

01 40 00 - 9

Fontana City Hall – Phase II

- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00

references

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Contract definitions are included in the Conditions of the Contract.
- B. Addenda: Written or graphic instruments issued prior to the opening of Bids, which clarify, correct or change the bidding requirements or the Contract Documents. Addenda shall not include the minutes of the Pre-bid Conference and Site Visit.
- C. Additive Bid: The sum to be added to the Base Bid if the change in scope of work as described in Additive Bid is accepted by Owner.
- D. Agreement: Agreement is the basic contract document that binds the parties to construction Work. Agreement defines relationships and obligations between Owner and Contractor and by reference incorporates Conditions of Contract, Drawings, and Specifications and contains Addenda and all Modifications subsequent to execution of Contract.
- E. Alternate: Work added to or deducted from the Base Bid, if accepted by Owner.
- F. "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. In no case will "approval" by Architect/Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of contract documents.
- G. Approved Equal: Approved in writing by Owner as being of equivalent quality, utility and appearance.
- H. Architect or Architect/Engineer: The person holding a valid Architect's license, whose firm has been designated as the Architect to provide architectural services on the project.
- I. Bid: The offer or proposal of the Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
- J. Bidder: One who submits a Bid.
- K. By Owner: Work that will be performed by Owner or its agents at the Owner's expense.
- L. By Others: Work that is outside scope of Work to be performed by Contractor under this Contract, which will be performed by Owner, other contractors, or other means.
- M. Business Day: A "Business Day" is defined as any day on which the Architect maintains regular working hours, exclusive of weekends and recognized public holidays. The Architect's standard

REFERENCES

01 42 00 - 1

Fontana City Hall – Phase II

working hours are Monday through Thursday, 8:00 a.m. to 5:00 p.m. PST, and Friday, 8:00 a.m. to 12:00 p.m. PST.

- N. Change Order: A written instrument prepared by Architect and signed by Architect, Owner and Contractor, stating their agreement upon all of the following:
1. a change in the Work,
 2. the amount of the adjustment in the Contract Sum, if any, and
 3. the amount of the adjustment in the Contract Time, if any.
- O. Concealed: Work not exposed to view in the finished Work, including within or behind various construction elements.
- P. Contract Conditions: Conditions of Contract define basic rights, responsibilities and relationships of Contractor and Owner and consists of two parts: General Conditions and Supplementary Conditions.
1. General Conditions are general clauses, which are common to the Owner Contracts.
 2. Supplementary conditions modify or supplement General Conditions to meet specific requirements for this Contract.
- Q. Contract Documents: Contract Documents shall consist of the documents identified as the Contract Documents in Contract Agreement, plus all changes, addenda and modifications thereto.
- R. Contract Modification: Either:
1. a written amendment to Contract signed by Contractor and Owner; or
 2. a Change Order; or
 3. a written directive for a minor change in the Work issued by Architect.
- S. Contract Sum: The sum stated in the Agreement and, including authorized adjustments, the total amount payable by Owner to Contractor for performance of the Work and the Contract Documents. (Also referred to as the Contract Price.)
- T. Contract Times: The number or numbers of days or the dates stated in the Agreement (i) to achieve substantial completion of the Work or designated milestones and/or (ii) to complete the Work so that it is ready for final payment and is accepted.
- U. Contractor: The person or entity identified as such in the Agreement and referred to throughout the Contract Documents as if singular in number and neuter in gender. The term "Contractor" means the Contractor or its authorized representative.
- V. Contractor's Employees: Persons engaged in execution of Work under Contract as direct employees of Contractor, as subcontractors, or as employees of subcontractors.
- W. Date of Substantial Completion: Date of Substantial Completion of Work or designated portion thereof is date certified by Architect when construction is sufficiently complete in accordance with Contract Documents for Owner to occupy Work or designated portion thereof for its use for which it is intended.
- X. Day: One calendar day, unless the word "day" is specifically modified to the contrary.
- Y. Deductive Bid: The sum to be subtracting to the Base Bid if the change in scope of work as described in Deductive Bid is accepted by Owner.

REFERENCES

01 42 00 - 2

Fontana City Hall – Phase II

- Z. Defective: An adjective which, when modifying the word "Work", refers to Work that is unsatisfactory or unsuited for the use intended, faulty, or deficient, that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents (including but not limited to approval of samples and "or equal" items), or has been damaged prior to final payment (unless responsibility for the protection thereof has been assumed by Owner). Architect is the judge of whether Work is defective.
- AA. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "approved," "required," and "permitted" have the same meaning as "directed." However, no such implied meaning will be interpreted to extend the Architect's/Engineer's responsibility into the Contractor's responsibility of construction supervision.
- BB. Drawings: The graphic and pictorial portions of Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.
- CC. Engineer: Where referenced in General Conditions, the person holding a valid Engineer's license, whose firm has been designated (if any designated) within the Contract Documents as the Engineer to provide engineering services on the project.
- DD. Equal: Equal in opinion of Architect. Burden of proof of equality is responsibility of Contractor.
- EE. Exposed: Work exposed to view in the finished Work, including behind louvers, grilles, registers and various other construction elements.
- FF. Final Acceptance or Final Completion: All Work satisfactorily completed in accordance with Contract Documents. It includes, but is not limited to:
1. All Systems having been tested and accepted as having met requirements of Contract Documents.
 2. All required instructions and training sessions having been given by Contractor.
 3. All as-built drawings and operations and maintenance manuals and Machine Inventory Sheets having been submitted by Contractor, reviewed by Architect/Engineer and accepted by Owner.
 4. All punch list work, as directed by Owner, having been completed by Contractor.
 5. Generally all work, except Contractor maintenance after Final Acceptance, having been completed to satisfaction of Owner.
- GG. Force-Account: Work directed to be performed without prior agreement as to lump sum or unit price cost thereof, and which is to be billed at cost for labor, materials, equipment, taxes, and other costs, plus a specified percentage for overhead and profit.
- HH. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- II. "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." No limitation of location is intended.
- JJ. "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.

REFERENCES

01 42 00 - 3

Fontana City Hall – Phase II

- KK. Inspector: The person engaged by Owner to inspect the workmanship, materials, or manner of construction of buildings or portions of buildings, to determine if such construction complies with the Contract Documents and applicable codes.
1. The inspector is subject to approval by the Architect, Owner and he will report to Owner.
 2. The terms "Inspector" and "Project Inspector" are used interchangeably in the Contract Documents.
- LL. Latent: Not apparent by reasonable inspection, including but not limited to, the inspections and research required as a condition to bidding under the General Conditions.
- MM. Material or Materials: These words shall be construed to embrace machinery, manufactured articles, materials of construction (fabricated or otherwise), and any other classes of material to be furnished in connection with Contract, except where a more limited meaning is indicated by context.
- NN. Milestone: A principal event specified in Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all Work.
- OO. Modification: Same as Contract Modification.
- PP. Not in Contract: Work that is outside the scope of work to be performed by Contractor under this Contract.
- QQ. Notice of Award: A written notice given by Owner to lowest responsive, responsible bidder advising that Bidder's bid and other qualifying information is acceptable to Owner, requiring Bidder to fulfill the requirements of the Contract.
- RR. Notice to Proceed: A written notice given by Owner to Contractor fixing the date on which the Contract Time will commence to run and on which contractor shall start to perform Contractor's obligations under the Contract Documents.
- SS. Off Site: Outside geographical location of the Project.
- TT. Owner: Individual or entity named as Owner in Section 01 11 00 "Summary of Work". Unless otherwise expressly indicated or required by the context of usage, the term "Owner" as used in the Contract Documents shall be deemed references to Owner.
- UU. Owner-Furnished, Contractor-Installed: Items furnished by Owner at its cost for installation by Contractor at its cost under this Contract.
- VV. Owner Representative(s): The person or persons assigned by Owner to be Owner's representatives or, if so designated, agent(s) at the site.
- WW. Progress Report: a periodic report submitted by Contractor to Owner with progress payment invoices accompanying actual work accomplished to the Project Schedule.
1. See Document 00 600 General Conditions.
- XX. Project: Total construction of which Work performed under this Contract may be whole or part.
- YY. Project Manual: Project Manual consists of Bidding Requirements, Agreement, Bonds, Certificates, Contract Conditions, and Specifications. The Project Manual is deemed to include and incorporate all matters noted in any Addenda issued by or on behalf of the Owner during the bidding for the Work.

REFERENCES

01 42 00 - 4

Fontana City Hall – Phase II

- ZZ. ""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.
- AAA. Provide": Furnish and install, complete and ready for the intended use.
- BBB. "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.
- CCC. Request for Interpretation (RFI): A document prepared by Contractor, Owner or Architect/Engineer requesting information from one of the parties regarding the Project or Contract Documents. The RFI system is also a means for Owner and Architect to submit Contract Document clarifications or supplements to Contractor.
- DDD. Required: "As required", "As needed", "As necessary" and terms of similar import, where used, shall mean as required or as needed to complete the item or effort in question in accordance with the Contract Documents, applicable standards and specifications for the quality indicated.
- EEE. RFI-Reply: A document consisting of supplementary details, instructions or information issued by the Architect/Engineer, which clarifies or supplements Contract Documents and with which Contractor shall comply. RFI-Replies do not constitute changes in Contract Sum or Contract Times except as otherwise agreed in writing by Owner. RFI-Replies will be issued through the RFI administrative system.
- FFF. Samples: Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
- GGG. Shop Drawings: All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the work.
- HHH. Shown: As indicated on Drawings.
- III. Site: The particular geographical location of Work performed pursuant to Contract, including staging areas, work areas, storage and lay down areas, access and parking.
- JJJ. Specifications: The written portion of the Contract Documents consisting of requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services.
- KKK. Specified: As written in Specifications.
- LLL. Subcontractor: A person or entity who has a direct contract with Contractor to perform a portion of the Work at the site. The term "subcontractor" is referred to throughout the Contract Documents as if singular in number and neuter in gender and means a subcontractor or an authorized representative of the subcontractor. The term "subcontractor" does not include a separate contractor or subcontractors of a separate contractor.
- MMM. Substantial Completion: The Work (or a specified part thereof) has progressed to the point where, in the opinion of the Architect/Engineer as evidenced by a Certificate of Substantial Completion, it is sufficiently complete, in accordance with Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment is evidenced by written recommendation

REFERENCES

01 42 00 - 5

Fontana City Hall – Phase II

of the Architect/Engineer for final payment. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

NNN. Supplemental Instruction: A written work change directive to Contractor from Architect/Engineer, approved by Architect, ordering alterations or modifications which do not result in change in Contract Sum or Contract Times, and do not substantially change Drawings or Specifications.

OOO. Underground Facilities: All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: Electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

PPP. Work: The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all is required by the Contract Documents. Wherever the word "work" is used, rather than the word "Work", it shall be understood to have its ordinary and customary meaning.

1. Wherever words "as directed", "as required", "as permitted", or words of like effect are used, it shall be understood that direction, requirements, or permission of Owner or Architect is intended. Words "sufficient", "necessary", "proper", and the like shall mean sufficient, necessary or proper in judgment of Owner or Architect. Words "approved", "acceptable", "satisfactory", "favorably reviewed" or words of like import, shall mean approved by, or acceptable to, or satisfactory to, or favorably reviewed by Owner or Architect.
2. Wherever the word "may" is used, the action to which it refers is discretionary. Wherever the word "shall" is used, the action to which it refers is mandatory.

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.
- D. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or laws or regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated in the Contract Documents.

REFERENCES

01 42 00 - 6

Fontana City Hall – Phase II

- E. Except as otherwise specifically stated in the Contract Documents or as may be provided by Change Order, or supplemental instruction, the provisions of the Contract Documents shall take precedence in resolving conflicts, errors, ambiguity or discrepancy between the Contract Documents and:
1. The provisions of standards, specifications, manuals, codes, or instructions (whether or not specifically incorporated by reference in the Contract Documents); or
 2. The provisions of laws or regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such law or regulation).
- F. No provision of referenced standards, specifications, manuals, codes or instructions shall be effective to change the duties and responsibilities of Owner, Contractor or Architect/Engineer, or their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents, nor shall it be effective to assign to Owner, Architect/Engineer or their consultants, agents or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

1.4 REPORTING AND RESOLVING DISCREPANCIES

- A. Report in writing at once to Owner, with copies to Architect, all conflicts, errors, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and provisions of laws or regulations applicable to the performance of the Work or of standards, specifications, manual, codes or instructions of manufacturers or suppliers. Do not proceed with the Work affected until direction to do so is given by the Architect.

1.5 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the 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. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. AABC - Associated Air Balance Council; www.aabc.com.
 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 10. AF&PA - American Forest & Paper Association; www.afandpa.org.
 11. AGA - American Gas Association; www.aga.org.
 12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.

REFERENCES

01 42 00 - 7

Fontana City Hall – Phase II

14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.
37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.

REFERENCES

01 42 00 - 8

Fontana City Hall – Phase II

63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; www.ec-central.org.
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.
85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).

REFERENCES

01 42 00 - 9

Fontana City Hall – Phase II

112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.
119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.
121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NECA - National Electrical Contractors Association; www.necanet.org.
137. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
138. NEMA - National Electrical Manufacturers Association; www.nema.org.
139. NETA - InterNational Electrical Testing Association; www.netaworld.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.
141. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.

REFERENCES

01 42 00 - 10

Fontana City Hall – Phase II

163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrasssod.org.
189. TRI - Tile Roofing Institute; www.tilerroofing.org.
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; www.ul.com.
192. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
201. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
202. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
203. WPA - Western Wood Products Association; www.wwpa.org.

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. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

REFERENCES

01 42 00 - 11

Fontana City Hall – Phase II

- 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. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; 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. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance 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. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

REFERENCES

01 42 00 - 12

Fontana City Hall – Phase II

1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS - California Department of Health Services; (See CDPH).
4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD - South Coast Air Quality Management District; www.aqmd.gov.
7. TFS - Texas Forest Service; Forest Resource Development and Sustainable Forestry; <http://txforests-service.tamu.edu>.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 42 00

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SECTION 01 43 39
MOCKUP REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.1 SUMMARY

- A. Construct mockups prior to installation of final work, to permit review of appearance, quality, coordination, compatibility and relation to adjacent work, and to test alternate colors and finishes of materials. Provide mockup identical in every respect to the final work specified.
- B. Construct mockups out of sequence as part of the Contract.
- C. Mockups will remain in place through the completion of the work and shall serve as standard for appearance and other attributes as specifically noted by the Architect.
- D. Provide design by Contractor's engineer as required to ensure the structural stability of mockups.
- E. Architect and other interested parties will make visual examination of the mockup during construction.

1.2 RELATED REQUIREMENTS

- A. Pertinent sections of other Divisions specifying mockups.

1.3 DEFINITIONS

- A. Mockup: Independent structures that represent components of a portion of the building as indicated, and where located, on the Drawings.

1.4 ACTION SUBMITTALS

- A. Sequence: All required submittals must be accepted prior to construction of mockup including but not limited to product data, samples and shop drawings as required.
 - 1. Project Schedule shall take account of early submittal requirements of these items to Architect for review and approval.
 - 2. Samples: All selection samples and verification must be approved prior to preparation of mockup.
- B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer and bearing his seal and signature, detailing fabrication and assembly of mockups.

1. Provide fully detailed drawings showing all components, including bracing and footings for independent elements which are required for free-standing mockup, although not part of the mockup itself.
 2. Identify all assembly components and materials, indicate means of full integration with surrounding adjacent materials.
 3. Include all details showing edges, perimeters, junctions and transitions, seals, sealant details, re-glazing details, water collection and drainage systems, anchorage and all other pertinent details necessary to illustrate and verify the performance capabilities of the proposed assembly.
- C. Product Data for any materials not currently listed in specifications as alternates.
- D. Delegated-Design Submittal: For mockup supporting structure, when mockups are not constructed in situ.
1. Structural Calculations: Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation, registered in the State where the project is located demonstrating compliance with referenced code and specified criteria.
- E. Construction Schedule: Include mockup activities including administrative and procedural submittals and materials ordering and assembly on Construction Schedule. Identify every element required for each mockup. Allow ample advance time for preparation and approval of mockup prior to placement of final orders for work without delay to progress or completion of the work.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Professional Engineer.

1.6 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of mockups that are similar to those indicated for this Project in material, design, and extent.
- B. Installer Qualifications: Installer experienced in performing work of the section who has specialized in installation of work similar to that required for this project and who will perform installation of final work.
- C. Comply with standards specified for permanent work.
- D. Secure mockup in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.
- E. Provide finish to match approved samples.

1.7 SCHEDULING

- A. Notify Architect at the start of construction of mockup and provide progress reports to allow the Architect to schedule observations of mockups.

- B. After approximately 50 percent of each mockup has been constructed, request the Architect's preliminary review before completion. Incorporate changes or variations requested by the Architect into the mockup during their construction and prior to their completion, insofar as possible.
- C. Obtain Architect and Owner Representative's acceptance of visual qualities of the mockup prior to commencing the corresponding work for the Project.
- D. Schedule the completion and reworking of mockup necessary to obtain acceptance to avoid delay in the construction schedule of the Project. Update the Construction Schedule to reflect required revisions to mockup.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Design Loads and Performance Criteria: As specified in the technical sections.
- B. Delegated Design: Engage a qualified professional engineer to design mockup supports.
- C. Provide full size mockup of typical wall construction and other elements as specified in accordance with details on Drawings in the sizes indicated, or if not indicated, in size and in location(s) directed by Architect.
 - 1. Construction shall be by the same personnel employed for the final work.
 - 2. Demonstrate aesthetic effects, establish quality standards for fabrication and installation and provide examples for testing as specified in related section.
- D. Mockups shall be free-standing and shall not be incorporated into the final work, unless otherwise approved by the Architect in writing.
- E. Assemble and erect complete, with specified attachment and anchorage devices, flashings, seals and finishes.
- F. Coordination: Utilize mockups to ascertain elements as designed fit into space provided and to coordinate and sequence work of multiple sections in an assembly.
- G. Should mockup fail to meet the Architect and Owner Representative's approval, take down or rework until acceptable.
- H. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- I. Approved mockup will form the standard for comparison for Architect's judging aesthetic qualities of the finished work, including the interface with adjacent materials and components, as applicable.
 - 1. Make modifications required by Architect to achieve acceptable mockups, at no additional cost to the Owner.
 - 2. Mockup will be used by the Architect to test color and material alternatives and to review and accept final colors, textures and finishes. Up to 5 different colors may be tested for each component.

MOCKUP REQUIREMENTS

01 43 39 - 3

Fontana City Hall – Phase II

3. Some mockups will be used for exterior façade testing as specified in related section 01 45 53 4000.

- J. Remove unacceptable mockups from the site immediately
- K. Mockup shall be approved by the Architect and Owner's Representative in writing, as a condition precedent to approval of shop drawings for work represented by the mockups.

2.2 MOCKUP DESCRIPTION

- A. Refer to drawings and various technical sections for descriptions of mockups and in-place installations required for review of materials and coordination.
 1. Mockup to incorporate items from exterior cladding, weather barriers, metal flashings, and fenestration items from Divisions 03, 04, 07, and 08.
- B. Provide quality control over work of various sections of specifications, manufacturers, products, services, workmanship, and site conditions to produce mockup in accordance with the Contract Documents.

2.3 MATERIALS AND COMPONENTS

- A. Materials and finishes shall comply with the requirements specified in the various applicable Sections of the Specifications, and shall match previously submitted and approved samples.
- B. Mockup shall include all related construction materials and finishes having a visual or technical effect upon the completed work.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions with installer present and verify that field conditions are acceptable and are ready to receive work. Correct conditions detrimental to the proper and timely performance of this work before proceeding with installation. Commencement of work indicates acceptance of substrates

3.2 INSTALLATION

- A. Install components in strict accordance with manufacturer's instructions and approved shop drawings. Use proper fasteners and hardware for material attachments as specified and as required to suit field conditions.
- B. Install items plumb and level, measured from established lines and levels, accurately fitted, free from distortion or defects.
- C. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.

MOCKUP REQUIREMENTS

01 43 39 - 4

Fontana City Hall – Phase II

- D. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Install materials in a manner that will duplicate the appearance in the completed building.
 - 1. Provide materials and personnel for prompt continuous construction of mock-ups.
 - 2. In constructing mockup, take measure to ensure the safety of Project personnel and the public.
 - 3. Construct mockup using the same construction personnel, means, and methods as intended for use on final work.
 - 4. Construct mockup in accordance with details indicated on the drawings and approved Shop Drawings.
 - 5. Mockups shall be located where specified or directed, and shall not be built "in-place" as part of the permanent construction.
- F. Construct mockup test specimens to match details shown in the architectural drawings under the manufacturer's/installer's direct supervision and employ workmen as they would be employed during the final construction at the job site.
 - 1. Construct in strict accordance with endorsed shop drawings. Any deviations from or additions to details shown on drawings are subject to final review and action by the Architect.
 - 2. Mockup test specimens shall be full size and fully represent the conditions of final construction including structural design of members and anchorages. Mock up specimens shall include not only the window but the surrounding framing, flashings, wall finishes and related materials.
 - 3. Mockup test specimens shall include joint sealants, glazing, and finishes. Install sufficient interior trim, mullion and horizontal covers to demonstrate details of completed work. Leave trim installed to demonstrate that design is not affected by testing criteria.
 - 4. Provide at least one extra light of glass for each type and size used for glazed mockups. Replace glass breaking during testing with new glass and continue tests.
 - 5. Repeated material breakage shall constitute failure. Prior to testing remove and re-glaze selected glass lites, using details and procedures intended for glass replacement on the actual building. Re-glazed lites must satisfy all test criteria.
- G. Record Drawings for Mockups:
 - 1. Prepare record drawings for mockups as specified in related Section 01 45 53.

3.3 PROTECTION

- A. Protect and maintain mockup until completion of construction or until removal is directed.
- B. Repair damage to mockup immediately upon occurrence. Maintain mockup and surrounding site in a safe and clean condition.
- C. Do not permit traffic near unprotected finish surface(s).

3.4 REMOVAL

- A. Remove mockup at the completion of the work in a manner that shows no evidence of mockup previous existence. Complete site work at area of mockups in accordance with Contract Drawings.

MOCKUP REQUIREMENTS

01 43 39 - 5

Fontana City Hall – Phase II

END OF SECTION 01 43 39

SECTION 01 45 53.00
BUILDING ENCLOSURE TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Air Infiltration.
 - 2. Water Penetration tests (Spray Rack and Hose Stream).
 - 3. Field sealant tests.
 - 4. Heat soak tests on tempered glass.
 - 5. Field water tests.
 - 6. Adhesion of Weather Resistive Barrier.
- B. Also Included:
 - 1. Testing Agency Selection, Payment, Duties
 - 2. Testing Agency Limits on Authority
 - 3. Contractor Responsibilities
 - 4. Architect/Engineer Responsibilities.
 - 5. Deficient Work and Re-Testing Procedures

1.3 REFERENCES

- A. AAMA 501.2 "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems"
- B. ASTM International:
 - 1. ASTM C 794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
 - 2. ASTM C 1021 - Practice for Laboratories Engaged in the Testing of Building Sealants.
 - 3. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.
 - 4. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants
 - 5. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
 - 6. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - 7. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - 8. ASTM E329 - Practice for Use in the Evaluation of Inspection and Testing Agencies as Used in Construction.

9. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
 10. ASTM E543 - Practice for Determining the Qualification of Nondestructive Testing Agencies.
 11. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.
 12. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- C. BS EN 14179-1 standard. Heat Soaked Thermally Toughened Soda Lime Silicate Safety Glass, Intended To Be Used In Buildings And Construction Works.

1.4 DEFINITIONS

- A. Deficient Work: Work found to be in not in compliance with the Contract Documents.
1. Work permitting Leakage or Water Penetration as defined in this Section is deemed deficient work.
- B. Water Penetration: This definition of water leakage shall govern over other definitions which may appear in reference documents. There shall be no water leakage as defined below:
1. All water shall be contained and drained to the exterior.
 2. There shall be no wetting of a surface that would be visible to building occupants.
 3. There shall be no staining or other damage to any part of the completed building, its finishes, or its furnishings.

1.5 RELATED REQUIREMENTS

- A. Sections specifying exterior façade components and assemblies requiring testing for delegated design or performance verification.
- B. Other pertinent Sections specifying exterior cladding elements.

1.6 SUBMITTALS

- A. Testing Agency Information and Qualifications: Prior to start of Work, submit the following:
1. Testing Agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
 2. Current copy of Testing Agency's established Quality Assurance Manual meeting criteria of the American National Standards Institute assuring that tests and/or inspections will be performed in accordance with established and accepted procedures and criteria.
 3. Copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
 4. Test procedures, including the basic chamber steel layout and dial indicator locations for the structural testing.
 5. Copy of latest Test Equipment certification attesting adherence to specified standards.
 6. Copy of all Test procedures and proposed Test schedule coordinated with Contractor's Construction Progress Schedule.

- B. Test Reports: After each test/inspection, promptly submit two copies of report to Architect, Engineer, Owner, and Contractor, with additional copies to other parties as noted.
- C. Construction Schedule:
 - 1. Include testing activities, with administrative and procedural submittals and materials ordering and assembly on Construction Schedule.
 - 2. Identify every element required for each test.

1.7 QUALITY ASSURANCE

- A. Conform to requirements of the referenced standards.

1.8 TESTING AGENCY QUALIFICATIONS

- A. Testing Agency Qualifications:
 - 1. Meet "Recommended Requirements for Independent Laboratory Qualification, latest edition, published by American Council of Independent Laboratories.
 - 2. Meet requirements of ASTM E 329 for inspection of construction activities and materials used in construction, testing of construction activities and materials used in construction, and Special Inspection, including the requirement that all inspection and testing services must be under the direction of an experienced testing technician with at least ten years experience in inspection and testing of exterior enclosure systems construction and materials.
 - 3. Meet requirements of ASTM E 543 as a qualified Nondestructive Testing Agency.
 - 4. Meet requirements of ASTM E 699 including Part A - Standards and Criteria for Testing Agencies, Part B - Standards and Criteria for Quality Assurance Agencies, and Part C - Standards and Criteria for Evaluating Agencies.
 - 5. Meet requirements of ASTM C 1021 - Practice for Laboratories Engaged in the Testing of Building Sealants.
- B. Equipment: Calibrate testing equipment at maximum twelve calendar month intervals by devices of accuracy traceable to the National Bureau of Standards or accepted values of natural physical constants.
- C. Personnel: Testing Agency on-site supervisory personnel shall be qualified and certified in the specified fields of testing as required in appropriate Quality Assurance and Calibration Manuals.
- D. Laboratory: Authorized to operate in State in which Project is located.
- E. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
- F. Approved Testing Agencies:
 - 1. Construction Consulting Laboratory West – Ontario, California
 - 2. Smith Emery Laboratory – Los Angeles, California
 - 3. Other facilities may be acceptable on the following conditions:
 - a. The proposed agency can carry out all specified tests in accordance with the specified standards.
 - b. The proposed agency is entirely independent from any and all contractors, subcontractors, or manufacturers involved in this project.

4. All proposed test laboratories are subject to acceptance by the Architect and Owner whose decision is final.

- a. Detailed information on facilities and test equipment for alternate test sites must be submitted at the time of bid.

G. The approved testing agency shall conform to the following:

1. General:

- a. Shall be solely responsible for conducting and reporting on all of the tests.
 - b. Shall exclusively follow the direction of the Architect and his consultants with regards to all test procedures and testing requirements.

2. Prior to any testing:

- a. Test procedures shall be submitted to the Architect for review and action including the basic chamber steel layout and dial indicator locations for the structural testing.
 - b. Test schedule shall be submitted to the Architect for review and action.

1.9 TESTING AGENCY SELECTION AND PAYMENT

- A. Owner will employ and pay for the services of an Independent Testing Agency, herein after called the Owner's Testing Agency, to perform specific testing, in accordance with the Specifications.
 1. Owner will pay for initial testing indicated under specific specification Sections and specifically noted to be paid by the Owner.
 2. Owner will pay for additional testing required for deficient work or other acts of the Contractor and deduct these costs from the Contract Sum via deductive Change Order. Refer to Article DEFICIENT WORK AND RE-TESTING PROCEDURES.
- B. Responsibility for Costs: All costs for testing and inspections by the Testing Agency including the fees and travel expenses, incurred by the Architect and his consultant shall be paid by the Owner.
- C. Employment of any testing laboratory by Contractor shall be subject to Owner approval. Contractor's laboratory shall meet all quality requirements of this section.
- D. Owner reserves the right to test any material or work of Project at any time, whether or not tests are indicated in Contract Documents.

1.10 TESTING AGENCY DUTIES

- A. Cooperate with Architect and Contractor. Provide qualified personnel after due notice.
- B. Perform specified reviews, inspections, sampling and testing of materials and methods of construction, as specified by the various technical specifications sections, and as requested by the Architect or Owner.
- C. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
- D. Perform specified sampling and testing of Products in accordance with specified standards. Ascertain compliance of materials with requirements of Contract Documents.
- E. Promptly submit written report of each test and inspection as described in this Section; one copy each to Architect, Engineer, Owner, Contractor, and one copy to Record Documents File.

BUILDING ENCLOSURE TESTING

01 45 53.00 - 4

Fontana City Hall – Phase II

- F. Promptly notify Architect and Contractor of observed irregularities or deficiencies of work or products.
- G. Interpretation of test results, when requested by Architect.
- H. Perform additional tests as required by Architect or the Owner.
- I. Attend preconstruction meetings and progress meetings.

1.11 LIMITATIONS OF AUTHORITY OF TESTING AGENCY

- A. Testing Agency is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.
- B. Testing Agency has no authority to stop the Work.
- C. Testing Agency shall not:
 - 1. Act as Consultant to the Contractor or any subcontractor or supplier for this project.
 - 2. Conduct testing without representatives of the Architect or Owner being present, without prior written consent.

1.12 CONTRACTOR'S RESPONSIBILITIES

- A. Employment of the Testing Agency shall in no way relieve Contractor's obligations to perform the Work of the Contract.
- B. Notify Architect, City representative at least 7 days prior to the test date.
- C. Cooperate with the Testing Agency to facilitate the execution of its required services; cooperate with Agency personnel; provide access to work; to manufacturer's operations.
- D. Provide information regarding activities requiring special inspection and tests to Architect and Testing Agency upon request.
- E. Secure and deliver to the Testing Agency adequate quantities of representational samples of materials proposed to be used and which require testing.
- F. Provide to the Testing Agency the design mixes and material properties proposed to be used for materials and material mixes which require control by the Testing Agency.
- G. Provide copies of Products and Material test reports, certifications and affidavits as required.
- H. Provide incidental labor and facilities:
 - 1. To provide access to Work to be tested.
 - 2. To obtain and handle samples at the Project site or at the source of the product to be tested.
 - 3. To facilitate inspections and tests.
 - 4. To provide storage and curing of test samples.
- I. Notify Testing Agency sufficiently in advance of operations to allow for Testing Agency assignment of personnel and scheduling of tests.

1. Notify Testing Agency and Architect/Engineer forty-eight (48) hours prior to expected time for operations requiring testing services.
 2. Become familiar with time constraints of tests required. Schedule work to allow time for performance of required tests.
- J. When tests or inspections cannot be performed after such notice the cost to the Owner for Testing Agency personnel and travel expenses incurred due to Contractor's negligence shall be deducted from the Contract Price.
- K. Make arrangements with Testing Agency and pay for additional samples and tests required for Contractor's convenience.
- L. Schedule Fabrication Work for Efficient Inspection and Testing:
1. Costs of excess inspection charges resulting from inefficiently scheduled fabricator work shall be paid by the Owner and deducted from the Contract Sums owed to the Contractor in the manner specified below for re-testing of deficient work.
- M. Incur expenses due to re-testing and re-inspection necessitated by defective work or other acts of the Contractor, including expenses incurred by the Owner for compensating the Testing Agency as described in the Article DEFICIENT WORK AND RE-TESTING PROCEDURES.
- 1.13 ARCHITECT/ENGINEER AND CITY RESPONSIBILITIES
- A. Architect/Engineer and City representative shall be present on site during the test.
 - B. Architect/Engineer or city is not responsible for notification of the Testing Agency or scheduling its work.
 - C. Architect or city will not be responsible for the actions of the Testing Agency.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 TESTING REQUIREMENTS - GENERAL

- A. Preliminary and unofficial tests are not permitted except in the presence of the Architect's Representative. Three day notification shall be given prior to any such testing. All preliminary or unofficial test results and all remedial work shall be documented in the laboratory report.
- B. Full time attendance by the Contractor's representative(s) shall be provided for during the assembly and erection of the test specimens and for all testing of the test specimens.

3.2 SEALANT TESTING

- A. Independent Field Testing: Proof of compliance of Field Testing of sealant materials shall be in the form of certification by a testing laboratory meeting the requirements of ASTM C 1021.
- B. Field Sealant Testing: Perform a minimum of twenty (20) site tests in accordance with ASTM C 1521 for weather seal sealant adhesion in accordance with approved methods:
 1. Perform testing at equal intervals during the construction period.

BUILDING ENCLOSURE TESTING

01 45 53.00 - 6

Fontana City Hall – Phase II

2. Perform testing under the observation of the Architect or his Consultant.
 3. Submit reports on site tests to the Architect as specified in this Section.
- C. Should sealant failures be found, perform additional testing to determine extent of the problem.
1. Replace all failed sealants promptly and retest for Architect's approval. All costs associated with the required remedial methods are to be borne by the Contractor.

3.3 HEAT SOAK TESTING OF TEMPERED GLASS

- A. All glass which is to be tempered for reasons other than compliance with Code issues shall be subject to heat soak testing. Reference BS EN 14179-1 standard.
- B. Heat Soak test all glass with a surface or edge stress of 7500 psi or higher for a minimum of two (2) cycles. Conduct test so the center of the glass lite remains at a minimum temperature of 525 degrees F (275 degrees C) for a period of one hour.
- C. Furnace minimum heat up times shall be as follows for glass thickness indicated:
 1. 1/4 inch lite (6mm) – 30 minutes.
 2. 3/8 inch lite (10mm) – 70 minutes.
 3. 1/2 inch lite (12mm) – 120 minutes.
 4. 3/4 inch lite (19mm) – 270 minutes.
- D. Monitor furnace heat output and glass area in each test batch and control to comply with these requirements.
- E. Cool down time: Approximately one half of heat up time.

3.4 FIELD WATER TESTING

- A. Field test exterior wall assemblies in accordance with AAMA 501.2 "Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems".
- B. Test Frequency: During construction at 5%, 15%, 30%, 60%, and 90% completion in multiple locations for a total of eight (8) tests minimum, and additional tests as directed by Architect.
 1. Location, extent and time of tests as directed by Architect.
 2. Total of tested area shall be not less than 1.0% nor more than 10.0% of the exterior wall area except as subsequently authorized by the Owner.
 3. Acceptable water penetration shall be as defined in this Section.
 4. Contractor to provide powered scaffold, hose, water supply, communication system, labor and all other necessary items to perform tests.
 5. Schedule out of sequence work necessary, such as sealant work, so that assemblies can be tested as required.

3.5 WEATHER RESISTIVE BARRIER

- A. Owner will engage an independent inspector to observe Weather-Resistive Barrier substrate and installation. Inspector shall provide a written, sign-off log, on all penetrations before the underlayment is placed against them. Architect shall approve form of log before contract with inspection service is approved.
- B. Inspections: Weather barrier inspections to include the following:

1. Continuity of weather barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Continuous structural support of weather barrier system has been provided.
 3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
 4. Site conditions for application temperature and dryness of substrates have been maintained.
 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Surfaces have been primed, if applicable.
 7. Laps in transition membrane have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish-mouths.
 8. Termination sealant has been applied on cut edges.
 9. Transition membrane has been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.
- C. Owner's Testing Agency will perform adhesion tests of fluid-applied Weather-Resistive Barrier using ASTM D 4541 Method (B through F). This is a destructive test.
1. Contractor shall repair test sites to match adjacent undisturbed work.
- D. Remove and replace deficient weather barrier components and re-inspect as specified above.

3.6 REPORTS AND CERTIFICATION

- A. Testing Agency shall submit copies of reports of tests and inspection and certification as described in the Article SUBMITTALS.
- B. After tests or inspections have been made, the Testing Agency shall distribute copies of all tests and inspection reports in standard outline form. Reports shall include the following:
1. Date issued.
 2. Project title and number.
 3. Testing Agency name, address and telephone number.
 4. Name and signature of Agency inspector or technician.
 5. Date and time of sampling or inspection.
 6. Record of temperature and weather conditions.
 7. Date of test.
 8. Report number
 9. Identification of product and specification Section.
 10. Location of sample or test in the Project.
 11. Type of inspection or test.
 12. Observations regarding compliance with contract documents.
 13. Results of tests
 14. Statement of Compliance or Non-compliance with Contract Documents, specifically noted and attested by signature of responsible individual performing test.

3.7 DEFICIENT WORK AND RE-TESTING PROCEDURES

- A. Deficient Work: When initial tests indicate deficient work, Contractor shall propose remedial modifications to correct deficiency. Modifications shall :
 - 1. Be constructable under project conditions prevailing.
 - 2. Meet or exceed specified requirements of quality and durability.
 - 3. Be accepted by product manufacturer in writing.
 - 4. Provide all specified warranties.
 - 5. Be subject to review and action by the Architect before implementation.
- B. In case of disagreement as to the cause of the test failure, the decision shall be made by the Architect and his Consultant.
- C. Architect will determine scope of additional tests and test methods.
- D. Following modifications, revise and retest building.
- E. Subsequent re-testing shall be performed by the same Testing Agency.
- F. Costs for Testing for Defective Work and other acts of the Contractor: All costs for testing and inspections by the Testing Agency including the fees and travel expenses, incurred by the Architect and his consultant for the following, shall be paid for by the Owner, and deducted from the Contract Sums owed to the Contractor via deductive Change Order. Costs subject to withholding from the Contractor include the following:
 - 1. Additional tests and inspections by Owner's testing agency where initial tests and inspections reveal failure to meet Contract requirements.
 - 2. Excessive inspection time by Owner's testing agency is required by Contractor's failure to provide sufficient workman or to properly pursue the progress of work.
 - 3. Test(s) deemed necessary by the Owner/Architect to evaluate any substitution proposed by the Contractor.
 - 4. Testing and inspection for the Contractor's convenience.
 - 5. Testing and inspection overtime necessitated by the Contractor's schedule.
- G. In no case shall the Contractor pay the Testing Agency directly.

3.8 SCHEDULE OF FIELD TESTING

- A. Schedule is attached following this Section.

END OF SECTION 01 45 53.00

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BUILDING ENVELOPE
FIELD TESTING RECOMMENDATIONS

SILLMAN

Project Name: **Fontana City Hall – Phase II**
Project Location: **Fontana, CA**
SILLMAN Project Number: **24013**

Owner: **City of Fontana**
Architect: **SILLMAN**
Date: **05/23/2020**

☒ **Water / Air Infiltration**
ASTM E1105 (Spray Rack)

☒ Curtainwall ☐ Storefront ☐ Window Wall
☐ Punch Openings ☐ Mock-Up ☐ Other: _____
Total Frequency of Tests: **12 each minimum**

☐ **Water Penetration**
AAMA 501.2 (Hose Stream)

☐ Skylights ☐ Sloped Glazing ☐ Curtainwall
☐ Storefront ☐ Window Wall ☐ Punch Openings
☐ Mock-Up ☐ Other: _____
Total Frequency of Tests: _____

☒ **Air Infiltration**
ASTM E783

☒ Curtainwall ☐ Weather Barrier ☐ Mock-Up
☐ Exterior Walls
☐ Other: _____
Total Frequency of Tests: **6 each minimum**

☐ **Leak Detection at Membrane Roofing**
Electronic Field Vector

☐ Roof (Low Slope) ☐ Podium Deck ☐ Green Roofs
☐ Below Pavers ☐ Swimming Pools ☐ Other: _____
Total Frequency of Tests: _____

☐ **Flood Testing**

☐ Roof (Low Slope) ☐ Podium Deck ☐ Green Roofs
☐ Swimming Pools ☐ Planters ☐ Other: _____
Total Frequency of Tests: **N/A**

☒ **Sealant Adhesion and Cohesion**
☐ ASTM C1193, Method A
☒ ASTM C1521, Method A

☒ Curtainwall ☐ Storefront ☐ Window Wall
☐ EIFS ☐ Cement Plaster ☐ Mock-Up
☐ Other: _____
Total Frequency of Tests: **11 ea. minimum**

☒ **Adhesion of Weather Barrier Membrane**
☒ ASTM D4541, Method (B through F)
☐ ABAA

☒ Gypsum Sheathing ☐ Wood Sheathing ☒ Mock-Up
☐ Other: _____
Total Frequency of Tests: **1 each at each roof parapet (roof to wall) (2 locations)**

☐ **Approval of Exterior Insulation and Finish System (EIFS)**
ICC-ES AC24

Total Frequency of Tests: **N/A**

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SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and 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 RELATED REQUIREMENTS

- A. Section 01 11 00 "Summary of Work" for work restrictions and limitations on utility interruptions.

1.4 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, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Arrangements for Site Utility Usage:
 - 1. Sewer Service: Pay [Owner will pay] sewer-service use charges for sewer usage by all entities for construction operations;
 - 2. Water Service: Pay [Owner will pay] water-service use charges for water used by all entities for construction operations;
 - 3. Electric Power Service: Pay [Owner will pay] electric-power-service use charges for electricity used by all entities for construction operations;
 - 4. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations;
 - 5. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.5 INFORMATIONAL SUBMITTALS

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

- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.6 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.

1.7 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Fence Materials: Materials at Contractor's option to prevent unauthorized access to site, but not less than one of the following:
 - 1. 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 rails .
 - 2. 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 concrete or galvanized-steel bases for supporting posts.
 - 3. Wood Enclosure Fence: Plywood, 6 feet (1.8 m) high, framed with four 2-by-4-inch (50-by-100-mm) rails, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 2

Fontana City Hall – Phase II

- B. 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.
- C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Coffee machine and supplies.
 - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (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.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00 "Closeout Procedures".

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

PART 3 - EXECUTION

3.1 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. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: 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.
 - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 4

Fontana City Hall – Phase II

1. Connect temporary service to Owner's existing power source, as directed by Owner.
 2. Install electric power service [overhead] [underground] unless otherwise indicated.
- H. 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.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install three telephone line(s) 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.
 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.
- J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
1. Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
 2. Memory: 4 gigabyte.
 3. Disk Storage: 500 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive.
 4. Display: 22-inch (560-mm) LCD monitor with 256-Mb dedicated video RAM.
 5. Full-size keyboard and mouse.
 6. Network Connectivity: 10/100 BaseT Ethernet.
 7. Operating System: Microsoft Windows XP Professional or Microsoft Windows Vista Business.
 8. Productivity Software:
 - a. Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook.
 - b. Adobe Reader 7.0 or higher.
 - c. WinZip 7.0 or higher.
 9. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions.
 10. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 1 Mbps download speeds at each computer.
 11. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 5

Fontana City Hall – Phase II

12. Backup: External hard drive, minimum 500 gigabyte, with automated backup software providing daily backups.

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 within construction limits indicated on Drawings.
 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Civil Drawings.
 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Civil Drawings.
- D. 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.
- E. Parking: Provide temporary parking areas for construction personnel.
- F. 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.
 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 1. Temporary Signs: Provide signs as indicated and as required to inform individuals seeking entrance to Project.

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 6

Fontana City Hall – Phase II

- a. Provide temporary, directional signs for construction personnel and visitors.
- 2. Maintain and touchup signs so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal".
- 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.
- J. Temporary Elevator Use: [Use of elevators is not permitted] See related Section(s) specifying Elevators for temporary use of new elevators.
- K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 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 01 11 00 "Summary of Work".
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit and authorities having jurisdiction, whichever is more stringent and requirements specified in related Sections "Erosion and Sedimentation Control" or "Site Clearing."
 - 1. Dust Palliation
 - a. All unpaved construction areas shall be sprinkled with water or other acceptable South Coast Air Quality Management District (SCAQMD) dust control agents during dust generating activities to reduce dust emissions. Additional watering or acceptable SCAQMD dust control agents shall be applied during dry weather or windy days until dust emissions are not visible.
 - 1) All grading and construction activities shall be suspended when wind speeds exceed 20 miles per hour, as directed by the SCAQMD.
 - 2) Construction sites shall be watered as directed by the City of San Juan Capistrano Department of Public Works and SCAQMD.
 - b. On dry days, dirt or debris spilled onto paved surfaces shall be swept up immediately to reduce resuspension of particulate matter caused by vehicle movement.

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 7

Fontana City Hall – Phase II

Approach routes to the Project site shall be cleaned daily of construction related dirt in dry weather.

- c. On-site stockpiles of excavated material shall be covered or watered.
- D. 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.
- E. 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.
- F. 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.
- G. 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 required to enclose entire Project site or portion determined sufficient to accommodate construction operations or as indicated on Drawings otherwise.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- H. 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.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. 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.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
 - 2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 8

Fontana City Hall – Phase II

- a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
 3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 4. Insulate partitions to control noise transmission to occupied areas.
 5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 6. Protect air-handling equipment.
 7. Provide walk-off mats at each entrance through temporary partition.
- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 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.

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 9

Fontana City Hall – Phase II

- 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 24 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 CONTINUITY OF SERVICES

- A. Provide temporary panels, raceway, conductors, piping, ductwork and other facilities or equipment as required for continuous operation of utilities in service. Do not allow interruption of utilities.
1. All utility services, such as water, gas, sewers, electricity, data, cable television, communication, clock, bell, security or fire protection system serving the project, or any part of it, shall be maintained in continuous operation at all times for the duration of the contract.
 2. Transfer of utilities function to new systems shall be coordinated in writing with the Owner at least two weeks in advance of the proposed date.
 3. Notify and obtain approval from agencies having jurisdiction over utilities prior to transfer of function.
 4. Coordinate provision and removal of temporary facilities with phasing of construction operations as indicated, or as necessary for continuity of service.

3.7 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. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- E. 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

TEMPORARY FACILITIES AND CONTROLS

01 50 00 - 10

Fontana City Hall – Phase II

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 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

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SECTION 01 56 39

TEMPORARY TREE PROTECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work includes but is not limited to following:

1. Furnish labor, equipment and materials specified herein for the installation, restoration and maintenance of steel post and plastic mesh fencing, installation and maintenance of root protection mulch and sheeting, and construction procedures required to effect the protection of trees and root systems from damage due to construction operations.
2. The fencing and root protection materials shall be removed at the conclusion of construction operations, but not before the completion of all construction operations other than soil amendment, planting and cleanup.

1.2 RELATED SECTIONS

A. Coordinate related work specified in other parts of the Project Manual, including but not limited to following:

Section 31 00 00	Earthwork
Section 32 90 00	Landscaping
Section 32 84 00	Irrigation

1.3 SYSTEM DESCRIPTION

- A. Tree protection fencing shall be provided for all trees within the project area shown to remain within 5' of proposed improvements. General Contractor shall install, modify, restore, maintain and relocate tree protection fencing as necessary throughout the construction period. Obtain approval in writing from the Construction Manager for temporary removal of portions of the tree protection fence necessary for construction access. Fencing must be restored within the time specified in the written approval, or a new request and approval must be made to continue the opening. Tree protection is a matter of life and death for the existing trees. Failure to follow these protections will result in time consuming and expensive replacement by the party found to be at fault for damages to trees.
- B. Tree root protection straw mulch will be required where excavation for any purpose exposes roots of trees.
- C. Landscape Architect or Construction Manager may ORDER THE WORK STOPPED if unauthorized use of protected area is occurring, or if tree protection fencing is not restored within 24 hours of removal.
- D. Tree protection fencing or root protection may be removed for temporary construction access with the approval of the Landscape Architect and shall be neatly stockpiled for reinstallation. Tree protection fencing and root protection shall be reinstalled, as specified herein, immediately once each construction operation requiring their removal is complete and shall be considered the last step of those specific operations. Multiple construction operations will require multiple removals and reinstallation of protective fencing.

TEMPORARY TREE PROTECTION

01 56 39 - 1

Fontana City Hall Renovation – Phase II

1.4 PROTECTION OF TREES

- A. Continuously and carefully protect all trees requiring protection as shown on the drawings over the course of the construction period. Install tree protection prior to beginning all other work. Remove tree protection once all other work is complete. Protect all vegetation against cutting, breaking, skinning or compaction of roots, skinning or bruising of bark by construction operations. Tree protection includes protection of tree roots within the drip line (outer edge of branches), tree trunks, and overhead branches. Excavation and high reach equipment operators shall be advised of the need for tree protection prior to beginning their operations.
- B. THE CONTRACTOR SHALL CAREFULLY PLAN THEIR OPERATIONS SO AS TO AVOID CREATING SITUATIONS IN WHICH TREES MAY BE DAMAGED.
- C. Notify Landscape Architect in any case where a contractor feels construction called for by Contract Documents may damage trees. Do not proceed with such work until directed by Landscape Architect.
- D. Except as approved by the Landscape Architect, the Contractor shall NOT:
 - 1. Stockpile materials within 5 feet of drip lines (outer edge of tree branches) of trees to remain.
 - 2. Allow foot or vehicular traffic or parking of vehicles is within 5 feet of drip lines of trees, except in existing street parking areas. Equipment driven under any trees shall be one foot less in height than the lowest tree branch and all attenuating and hydraulics shall be retracted until the equipment comes to a standstill.
 - 3. Alter surface drainage patterns within the drip lines of trees to remain, unless otherwise indicated on the Landscape Drawings. Alterations shown on other drawing shall be brought to the attention of the Landscape Architect prior to that work being done.
 - 4. Trench within tree driplines unless absolutely necessary. If trenching is necessary, it shall first be brought to the attention of the landscape architect who may authorize trenching by hand, tunneling under all tree roots greater than 1" in diameter.

1.5 QUALITY ASSURANCE

- A. Qualification of Personnel: Continuously maintain a competent foreman on the site during the installation of all work, able to supervise actions of all workers on the site and with authority to act in all matters pertaining to this Section.

1.6 DAMAGES

- A. Damages for loss or injury to trees required to be protected:
 - 1. The party responsible for every tree lost or irreparably damaged as a result of failure to protect or to adequately maintain live trees on site, shall replace each tree with a tree of the same size and species. Trees which fail to foliate fully in the second spring following completion of construction operations will be presumed to have been lost due to construction operations and the contractor shall be responsible for their replacement, regardless of the Contractor's contract status. Location(s) of trees to be replaced shall be determined by the Landscape Architect.
 - 2. New plant material installed due to damages shall carry a minimum one (1) year warranty from the date of installation.

3. The Contractor shall remove damaged trees and their roots in accordance with direction provided by the Landscape Architect.

PART 2 - PRODUCTS

2.1 FENCING MATERIALS - TYPE I

- A. Acceptable manufacturers and products for fencing materials:
 1. Norplex
 2. Tenax
 3. Uline
- B. Plastic mesh shall be continuous molded safety mesh 36 inches wide with clear openings no more than 1-1/2" x 2". Material shall be orange, 40 grams per square foot, High Density Polyethylene with U-V inhibitor suitable for above-grade use.
- C. Posts shall be 5 foot steel heavy duty "T" posts 1-3/8 inches X 1-3/8 inches x 7/64 inch with steel anchor. T-posts may be set in temporary fence post bases where ground or utility conditions prohibit the driving of posts provided post bases do not present a safety hazard.
- D. Attach mesh with nylon zip-straps having a minimum breaking strength of 150 lbs, with not less than 3 straps per post.

2.2 ROOT PROTECTION

- A. Mulch:

New straw mulch, free from weeds, weed seeds and foreign materials shall be used.
- B. Erosion Control Fabric:
 1. American Excelsior Stabilenka 140
 2. Celanese Mirafi 140
 3. Propex 45-45, or approved substitution geotextile fabric
- C. 9 gauge x 9" wire staples.

PART 3 - EXECUTION

3.1 TREE PROTECTION MANDATORY REQUIREMENTS

- A. For commercially-grown trees delivered to the site prior to planting, place and/or maintain tree protection fencing a minimum of 2'-0" outside the line of the container in which the tree was shipped.
- B. Maintain tree protection fencing in sound unbroken and upright condition throughout construction operations. Immediately repair fencing when damaged, regardless of cause of damage.
- C. Tree protection fencing may be removed temporarily for specific construction operations ONLY when explicitly approved IN WRITING by the Construction Manager (See 1.03, Section 02090.)
- D. If tree protection fencing is removed without written permission; or if fenced areas are used in ways not specifically permitted by written permission; or if fencing is not restored promptly on completion of permitted work, the Landscape Architect may order a STOP to all construction work until tree protection is restored. The contractor agrees to halt work of construction

TEMPORARY TREE PROTECTION

01 56 39 - 3

Fontana City Hall Renovation – Phase II

personnel and to stop moving machinery on site until Landscape Architect verifies that tree protection has been restored to meet the requirements of the Contract Documents.

3.2 INSTALLING TREE PROTECTION FENCING

- A. Posts:
Line posts shall be spaced at intervals not to exceed 10 feet. All intervals are to be measured center to center of posts. Set posts vertically to minimum 12" depth. Line posts may be driven in place provided the method of driving does not damage the post or tree roots. If tree roots are encountered, move post to avoid damage to tree roots.
- B. Fence Installation:
Secure plastic fencing fabric to posts with nylon zip-ties, 3 per post, pulling fence material tight horizontally and vertically. Ensure stability of posts throughout the length of the project.

3.3 INSTALLING ROOT PROTECTION

- A. Straw Mulch & Geotextile:
Thoroughly wet excavated earth bank where roots have been exposed. Apply 4" of straw mulch or geotextile fabric with wire staples and keep moist until bank is ready for backfilling. Remove mulch or fabric and staples prior to backfilling.
- B. Watering and Maintenance:
Thoroughly and evenly water protected areas weekly during dry periods, including entire tree drip line areas. Maintain root protection throughout the term of the Contract or until backfilling has occurred.

END OF SECTION 01 56 39

SECTION 01 57 23
TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. CASQA Construction Handbook / Website Portal – Available as a subscription service at: <https://www.casqa.org/resources>.

1.2 SUMMARY

- A. This Section includes all methods and materials to comply with the Project's Storm Water Pollution Prevention Plan (SWPPP), which is required for construction sites with a disturbed area of one or more acres, including construction sites of less than one acre when they are part of a larger common development plan that is equal to or greater than one acre:
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances."

1.3 ALLOWANCES

- A. An allowance for costs associated with this Section is specified in Section 01 21 00 "Allowances".

1.4 ABBREVIATIONS

- A. BMP: Best Management Practice.
- B. CASQA: California Storm water Quality Association.
- C. CCR: California Code of Regulations.
- D. CGP: Construction General Permit.
- E. CSMP: Construction Site Monitoring Program.
- F. DTSC: Department of Toxic Substance Control.
- G. EPA: Environmental Protection Agency.
- H. ESA: Environmentally Sensitive Area.
- I. LRP: Legally Responsible Person.
- J. NAL: Numeric Action Level.

- K. NEL: Numeric Effluent Limitation.
- L. NOI: Notice of Intent.
- M. NOT: Notice of Termination.
- N. NPDES: National Pollutant Discharge Elimination System.
- O. PRD: Project Registration Document.
- P. QSD: Qualified SWPPP Developer.
- Q. QSP: Qualified SWPPP Practitioner.
- R. REAP: Rain Event Action Plan.
- S. RWQCB: Regional Water Quality Control Board.
- T. SAP: Sampling and Analysis Plan.
- U. SMARTS: Storm water Multiple Application and Report Tracking System.
- V. SWPPP: Storm Water Pollution Prevention Plan.
- W. SWRCB: State Water Resources Control Board.
- X. WDID: Waste Discharge Identification Number.
- Y. WPCD: Water Pollution Control Drawing.
- Z. WPCP: Water Pollution Control Program

1.5 QUALITY ASSURANCE

- A. QSP Qualifications: Throughout the duration of construction, assign to the Project a QSP with the following training qualifications in accordance with Section VII of the CGP:
 - 1. A person who has attended and passed a State Water Board-sponsored or approved QSP training course.
 - 2. Certified as at least one of the following:
 - a. Certified Erosion, Sediment and Storm Water Inspector (CESSWI)TM registered through Enviro Cert International, Inc.
 - b. Certified Inspector of Sediment and Erosion Control (CISEC)TM registered through CISEC, Inc.
 - c. QSD.
- B. Qualified Person Qualifications: Throughout the duration of construction, assign to the Project an appropriately trained individual with at least one of the following training qualifications:
 - 1. Attended and passed a State Water Board-sponsored or approved QSD or QSP training course, or
 - 2. Registered or certified as a:

- a. California Registered Civil Engineer.
- b. California Registered Professional or Engineering Geologist.
- c. California Licensed Landscape Architect.
- d. Professional American Institute of Hydrology Hydrologist.
- e. Certified Professional in Storm Water Quality (CPSWQ)TM registered through Enviro Cert International, Inc.
- f. Certified Professional in Erosion and Sediment Control (CPESC)TM registered through Enviro Cert International, Inc.
- g. Professional in Erosion and Sediment Control registered through the National Institute for Certification in Engineering Technologies (NICET).
- h. Certified Erosion, Sediment and Storm Water Inspector (CESSWI)TM registered through Enviro Cert International, Inc.
- i. Certified Inspector of Sediment and Erosion Control (CISEC)TM registered through CISEC, Inc.

1.6 LAWS, REGULATIONS, AND POLICIES

- A. The following laws, permits, regulations and Board policies apply to the erosion and sediment transport control requirements described in this Section.
 1. Construction General Permit (CGP): National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activity. State Water Resources Control Board (SWRCB) Order No. 2009-0009-DWQ, NPDES No. CAS000002, adopted September 2, 2009 and associated amendments.
 2. California Code of Regulations (CCR), Title 23 (Divisions 2 and 4) and Title 24 (Parts 5 and 11).
 3. California Regional Water Quality Control Board (RWQCB) Water Quality Control Plan for the San Diego Basin (9).
 4. California Statewide General Permit for Waste Discharge Requirements for Discharges from Utility Vaults and Underground Structures to Surface Waters, Order No. 2006-008-DWQ, NPDES No. CAG990002.
 5. California RWQCB San Diego Region, General Waste Discharge Requirements for Discharges of Hydrostatic Test Water and Potable Water to Surface Waters and Storm Drains or Other Conveyance Systems, Order No. R9-2002-0020, NPDES No. CAG679001.
 6. California RWQCB San Diego Region, General Waste Discharge Requirements for Discharges from Groundwater Extraction Waste to Surface Waters within the San Diego Region except for San Diego Bay, Order No. R9-2008-0002, NPDES No. CAG919002 (Waste Discharge Application/NPDES Permit, Form 200, replacing Order No. R9-2001-96).
 7. California RWQCB San Diego Region, General Waste Discharge Requirements for Discharges from Temporary Groundwater Extraction and Similar Waste Discharges to San Diego Bay, Tributaries Thereto under Tidal Influence, and Storm Drains or Other Conveyance Systems Tributary Thereto, Order No. R9-2007-0034, NPDES No. CAG919001.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Best Management Practices (BMP's) shall be installed and maintained for water pollution control following the guidance of the appropriate BMP Fact Sheet from the CASQA Construction Handbook / Website Portal.
- B. BMP's shall be installed and maintained for water pollution control following the guidance of the appropriate BMP Fact Sheet from the CASQA Construction Handbook / Website Portal.
- C. Materials needed for the proper installation and operation of BMP's shall comply with the requirements identified on the appropriate CASQA BMP Fact Sheets.

2.2 RAIN GAUGES

- A. Provide a non-recording rain gauge on the project site and ensure proper positioning to avoid shielding from neighboring buildings, vegetation, etc.
- B. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - 1. High Sierra Electronics, Model 2501-00.
 - 2. Belfort Instruments, Model 5-400.
 - 3. Hydrologic Services Pty., Ltd., Standard Model SRG.
 - 4. Or equal.

PART 3 - EXECUTION

3.1 CONSTRUCTION POLLUTION PREVENTION DOCUMENT

- A. Provide a designated individual, meeting the specified qualifications, to amend the SWPPP with phase-specific details.
 - 1. Provide a designated individual, meeting the specified qualifications, to implement the SWPPP with regards to contract work items and all elements required by the CGP. The CGP is available online at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.
 - 2. In addition to compliance with the CGP, comply with all other applicable state, municipal or regional laws, ordinances, rules or regulations governing discharge of storm water, including applicable municipal storm water management programs.

3.2 STORM WATER POLLUTION CONTROL

- A. Assign a QSD for the project to be in charge of amending and certifying the SWPPP. In particular, the QSD shall perform the responsibilities indicated in Section XIV of the CGP and shall meet the training requirements specified in Section VII.B.1 of the CGP.
- B. Assign a Qualified SWPPP Practitioner (QSP) for the project, to be in charge of implementation of all provisions of the SWPPP, including non-stormwater and stormwater visual observations, sampling and analysis, and erosion and sediment control best management practice (BMP)

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 4

Fontana City Hall – Phase II

implementation. In particular, the QSP shall perform the responsibilities indicated in Section G of Attachments C, D, and E of the CGP and shall meet the training requirements specified in Section VII.B.3 of the CGP.

- C. Upload the following documentation during the course of the Project as required by the CGP and the SWPPP until the approval of the Project's Notice of Termination (not meant to be an all-inclusive list):
 - 1. Sampling and analysis data.
 - 2. Storm water annual reports.
 - 3. NOT
- D. The final SWPPP with all of its attachments and appendices, including anything uploaded onto SMARTS during the course of construction shall be included in the record documents.
- E. Comply with all applicable state, municipal or regional laws, ordinances, rules or regulations governing discharge of stormwater, including applicable municipal stormwater management programs.
- F. Construction activities shall not cause a discharge that alters the physical, thermal, chemical, biological or radioactive properties of any waters of the State; or discharge a contaminant that is likely to cause a nuisance or be harmful to public health, wildlife, or other legitimate uses.
- G. To the extent practicable, all construction sites shall provide onsite methods to prevent sediment from entering the existing stormwater systems. Discharge of cloudy or sediment-laden water from any construction site to surface waters or any part of the sewer system is prohibited.
- H. All construction sites shall have stabilized construction site ingress and egress to limit tracking of sediment offsite.
- I. When sediment escapes the construction site, offsite accumulations of sediment shall be removed by the end of the day. Precautions shall be taken to ensure that sediment does not enter receiving waters.
- J. Existing vegetation shall be preserved where possible to minimize erosion.
- K. Follow instructions in Part 3 Articles "Temporary BMP Installation, Operation and Maintenance," "Post-Construction BMP's," and "Maintenance Prior to Final Acceptance."
- L. Discharges of runoff from a project shall comply with the CGP.
 - 1. Construction site management activities include:
 - a. Preparation of REAP's.
 - b. Implementation and maintenance of construction best management practices (BMP's).
 - c. Construction site monitoring, sampling and analysis.
 - d. Preparation of storm water annual report.
 - 2. Stormwater pollution control work shall comply with the SWPPP.
- M. Contractor is responsible for protecting stormwater systems and receiving waters from the discharge of potential pollutants from the project site due to construction activities by using stormwater pollution control practices, including but not limited to the following construction support facilities:

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 5

Fontana City Hall – Phase II

1. Staging areas.
 2. Storage yards for equipment and materials.
 3. Mobile operations.
 4. Batch plants for Portland cement concrete and hot mix asphalt.
 5. Crushing plants for rock and aggregate.
 6. Other facilities installed for construction-related reasons such as haul roads.
 7. Borrow and disposal sites:
 - a. Stormwater pollution due to erosion shall be prevented at an operated borrow or disposal site, during and after completion of construction activities.
 - b. Upon completion of work, the site shall be left in a condition where stormwater will not collect or stand therein.
- N. At least 5 days before operating any construction support facility that is not covered in the SWPPP, submit an amendment to the SWPPP, signed by the Contractor's QSD, showing the location and quantity of water pollution control practices associated with the construction support facility.
- O. Contractor is responsible for designating one or more QSP's to be responsible for the following duties:
1. Maintaining an up-to-date copy of the SWPPP onsite at all times, from commencement of construction to final site stabilization and approval of the Notice of Termination (NOT).
 2. Making a copy of the up-to-date SWPPP available for inspection by outside authorized regulatory authorities upon request.
 3. Maintaining records detailing the dates on which major construction activities began and were completed.
 4. Keeping track of any data or attachments uploaded onto SMARTS.
 5. Keeping track of any Data Submitters who are linked to or removed from this Project through SMARTS.
 6. Documenting any new contractor/subcontractor who will implement a measure of the C-SWPPP.
 7. Ensuring that new contractors and subcontractors are made aware of their responsibilities in the SWPPP.
 8. Keeping track of required training/certifications for key personnel.
 9. Ensuring training is conducted for site personnel such as:
 - a. Project managers.
 - b. Supervisory personnel.
 - c. Employees involved in stormwater pollution control work, including subcontractor personnel.
 10. Ensuring that employees receive their initial stormwater pollution control training before working at the job site.
 11. Ensuring that employees involved in stormwater pollution control work, including subcontractor personnel, are trained in the following subjects:
 - a. Stormwater pollution control rules and regulations
 - b. Implementation and maintenance for:
 - 1) Temporary Soil Stabilization.
 - 2) Temporary Sediment Control.
 - 3) Tracking Control.
 - 4) Wind Erosion Control.
 - 5) Material pollution prevention and control.
 - 6) Waste management.

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 6

Fontana City Hall – Phase II

- 7) Non-storm water management.
12. Ensuring that weekly training meetings covering:
- Deficiencies and corrective actions for stormwater pollution control practices.
 - Stormwater pollution control practices required for work activities during the week.
 - Spill prevention and control.
 - Material delivery, storage, usage, and disposal.
 - Waste management.
 - Non-storm water management procedures.
13. Ensuring that personnel who collect water quality samples are trained in the following subjects:
- Sampling and analysis plan (SAP) review.
 - Health and safety review.
 - Sampling simulations.
14. Documenting all training sessions conducted. This involves increasing awareness of the need to comply with the SWPPP, which includes, but is not limited to: minimizing sediment in stormwater discharges offsite; keeping a clean site; and minimizing the potential for construction materials and wastes from entering stormwater discharges.
15. Conducting an assessment of materials and equipment onsite with the potential to contaminate stormwater runoff.
16. Updating the inventory of potential pollutants as new potential contaminants arrive onsite.
17. Documenting all monitoring/sampling and analysis.
18. Acting as the site spill coordinator to document spills, direct clean-up activities, minimize impact to stormwater, and ensure that the proper reporting, if necessary, is completed.
19. Documenting all incidences of non-compliance with the CGP. Incidences of non-compliance shall trigger a review of the SWPPP to determine when another amendment is necessary.
20. Overseeing and enforcing hazardous waste management practices as directed in the SWPPP, including spill prevention and control measures, and in accordance with applicable local, state, and federal regulations such as proper hazardous waste handling and emergency procedures under 40 CFR § 262.34(d)(5)(iii) and under 22 CA Code of Regulations Division 4.5:
- Preparation and submittal of appropriate documentation for transportation and disposal.
 - Following appropriate procedures when unanticipated hazardous substances as defined in Health & Safety Code § 25316 and § 25317 are discovered onsite.
 - Marking labels when needed with the following information in compliance with 22 CCR § 66262.31 and § 66262.32:
 - 1) Date the hazardous waste is generated.
 - 2) The words "Hazardous Waste."
 - 3) Composition and physical state of the hazardous waste (for example, asphalt grindings with thermoplastic or paint).
 - 4) The word "Toxic."
 - 5) Name, address, and telephone number of the Owner Representative.
 - 6) Contract number.
 - 7) Contractor or subcontractor name.
 - 8) Disposal of hazardous waste within California at a disposal site operating under a permit issued by Department of Toxic Substance Control (DTSC).

21. Ensuring that field engineering activities are planned and conducted in accordance with the SWPPP.
22. Preparation and implementation of REAP's.
23. Ensuring that inspection requirements identified in the SWPPP are performed:
 - a. Inspections and reports for visual monitoring:
 - 1) before a likely precipitation event;
 - 2) after precipitation that produces site runoff;
 - 3) at 24-hour intervals during extended precipitation; and
 - 4) on a pre-determined schedule of at least once a week.
 - b. Daily inspections and oversight of:
 - 1) Storage areas for hazardous materials and waste, including all temporary containment facilities and satellite collection locations;
 - 2) Hazardous waste disposal and transporting activities; and
 - 3) Hazardous material delivery and storage activities.
 - c. Overseeing inspections with regard to the following specific construction activities:
 - 1) Vehicle and equipment cleaning facilities:
 - a) Daily when vehicle and equipment cleaning occurs daily
 - b) Weekly when vehicle and equipment cleaning does not occur daily
 - 2) Vehicle and equipment maintenance and fueling areas:
 - a) Daily when vehicle and equipment maintenance and fueling occurs daily.
 - b) Weekly when vehicle and equipment maintenance and fueling does not occur daily
 - 3) Vehicles and equipment storage areas:
 - a) At the job site, check for leaks on a daily basis.
 - b) Operators shall inspect vehicles and equipment each day of use.
 - 4) Demolition sites within 50 feet of storm drain systems and receiving waters daily.
 - 5) Pile driving areas for leaks and spills:
 - a) Daily when pile driving occurs daily.
 - b) Weekly when pile driving does not occur daily.
 - 6) Temporary concrete washouts:
 - a) Daily when concrete work occurs daily.
 - b) Weekly when concrete work does not occur daily.
 - 7) Paved roads at construction access points for street sweeping:
 - a) Daily when earthwork and other sediment or debris generating activities occur daily.

- b) Weekly when earthwork and other sediment or debris generating activities do not occur daily.
 - c) Whenever the National Weather Service is predicting precipitation.
- 8) Temporary active treatment system:
 - a) Daily when dewatering work occurs daily.
 - b) Weekly when dewatering work does not occur daily.
- d. Quarterly non-stormwater inspections: noting the conditions of those areas onsite that have the potential to result in pollution of stormwater.
- 24. Consulting with the QSD regarding inspection results (BMP deficiencies or potential failures) to determine when corrective action (an amendment to the SWPPP) is necessary.
- 25. Implementing and overseeing necessary corrective actions to the erosion/sediment control devices and other BMP's under the oversight of the QSD.
- 26. Documenting all inspections and any corrective actions.
- 27. Directing ongoing regular BMP maintenance activities (e.g. silt fence repair, hay bale replacement, sediment removal in retention basin, timely waste disposal, etc). Routine maintenance or the implementation of additional BMP's as recommended in the SWPPP does not constitute a corrective action.
- 28. Ensuring that materials and manpower are made available for the successful maintenance of all erosion and sediment control and other BMP's specified in the SWPPP.
- 29. Mobilizing crews to:
 - a. Repair, replace, and/or implement additional BMP's due to deficiencies, failures or other shortcomings identified during inspections, to be completed within 72 hours of identification.
 - b. Repair existing BMP's and/or implement additional BMP's immediately in the event of an NAL exceedance.
 - c. Repair or replace stormwater pollution control practices at Contractor's expense when they are disturbed or displaced by Contractor or Subcontractor vehicles, equipment, or activities.
 - d. Remove and dispose of stormwater pollution control practices when the Owner determines they are no longer required.
 - e. Restore areas disturbed by the installation and removal of stormwater pollution control practices. Backfill holes and depressions when removing stormwater pollution control practices.
- 30. Documenting all maintenance.
- 31. Marking up the Water Pollution Control Drawings (WPCD's) with actual site conditions, including any sampling locations, and posting them in the construction trailer. (The SWPPP should contain specific WPCD's for each phase of construction of an appropriate size for use in the construction trailer.):
 - a. When a marked up WPCD is too full to be easily read, the QSP shall date and fold it, put it in the SWPPP for documentation, and start a new one.
 - b. Another way of documenting the changing site conditions is to laminate the map, take a picture of it after any changes are made, then date the photo and put it in the SWPPP for documentation.
- 32. Maintaining records detailing the dates on which post-construction BMPs were completed.
- 33. Preparing an NOT submittal upon final stabilization of the site. A copy of the NOT shall be printed and included in Appendix A upon submission through SMARTS.

- P. Whenever there is the potential of a pollutant discharge, the QSP may order laboratory analysis of stormwater or non-stormwater samples.
- Q. The Owner will not pay for the preparation, collection, laboratory analysis, and reporting of stormwater samples for non-visible pollutants when: water pollution control practices are not implemented before precipitation, or a failure of a water pollution control practice is not corrected before precipitation.
- R. Contractor is responsible for implementing appropriate construction site management and erosion and sediment control BMP's as described in this section. The "Construction Site Management" portion of this section describes the minimum BMP requirements from the CGP.
- S. The Owner will not pay for implementation of stormwater pollution control practices in areas outside the project limits such as borrow sites and construction support facilities.
- T. Contractor is responsible for implementation of appropriate post-construction BMP's as required to minimize and/or mitigate for post-construction stormwater runoff impacts in accordance with approved civil design plans.
- U. Each failure to comply with the project SWPPP and each failure to implement stormwater pollution control practices are considered separate performance failures.

3.3 SWPPP CONSTRUCTION SITE MONITORING PROGRAM (CSMP)

- A. The Project shall revise the CSMP from the SWPPP to reflect current construction activities as needed.
- B. The following steps shall occur in order for the CSMP to be properly implemented.
 - 1. Obtain, install, and maintain a rain gauge at the job site. Observe and record daily precipitation.
 - 2. Install facilities and devices used for stormwater pollution control within 15 days or before predicted precipitation, as detailed in the SWPPP.
 - 3. Complete REAP activities including crew mobilization no later than 24 hours before precipitation occurs.
 - 4. Monitor the National Weather Service forecast on a daily basis. For the National Weather Service forecast, go to: <http://www.srh.noaa.gov/> forecast.
- C. The CSMP shall include the following items for each risk level as follows:
 - 1. Visual monitoring procedures.
 - 2. Sampling and analysis for non-visible pollutants.
 - 3. Visual monitoring procedures.
 - 4. Sampling and analysis for non-visible pollutants.
 - 5. Sampling and analysis for sediment and turbidity.
 - 6. Sampling and analysis for pH.
 - 7. Visual monitoring procedures.
 - 8. Sampling and analysis for non-visible pollutants.
 - 9. Sampling and analysis for sediment and turbidity.
 - 10. Sampling and analysis for pH.
 - 11. Sampling and analysis for receiving water sampling.
 - 12. Sampling and analysis for temporary active treatment systems.
- D. The CSMP shall include all visual monitoring (inspection) requirements:

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 10

Fontana City Hall – Phase II

1. The QSP shall oversee inspections for stormwater pollution control practices identified in the SWPPP:
 - a. Before a forecasted storm.
 - b. After precipitation that causes site runoff.
 - c. At 24-hour intervals during extended precipitation.
 - d. On a predetermined schedule of at least of once a week.
2. The QSP shall ensure that a site inspection report is completed within 24 hours of completing a site inspection. The report shall include:
 - a. Inspection date and date the inspection report was written.
 - b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.
 - c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.
 - d. A description of any BMP's evaluated and any deficiencies noted.
 - e. If the construction site is safely accessible during inclement weather, list the observations of all BMP's: erosion controls, sediment controls, chemical and waste controls, and non-stormwater controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.
 - f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.
 - g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.
 - h. Photographs taken during the inspection, if any.
 - i. Inspector's name, title, and signature.
3. The QSP shall ensure that documentation is completed for:
 - a. Qualified rain events. The QSP shall oversee the performance of visual monitoring for qualified rain events. Visual inspections shall be performed during normal working hours. For each qualified rain event:
 - 1) Record the date, time, and rain gauge reading
 - 2) Report on observations:
 - a) Within 2 days before the storm for: spills, leaks, or uncontrolled pollutants in drainage areas; proper implementation of water pollution control practices; and leaks and adequate freeboard in storage areas.
 - b) Every 24 hours during the storm for: effective operation of water pollution control practices; and water pollution control practices needing maintenance and repair.
 - c) Within 2 days after the storm event for: stormwater discharge locations; and evaluation of design, implementation, effectiveness, and locations of water pollution control practices including locations where additional water pollution control practices may be needed.
 - b. Non-stormwater discharges. Perform visual monitoring of non-stormwater discharges at least once during each of the following periods:
 - 1) January through March.
 - 2) April through June.

- 3) July through September.
 - 4) October through December.
 - c. Documentation for non–stormwater discharge monitoring shall include:
 - 1) Name of personnel performing the inspection, inspection date, and date the inspection report is completed.
 - 2) Storm and weather conditions.
 - 3) Location of any:
 - a) Floating and suspended material, oil sheen on the surface of stormwater, discoloration, turbidity, odor, and source of observed pollutants for flowing and contained storm water systems.
 - b) Non–stormwater discharges and their sources.
 - d. Corrective actions taken.
 - e. Maintain monitoring (inspection) reports at the job site as part of the SWPPP.
- E. Whenever a deficiency is identified during a visual inspection:
- 1. Correct the deficiency immediately.
 - 2. Correct the deficiency before precipitation occurs.
 - 3. The Owner may correct the deficiency and deduct the cost of correcting the deficiency from payment when the Contractor fails to correct the deficiency by the agreed date or before the onset of precipitation.
 - 4. Continue SWPPP implementation during any suspension of work activities.
- F. The CSMP shall include an SAP.
- 1. The SAP shall include specifications for:
 - a. Collecting samples.
 - b. preparing, testing and analyzing samples.
 - c. Reporting on test results.
 - 2. For a qualified rain event that produces runoff, sampling and analysis work shall comply with the project's SAP.
 - 3. Submit a copy of water quality analytical results within 60 days of laboratory analysis to the Owner. Electronic copies shall be in one of the following formats: xls, .txt, or .cvs, for uploading onto SMARTS. Also submit an evaluation of whether the downstream samples show levels of the tested parameter that are higher than the control sample. Include the following information:
 - a. Sample identification number.
 - b. Contract number.
 - c. Constituent.
 - d. Reported value.
 - e. Analytical method.
 - f. Method detection limit.
 - g. Reported limit.
 - h. When an effluent sample exceeds a numeric action level (NAL), notify the Owner and submit an NAL exceedance report no later than five (5) days after the conclusion of the storm event through SMARTS. The report shall include the following field sampling results and inspections:
 - i. Analytical methods, reporting units, and detection limits.

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 12

Fontana City Hall – Phase II

- j. Date, location, time of sampling, visual observations, and measurements
 - k. Quantity of precipitation of the storm event.
 - l. Description of BMP's and corrective actions taken to manage NAL exceedance.
4. When a numeric effluent limit (NEL) is exceeded, notify the Owner and submit an NEL violation report no later than five (5) days after the conclusion of the storm event through SMARTS. The report shall include the following field sampling results and inspections:
- a. Analytical methods, reporting units, and detection limits.
 - b. Date, location, time of sampling, visual observation and measurements.
 - c. Quantity of precipitation of the storm event.
 - d. Description of BMP's and corrective actions taken to manage NEL exceedance.
- G. The sampling and analysis portion of the CSMP shall be prepared as described below:
- 1. Assign trained personnel to collect water quality samples. Document the personnel and training in the SAP.
 - 2. Describe the following water quality sampling procedures in the SAP:
 - a. Sampling equipment - Samples taken by assigned field personnel shall comply with the equipment manufacturer's recommendation for collection, analytical methods, and equipment calibration.
 - b. Sample preparation - Samples taken for laboratory analysis shall follow water quality sampling procedures and be analyzed by a State-certified laboratory under 40 CFR Part 136 "Guidelines Establishing Test Procedures for the Analysis of Pollutants."
 - c. Collection.
 - d. Field measurement methods.
 - e. Analytical methods.
 - f. Quality assurance and quality control.
 - g. Sample preservation and labeling.
 - h. Collection documentation - Document all sample collections.
 - i. Sample shipping.
 - j. Chain of custody.
 - k. Data management and reporting - Retain water quality sampling documentation and analytical results with the SWPPP at the job site.
 - l. Precautions from the construction site health and safety plan.
 - m. Laboratory selection and certifications - The SAP shall identify the State-certified laboratory, sample containers, preservation requirements, holding times, and analytical method. For a list of State certified laboratories, go to: <http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx>.
 - 3. Amend the SAP when discharges or sampling locations change because of changed work activities or knowledge of site conditions.
 - 4. The SAP shall describe the sampling and analysis strategy for monitoring non-visible pollutants.
 - 5. The SAP shall identify potential non-visible pollutants present at the job site associated with any of the following:
 - a. Construction materials and wastes.
 - b. Existing contamination due to historical site usage.
 - c. Application of soil amendments, including soil stabilization materials, with the potential to change pH or contribute toxic pollutants to storm water.
 - 6. The SAP shall include sample collection procedures for the conditions described below, if applicable:

- a. For collecting samples from non-visible pollutant sources.
 - b. For collecting uncontaminated control samples.
 - c. For collecting samples during precipitation:
 - 1) For turbidity, pH, and other constituents as required.
 - 2) For all locations where stormwater is discharged offsite. Describe the collection of effluent samples at all locations where the stormwater is discharged offsite.
 - 3) At least three samples for each day of each qualifying rain event.
 - 4) Obtain run-on samples and receiving water samples downstream from the project site.
7. The SAP shall include a schedule for sample collection:
- a. During the first two hours of each qualified rain event that produces runoff.
 - b. During normal working hours.
 - c. Not during dangerous weather conditions such as flooding or electrical storms.
8. The SAP shall include sampling procedures for collecting at least one sample for each qualified storm event when the following conditions are observed during a stormwater visual inspection:
- a. Materials or wastes containing potential non-visible pollutants not stored under watertight conditions.
 - b. Materials or wastes containing potential non-visible pollutants stored under watertight conditions, but a breach, leak, malfunction, or spill occurred that was not cleaned up before the precipitation.
 - c. Chemical applications occurring within 24 hours preceding precipitation or during precipitation that could discharge pollutants to surface waters or drainage systems, including fertilizer, pesticide, herbicide, methyl methacrylate concrete sealant, or non-pigmented curing compound.
 - d. Applied soil amendments, including soil stabilization materials that could change pH levels or contribute toxic pollutants to stormwater runoff and discharge pollutants to surface waters or drainage systems, unless available independent test data is available to indicate acceptable concentrations of non-visible pollutants in the soil amendment.
 - e. Stormwater runoff from an area contaminated by historical usage of the site that could discharge pollutants to surface waters or drainage systems.
9. The SAP shall identify locations for sampling downstream and control samples, and the reasons for selecting those locations. Select control sample locations where the sample does not come in contact with materials, wastes, or areas associated with potential non-visible pollutants or disturbed soil areas.
10. For multiple discharge points, describe procedures for obtaining samples from a single upstream and a single downstream location.
11. The CSMP shall address the assessment of stormwater pollution control practices, site conditions, and surrounding influences to determine the probable cause for an increase in levels of turbidity, pH, and other constituents.
12. The Owner will not adjust payment for an increase or decrease in the quantity of stormwater sampling and analysis required during the course of the project.
13. The SAP shall describe procedures for obtaining samples and analyzing turbidity as shown in the following table:

Parameter	Test method	Detection limit (min)	Unit
Turbidity	Field test with calibrated portable instrument	1	NTU ^a

^a Nephelometric turbidity units (NTU)

14. The SAP shall describe procedures for obtaining samples and analyzing suspended sediment concentration when the turbidity NEL is exceeded as shown in the following table:

Parameter	Test method	Detection limit (min)	Unit
Suspended sediment concentration	ASTM D 3977	5	mg/L

15. The SAP shall describe procedures for obtaining samples and analyzing pH as shown in the following table:

Parameter	Test method	Detection limit (min)	Unit
pH	Field test with calibrated portable instrument	0.2	pH units

16. The SAP shall describe procedures for obtaining samples from representative and accessible locations upstream of the discharge point and downstream of the discharge point.

- H. The project is subject to NALs as shown in the following table:

Numeric Action Levels

Parameter	Test method	Detection limit (min)	Unit	Numeric action level (NAL)
pH	Field test with calibrated portable instrument	0.2	pH	Lower NAL = 6.5 Upper NAL = 8.5
Turbidity	Field test with calibrated portable instrument	1	NTU ^a	250 NTU

^a Nephelometric turbidity units (NTU)

- I. The project is subject to NEL's as shown in the following table:

Numeric Effluent Limits

Parameter	Test method	Detection limit (min)	Unit	Numeric effluent limit (NEL)
pH	Field test with calibrated portable instrument	0.2	pH	Lower NEL = 6.0 Upper NEL = 9.0
Turbidity	Field test with calibrated portable instrument	1	NTU^a	500 NTU

^a Nephelometric turbidity units (NTU)

1. The storm event daily average for storms up to the 5-year, 24-hour storm shall not exceed the NEL for turbidity.
2. The daily average sampling results shall not exceed the NEL for pH.

3.4 SWPPP RAIN EVENT ACTION PLANS (REAP'S)

- A. A QSP or QSD shall prepare a REAP designed to protect all exposed portions of the job site within 48 hours prior to any likely precipitation event. A likely precipitation event is defined as when the National Weather Service predicts a 50 percent or greater probability of precipitation within 72 hours in the vicinity of the job site.
- B. The REAP shall include:
 1. Site location.
 2. Risk level.
 3. Contact information including 24-hour emergency phone numbers for:
 - a. QSP.
 - b. Erosion and sediment control providers or subcontractors.
 - c. Stormwater sampling providers or subcontractors.
 4. Storm Information.
 5. Description of:
 - a. Construction, including active and inactive areas.
 - b. Plant Establishment, including maintenance on vegetation installed for final stabilization in inactive areas.
 - c. Areas where work activities have been suspended.
 - d. Active work areas and activities.
 - e. Subcontractors and trades on the job site.
 6. Pre-storm activities including:
 - a. Responsibilities of the QSP.
 - b. Responsibilities of the crew and crew size.
 - c. Stabilization for active and inactive disturbed soil areas
 - d. Stockpile management.

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 16

Fontana City Hall – Phase II

- e. Corrective actions taken for deficiencies identified during pre-storm visual inspection.
- 7. Activities to be performed during storm events including:
 - a. Responsibilities of the QSP.
 - b. Responsibilities of the crew and crew size.
 - c. BMP's for maintenance and repair.
- 8. Flood contingency measures.
- C. The QSP shall submit a REAP to the Owner at least 48 hours before a predicted rain event.
- D. The Contractor shall have the REAP onsite at least 24 hours before a predicted rain event.
- E. The QSP shall ensure that crews are being mobilized to implement REAP's no later than 24 hours before precipitation occurs.
- F. A printed copy of each REAP shall be kept at the job site as part of the SWPPP.
- G. The Owner will not adjust payment for an increase or decrease in the quantity of REAP's prepared.

3.5 SWPPP STORMWATER ANNUAL REPORT

- A. The QSP shall prepare the annual report for the reporting period from July 1st to June 30th.
- B. The following information shall be included in the report:
 - 1. Project information such as description and work locations
 - 2. Stormwater monitoring information including:
 - a. Summary and evaluation of sampling and analysis results and laboratory reports.
 - b. Analytical methods, reporting units, and detections limits for analytical parameters.
 - c. Summary of corrective actions.
 - d. Identification of corrective actions or compliance activities not implemented.
 - e. Summary of violations.
 - f. Names of individuals performing storm water inspections and sampling.
 - g. Logistical information for inspections and sampling including location, date, time, and precipitation.
 - h. Visual observation and sample collection records.
 - 3. Documentation of all training for:
 - a. Individuals responsible for NPDES permit compliance.
 - b. Individuals responsible for BMP installation, inspection, maintenance, and repair.
 - c. Individuals responsible for preparing, revising, and amending the SWPPP.
- C. Upload the Annual Report onto SMARTS no later than July 15th if construction occurs from July 1st through June 30th or within 15 days after Contract acceptance if construction ends before June 30th. Notify the LRP or AS that the report has been uploaded.
- D. The Owner does not adjust payment for an increase or decrease in the quantity of Annual Reports submitted.

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 17

Fontana City Hall – Phase II

- E. For each failure to submit a completed Annual Report by the September 1st submittal deadline, the Contractor will be required to compensate the Owner for any additional fees paid to the SWRCB due to the delay.

3.6 CONSTRUCTION SITE MANAGEMENT

- A. Implement effective erosion and sediment control practices as well as effective handling, storage, usage, and disposal practices thereby controlling potential pollutants on the job site before they come in contact with storm drain systems and receiving waters in accordance with Attachment C, D, or E of the CGP as required by the Project Risk Level.
- B. Guidance for the implementation of BMP's required to control pollution from erosive activities at the job site is located in Section 3 of the CASQA Construction Handbook (Erosion and Sediment Control BMP's).
- C. Guidance for the implementation of BMP's required to control material pollution and manage waste and non-stormwater discharges at the job site is located in Section 4 of the CASQA Construction Handbook (Non-Stormwater Management and Material Management BMP's).
- D. The following Construction Site Management is required for construction materials and potential pollutants:
 - 1. The QSP shall keep an inventory of the materials and equipment onsite that are not designed to be outdoors and exposed to environmental conditions (potential pollutant sources). This potential pollutant list shall be kept with the SWPPP and shall identify all non-visible pollutants that are known, or expected, to occur on the construction site.
 - 2. The QSP shall conduct an assessment from the inventory of potential pollutant sources and identify any areas of the site where additional BMP's are necessary to reduce or prevent pollutants in stormwater discharges and authorized non-stormwater discharges. Stormwater discharges and authorized non-stormwater discharges regulated by the CGP shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges. At a minimum, the QSP shall consider the following:
 - a. The quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.
 - b. The degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.
 - c. The direct and indirect pathways that pollutants may be exposed to stormwater or authorized non-stormwater discharges, including an assessment of past spills or leaks, non-stormwater discharges, and discharges from adjoining areas.
 - d. Sampling results, visual observations, and inspection records.
 - e. The effectiveness of existing BMP's in reducing or preventing pollutants in stormwater discharges and authorized non-storm water discharges.
 - f. Nothing in the CGP or the SWPPP relieves the Contractor from any responsibilities, liabilities, or penalties to which the Contractor is or may be subject to under Section 311 of the Clean Water Act.
 - 3. The QSP shall ensure that the appropriate MSDS forms are available onsite at least five days before hazardous substances are used or stored onsite.
- E. The following Good Site Management Housekeeping is required for construction materials:

1. Minimize exposure of potential pollutant sources to precipitation.
2. Cover and berm (contain) stockpiled construction materials that are not actively being used, materials that are adversely affected by wind and rain such as fertilizer, mulches, topsoil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.
3. Stack erodible landscape material on pallets and cover or store such materials when not being used or applied.
4. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).
5. Implement BMP's to prevent the offsite tracking of loose construction and landscape materials.
6. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.
7. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

F. The following Good Site Management Housekeeping is required for waste management:

1. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.
2. Ensure the containment of portable toilets to prevent discharges of pollutants to the storm drain system or receiving water.
3. Clean portable toilets on a regular basis inspecting them for leaks and spills. When a problem is identified, corrective action shall be taken in a timely manner (within 72 hours or prior to any likely precipitation event, whichever is more immediate).
4. Cover waste disposal containers at the end of every business day and during rain events.
5. Prevent discharges from waste disposal containers to the storm drain system or receiving water.
6. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.
7. Implement procedures that effectively address hazardous and non-hazardous spills.
8. Develop a spill response and implementation plan as part of the SWPPP prior to commencement of construction activities.
9. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

G. The following Good Site Management Housekeeping is required for vehicle storage and maintenance:

1. Prevent any of the following substances from discharging to the storm drains or surface waters (not meant to be an all-inclusive list):
 - a. Transfer case oil.
 - b. Antifreeze.
 - c. Brake fluid.
 - d. Power steering fluid.
 - e. Transmission fluid.
 - f. Hydraulic fluid.
 - g. Grease.
 - h. Fuel.
 - i. Oil.
2. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMP's.
3. Clean leaks immediately and disposing of leaked materials properly.

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 19

Fontana City Hall – Phase II

- H. The following Good Site Management Housekeeping is required to control air deposition of site materials and from site operations (dust control):
1. Effective wind erosion control BMP's shall be implemented year round to prevent or alleviate dust, which may contain, but are not limited to, such particulates as sediment, nutrients, trash, metals, bacteria, oil and grease, and organics.
 2. Excavation, transportation, and handling of material containing hazardous waste or contamination shall result in no visible dust migration
- I. Document all Good Site Management Housekeeping BMP's in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project (Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects).
- J. The following Good Site Management Housekeeping is required for non-stormwater management:
1. Effective BMP's shall be implemented to control all non-stormwater discharges during construction.
 2. Vehicles shall be washed in such a manner as to prevent non-stormwater discharges to surface waters or MS4 drainage systems.
 3. Streets shall be cleaned in such a manner as to prevent unauthorized non-stormwater discharges from reaching surface water or MS4 drainage systems.
 4. Dewatering shall be conducted in such a manner as to prevent sediment-laden or contaminated discharge from leaving the site:
 - a. The discharge of water from utility vaults and underground structures and surface waters is covered under the California Statewide permit, Order No. 2006-008-DWQ. Dischargers shall comply with BMPs that ensure the water discharged is not contaminated and will not create an adverse water quality impact when discharged.
 - b. Dewatering BMP's shall be incorporated into the SWPPP by the QSP. The dewatering of construction excavations is subject to San Diego Regional Water Quality Control Board regulations depending on where the accumulated construction water is discharged:
 - 1) Discharge to the sanitary sewer: Discharge of accumulated water to the sanitary sewer is not allowed without the permission of the Department of Public Works. Permission may be obtained by submitting a request to the appropriate Municipalities Public Works Department.
 - 2) Land application of construction site discharges: Land application will comply with Conditional Waiver #2 to the amendments to the Basin Plan Waste Discharge Requirements, as amended in San Diego RWQCB Resolution NO. R9-2007-0104. Contractor shall comply with the Construction site dewatering BMP's specified in Conditional Waiver #2 and will submit a Notice of Intent if requested by the RWQCB.
 - 3) Discharge to storm drain or surface waters: When the volume of accumulated groundwater is significant or when the drainage conditions do not allow land application, Contractor shall prepare an NOI to seek permit coverage under San Diego RWQCB Order No. R9-2008-0002, Discharges from Groundwater Extraction and Similar Discharges to Surface Waters and Storm Drains or Order No. R9-2007-0034, Discharges from Groundwater Extraction and Similar Discharges to San Diego Bay. A separate permit is required for Discharges of Hydrostatic Test Water and Potable Water to Surface Waters and Storm Drains, Order No. R9-2002-0020.

- c. When the Contractor chooses to discharge slurries and drilling mud to land, the Contractor may be required to file an NOI with the RWQCB. Therefore the Contractor shall comply with Conditional Waiver #9, Discharges of Slurries to Land per the amendments to the Basin Plan Waste Discharge Requirements, Resolution No. R9-2007-0104. Choose how and where to discharge slurries and drilling mud.
 - d. Copy of the written approval to discharge into a sanitary sewer system at least five days before starting discharge activities, if applicable. This information shall be on site when discharging to a municipal sanitary sewer system.
 - e. Copy of the written approval from the local health agency, city, county, and sewer district before discharging from a sanitary or septic system directly into a sanitary sewer system, if applicable. This information shall be on site when discharging to a municipal sanitary sewer system.
- 5. Authorized non-stormwater discharges regulated by the CGP shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges:
 - a. Immediately stop working and notify the Owner if any of the following is discovered onsite:
 - 1) Contractor reasonably believes that the substance discovered is asbestos as defined in Labor Code § 6501.7 or a hazardous substance as defined in Health & Safety Code § 25316 and § 25317.
 - 2) An unidentifiable substance not described in the Contract or the SWPPP is discovered.
 - 3) An identifiable substance that has not been made harmless is discovered.
 - b. Handle, store, and dispose of hazardous waste under 22 CA Code of Regulations Division 4.5.
 - c. Dispose of hazardous waste within 90 days of the start of generation. Use a hazardous waste manifest and a transporter registered with the California DTSC to transport hazardous waste to an appropriately permitted Class I Disposal Site.
- K. The following Good Site Management Housekeeping is required for erosion control:
 - 1. Provide effective soil cover for inactive areas and all finished slopes, open space, utility backfill, and completed lots:
 - a. Provide temporary irrigation equipment for vegetation.
 - 2. Limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, consider the use of plastic materials resistant to solar degradation.
- L. The following Good Site Management Housekeeping is required for sediment control:
 - 1. Establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site for all projects regardless of the risk level.
 - 2. On sites where sediment basins are to be used, design at minimum, sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.
- M. Implement appropriate erosion control BMP's (runoff control and soil stabilization) in conjunction with sediment control BMP's for areas under active construction, including but not limited to:

1. Linear sediment controls along toe to slopes face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths.

Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

2. Limiting construction activity traffic to and from the project to entrances and exits that employ effective controls to prevent offsite tracking of sediment.
 3. Storm drain protection for all inlets with the potential to receive runoff from areas impacted by construction activities.
 4. Perimeter protection.
 5. Daily inspections of all immediate access roads with removal of any sediment or other deposited materials prior to any rain event by vacuuming or sweeping.
- N. The RWQCB may require implementation of additional site specific sediment control requirements when the installed sediment control BMP's are not adequate to protect receiving waters.
- O. The following Good Site Management Housekeeping is required for run-on and runoff control:
1. All projects shall effectively manage all run-on, all runoff within the site, and all runoff that discharges off the site.
 2. Run-on from offsite shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in the CGP.

3.7 SWPPP NOTICE OF TERMINATION (NOT)

- A. Within 90 days of the final completion date of the Project, the QSP shall electronically file a Notice of Termination (NOT) through SMARTS and upload a final site map and photos.
- B. When a complete NOT package has not been uploaded through SMARTS within the allotted amount of time, the Contractor will be required to compensate the Owner for any additional fees paid to the SWRCB due to the delay.
- C. When the Contractor has failed to achieve final stabilization in accordance with Section II.D of the CGP within 90 days of the final completion date of the Project, the Contractor will be required to compensate the Owner for any additional fees paid to the SWRCB due to the delay.

3.8 TEMPORARY BMP INSTALLATION, OPERATION, AND MAINTENANCE

- A. The SWPPP shall describe and include the specific use of each type of water pollution control BMP as required for adherence to water quality objectives.
- B. When a temporary construction entrance or roadway is being used, do not allow soil, sediment, or other debris that is tracked onto the pavement to enter storm drains, open drainage facilities, and watercourses.
- C. When material is tracked onto the pavement, remove it within 24 hours unless the Owner authorizes a longer period.

TEMPORARY STORM WATER POLLUTION CONTROL

01 57 23 - 22

Fontana City Hall – Phase II

- D. Retain records of street sweeping activities including sweeping times, sweeping locations, and the quantity of disposed sweeping waste as part of the SWPPP.
- E. Before installing erosion control measures remove and dispose of trash, debris and weeds in areas to receive erosion control materials.
- F. Protect any hardscape, lined drainage channels, and existing vegetation from hydraulically applied material overspray.
- G. Proper selection of materials is critical for specific slopes and slope distances. No one product is applicable for all situations. Erosion control products should be selected on a case by case basis.
- H. Do not drive vehicles upon erosion control products following placement.
- I. Install temporary fencing for the protection of ESA's and the preservation of existing vegetation:
 - 1. If wood posts are used, fasteners shall be staples or nails.
 - 2. If steel posts are used, fasteners shall be tie wires or locking plastic fasteners.
 - 3. Spacing of the fasteners shall be no more than 8 inches apart.
 - 4. Before clearing and grubbing activities.
 - 5. From outside of the protected area.
 - 6. With posts spaced 8 feet apart and embedded at least 16 inches in the soil.
 - 7. Signs shall be attached with the top of the sign panel flush with the top of the high visibility fabric and placed 100 feet apart along the length and at each end of the fence.
 - 8. Install fence to enclose the drip line of foliage canopy of protected plants and protect visible roots from encroachment.
- J. Provide a certificate of compliance (certified weed free from the vendor) for temporary straw bales when used as visibility or noise barriers in ESA's.
- K. Place gravel-filled bags behind Type K temporary railings if used in an area with run-on.

3.9 POST-CONSTRUCTION BMP'S

- A. Install post-construction BMP's as required by the Contract Documents and described in the SWPPP to minimize or mitigate for post-construction activities that may be potential sources of stormwater pollution.
- B. Provide maintenance for any post-construction BMP's that have been adversely affected by construction activities:
 - 1. Maintain post-construction BMPs for of 180 days.
 - 2. Maintenance activities will vary depending upon the BMPs in place and the construction activities.
 - 3. The Owner will not pay for maintenance of post-construction BMP's unless arrangements are made prior to project initiation.
 - 4. Manufacturer's specifications, civil drawings, and maintenance and operation manuals/plans for each post-construction BMP shall be included in the Record Documents submittal to the Owner.
- C. The Contractor is responsible for ensuring that all post-construction BMP's are in proper working order with no maintenance required prior to the next rain event.

3.10 MAINTENANCE PRIOR TO FINAL ACCEPTANCE

- A. Maintain planted areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include the filling, leveling, and repairing of any washed or eroded areas, as may be necessary and sufficient watering to maintain the plant materials in a healthy condition.
- B. The Owner may require replanting of any areas in which the establishment of the vegetative ground cover does not appear to be developing satisfactorily.

END OF SECTION 01 57 23

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 RELATED REQUIREMENTS

- A. Section 01 25 00 "Substitution Procedures" for requests for substitutions.
- B. Section 01 42 00 "References" for applicable industry standards for products specified.

1.4 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 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. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," 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 additional manufacturers named in the specification.

1.5 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures."
 - b. Use product specified as Basis of Design Product if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.6 QUALITY ASSURANCE

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

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at 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 determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:

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

1.8 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. All subcontractors to obtain copies of 01 8113 Sustainable Design Requirements, 01 7419 Construction Waste Management and Disposal and 01 5721 Indoor Air Quality Management.
- B. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, 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. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner 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," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

C. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

D. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 "Substitution Procedures" for proposal of product.

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

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 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 architects and owners, if requested.
 - 5. Samples, if requested.

2.3 PRODUCT REQUIREMENTS

- A. Salient Physical Attributes: Physical and other characteristics of products which may not be individually noted in the specifications are essential parts of the product specification. Products shall possess all attributes set forth in the manufacturer's catalog description for the specified item, except for such modifications thereto as may be indicated in the Contract Documents. Such attributes include:
 - 1. Size: Dimensions, Form Factor (relative proportions of height, width, depth), Configuration. Ability to fit in space provided, without change to other assemblies or systems, set in place for use without reconfiguration.
 - 2. Capacity: Ability to fulfill specified requirements.
 - 3. Weight: Ability to be supported and braced by structure as shown.
 - 4. Physical arrangement of connections or ports: Intakes, exhausts, utility connections and other such items; their dimensions, form factors and relative proportions. Connect to other systems, ductwork, utilities, controls without changes to other systems.
 - 5. Required Clearances: Vertical, horizontal, to other equipment or construction, other similar attributes.
- B. Proprietary Names, Catalog Numbers and Identification: These attributes may be included for convenience in identifying products. Unless modified by Specifications or notation on Drawings, manufacturer's complete product catalog description for indicated product name or number shall constitute requirements for each product as if fully included in the product specification. Products shall incorporate all features set forth in the manufacturer's catalog description for the standard item, except for such modifications thereto as may be indicated in the Contract Documents.
- C. Proprietary names, catalog numbers, and specific requirements as may be set forth, are given to establish standard of design and quality for materials, construction and workmanship. Use of this information to identify products is not intended to preclude use of alternate products by other manufacturers, except as specified in that given section.

- D. Manufacturer's Requirements: All deviations from design requirements shown or specified, resulting either from Contractor's or supplier's change of model, or manufacturer's recommendation, or from submitted alternates or accepted substitutions, shall be clearly indicated on the Contractor's submittals. Contractor shall provide all such manufacturer or supplier supplemental requirements at no additional cost.

PART 3 - EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 73 00

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching, as required to:
 - a. Make the several parts fit properly.
 - b. Uncover work to provide for installation, inspection, or both of ill-timed work.
 - c. Remove and replace work non-conforming or defective work.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.

1.3 RELATED REQUIREMENTS

- A. Section 01 11 00 "Summary of Work" for limits on use of Project site.
- B. Section 01 33 00 "Submittal Procedures" for submitting surveys.
- C. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- D. Section 07 84 13 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.4 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

EXECUTION

01 73 00 - 1

Fontana City Hall – Phase II

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For land surveyor.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.

EXECUTION

01 73 00 - 2

Fontana City Hall – Phase II

- h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
 - l. Operating systems critical to the function of the facility.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
- a. Water, moisture, or vapor barriers, including roofing.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

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

2.2 FABRICATION

- A. Curved Construction: Where curved construction is shown, provide true curves minimizing joints. Segmented fabrication not allowed.

1. Machine-roll components or elements required to be curved or "radiused".
2. Do not field bend or "walk-down".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 1. Description of the Work.
 2. List of detrimental conditions, including substrates.
 3. List of unacceptable installation tolerances.
 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before

fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 2. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces, unless more stringent requirements are shown on the Drawings or related specifications.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Grind or bush split-faced or textured masonry to achieve hairline fit to adjacent trim, flashings, inserts, escutcheons or other penetrating elements.
- K. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 11 00 "Summary of Work".

- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Discrepancies:
1. If uncovered conditions are not as anticipated, immediately notify the Architect through the Owner's Representative and secure needed directions.
 2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.
- I. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 4. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final

paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

5. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 6. Exterior Building Enclosure: Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces. Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- J. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.

2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal".
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements".

3.10 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

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SECTION 01 74 19
construction and demolition waste management

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction and demolition waste.
 - 2. Recycling nonhazardous construction and demolition waste.
 - 3. Disposing of nonhazardous construction and demolition waste.

1.2 DEFINITIONS

- A. Alternative daily cover: Cover material other than earthen material placed on the surface of the active face of a municipal solid waste landfill at the end of each operating day to control vectors, fires, odors, blowing litter, and scavenging.
- B. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- C. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations
- D. 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.
- E. Extended Producer Responsibility: Closed-loop program, aka product take-back, are measures undertaken by a producer to accept its own and sometimes other manufacturers' products as post-consumer waste at the end of the product's useful life to recover and recycle the materials for use in new products of the same type.
- F. Material Stream: A material flow coming from a jobsite into markets for building materials including a specific material category that is diverted in a specific way or a mixture of several material categories that are diverted in a specific way.
- G. On site Waste Diversion: On site reuse including crushing asphalt, concrete, and masonry for infill or aggregate.
- H. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- I. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- J. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 PERFORMANCE REQUIREMENTS

- A. Develop waste management plan that results in end-of-Project rates for salvage/recycling of at least 50% by weight (minimum allowable) of total waste generated by the Work with a minimum of two separate diverted material streams (1 pt) plus one commingled waste stream. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.
- B. Develop waste management plan that results in end-of-Project rates for salvage/recycling of at least 75% by weight (minimum allowable) of total waste generated by the Work with a minimum of three separate diverted material streams (2 pts) plus one commingled waste stream. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1.4 ACTION SUBMITTALS

- A. Construction and Demolition Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed. Plan should meet the requirements outlined below in Section 1.7.

1.5 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 - 1. Material category.
 - 2. Total quantity of waste in tons.
 - 3. Quantity of waste salvaged, in tons.
 - 4. Quantity of waste recycled, in tons.
 - 5. Quantity of waste diverted on site, in tons.
 - 6. Total quantity of waste diverted (salvaged, recycled, and on site diversion) in tons.
 - 7. Total quantity of waste diverted salvaged, recycled, and on site diversion) as a percentage of total waste.
 - 8. Location and name of facilities, organizations or landfills receiving waste.
 - 9. For commingled materials, provide the annual reporting rate for that facility. To count toward the corresponding credit (MR Credit Construction and Demolition Waste Management), commingled recycling facilities must be able to provide diversion rates either specific to the project, or an average diversion rate for the facility that is regulated by the local or state authority. The average recycling rate for the facility must exclude alternative daily cover (ADC).
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Record of Extended Producer Responsibility Program: Indicate receipt and acceptance of materials from the manufacturer participating in the program.

- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. Qualification Data: For waste management coordinator.

1.6 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements, that employs a LEED-Accredited Professional, certified by the USGBC, as waste management coordinator. Waste management coordinator may also serve as LEED coordinator.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. The Plan must include the following information and directives:
 - 1. Must be customized for each project.
 - 2. Must include an overall project waste diversion goal and identify at least five kinds of materials that will be diverted from landfills or incineration.
 - 3. Must account for all materials, including land-clearing debris, materials to be used for alternative daily cover (ADC), and other materials not contributing to diversion but not included in the diverted waste total.
 - 4. Must include the strategy for the safe removal and disposal of hazardous materials. Hazardous materials must be tracked separately and not be included in the project's total waste.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing, demolition and construction waste generated by the Work. Identify at least two kinds of materials that will be

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

01 74 19 - 3

Fontana City Hall – Phase II

diverted from landfills or incineration. Include estimated quantities and assumptions for estimates. Specify the means and methods of diversion for each of the selected material streams.

- 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. Include on site reuse such as crushing asphalt, concrete, and masonry for infill or aggregate.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Extended Producer Responsibility: Include list of manufacturers that may accept materials as part of a take-back program.
 6. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 7. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. 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.
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.

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

01 74 19 - 4

Fontana City Hall – Phase II

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 4. Store components off the ground and protect from the weather.
 5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE – BEST PRACTICES

- A. Packaging:
 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 2. Polystyrene Packaging: Separate and bag materials.
 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Commingled Waste Recycling:
 1. If utilizing commingled waste strategy, the General Contractor shall select a facility that meets ONE of the following:

- a. Facility has an average diversion rate and is regulated by the local or state authority and must exclude alternative daily cover (ADC). This system must be a closed system; shipping waste to another municipality to manage, thus burdening another system, does not count as diverting the waste.
- b. The waste-sorting facility shall provide a waste diversion percentage specific to the project's waste based on measurement of each component waste material. Visual inspection is not an acceptable method of evaluation for documenting this percentage.

C. Source Separated Waste Recycling:

- 1. If utilizing a source separation waste strategy, the Construction Waste Management Plan shall include a list of anticipated types and quantities of waste materials generated from the Project site and proposed siting locations (including map) for waste/recycling containers. The plan shall identify materials to be recycled, re-used or salvaged. It shall include efforts at source reduction, material handling procedures and collection of weight and hauling destination information.
- 2. Source Reduction: List processes that minimize waste such as working with suppliers to take back or buy back substandard, rejected or unused items and to deliver supplies using returnable pallets and containers. Also include procedures to minimize breakage, mishandling, contamination, and other factors that reduce job site waste.
- 3. Material Handling Procedures: List means by which source separated waste materials will be protected from contamination, and the means for recycling them consistent with requirements for acceptance by designated facilities
- 4. Implement recycling program that includes separate collection of waste materials of following types as applicable to Project:
 - a. Asphalt.
 - b. Land clearing debris.
 - c. Soil.
 - d. Trees and shrubs.
 - e. Concrete and concrete blocks.
 - f. Brick and masonry materials.
 - g. Wood.
 - h. Cardboard and paper packaging materials.
 - i. Plastics.
 - j. Ferrous metal.
 - k. Non-ferrous metals (e.g. copper, aluminum, etc.).
 - l. Glass.
 - m. Food and beverage containers.
 - n. Electrical fixtures and wires.
 - o. Other (where applicable)

- D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.4 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
 - C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 01 74 19

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SECTION 01 77 00
closeout procedures

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.

1.3 RELATED REQUIREMENTS

- A. Section 01 73 00 "Execution" for progress cleaning of Project site.
- B. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
- C. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- D. Section 01 79 00 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.4 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

- C. Field Report: For pest control inspection.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.7 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items no later than 45 days following Notice to proceed for Architect to submit to Owner for their review, including name and quantity of each item and name and number of related Specification Section. Schedule of Materials and extra stock items to be modified following Owner's review. Obtain Architect's signature for receipt of submittals.
 - 5. Submit test/adjust/balance records.
 - 6. Submit sustainable design submittals required in Section 01 81 13 "Sustainable Design Requirements" and in individual Sections.
 - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.

CLOSEOUT PROCEDURES

01 77 00 - 2

Fontana City Hall – Phase II

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "Demonstration and Training."
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for final completion.

1.8 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
- ~~1.~~ Submit a final Application for Payment.
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.9 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. Electronic punchlist on procore software system.
 - c. PDF electronic file. Architect will return annotated file.
 - d. Three paper copies. Architect will return two copies.

1.10 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 inch x 11 inch (215 mm x 280 mm) paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

CLOSEOUT PROCEDURES

01 77 00 - 5

Fontana City Hall – Phase II

- m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grilles.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.

1.3 RELATED REQUIREMENTS

- A. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
- B. Section 01 91 13 "General Commissioning Requirements" for verification and compilation of data into operation and maintenance manuals.

1.4 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.5 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.
1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

OPERATION AND MAINTENANCE DATA

01 78 23 - 2

Fontana City Hall – Phase II

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Architect.
 7. Name and contact information for Commissioning Authority.
 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf or post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 inch x 11 inch (215 mm x 280 mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

- a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2 inch x 11 inch (215 mm x 280 mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.

3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

OPERATION AND MAINTENANCE DATA

01 78 23 - 7

Fontana City Hall – Phase II

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Section 01 78 39 "Project Record Documents."
- G. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.

1.3 RELATED REQUIREMENTS

- A. Section 01 73 00 "Execution" for final property survey.
- B. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
- C. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one set of file prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 2. Format: DWG Version, Microsoft Windows operating system.
 3. Format: Annotated PDF electronic file with comment function enabled.
 4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 5. Refer instances of uncertainty to Architect for resolution.
 6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01 33 00 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file.
 - 1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file.
 - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

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SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training video recordings.

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date of video recording.
 - 2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
 - 3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
 - 4. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.

- h. Performance curves.
- 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
- 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning

- e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data".
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
 - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
 - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
 - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video: Provide minimum 640 x 480 video resolution converted to .mp4 format file type or other format file type acceptable to Owner, on electronic media.
 - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
 - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
 - 1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
 - 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone or by dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 01 79 00

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 Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".
 - 1. Chapter 5 - Non-Residential Mandatory Measures.

1.3 RELATED REQUIREMENTS

- A. Pertinent sections specifying erosion control.
- B. Division 01 Section "Volatile Organic Compound (VOC) Restrictions."
- C. Division 01 Section "Construction Waste Management and Disposal."
- D. Division 01 Section "Operation & Maintenance Data"
- E. Division 01 Section "Demonstration and Training."
- F. Division 01 Section "General Commissioning Requirements."

1.4 DEFINITIONS

- A. CAL-Green Definitions: Certain terms are defined by CAL-GREEN in Chapter 5 of the code. Words and terms used in this section shall have the meanings shown therein.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and the City regarding CAL-Green credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures. Document responses as informational submittals.

1.6 INFORMATIONAL SUBMITTALS

- A. General: Submit CAL-GREEN submittals required by code and in other Specification Sections.

- B. CAL-GREEN 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 CAL-GREEN requirements.
- C. Acceptable verification submittals are specified in the Related Sections.

PART 2 - PRODUCTS

2.1 REQUIREMENTS - GENERAL

- A. Provide products and procedures necessary to confirm CAL-GREEN compliance required in this Section. Although other Sections may specify some CAL-GREEN requirements, the Contractor shall determine additional materials, techniques, means, methods and procedures necessary to comply with CAL-GREEN requirements.

2.2 STORM WATER POLLUTION PREVENTION PLAN

- A. Section 5.106.1: Comply with requirements of this code section, local ordinances, General Conditions, Special Provisions, and related sections specifying erosion control.

2.3 OUTDOOR WATER USE

- A. Section 5.304.3.1: Irrigation Controllers: Comply with requirements of this code section, local ordinances.

2.4 CONSTRUCTION WASTE REDUCTION

- A. Section 5.408 Construction Waste Management, Diversion and Recycling: Comply with requirements of this code section, local ordinances and Division 01 Section "Construction Waste Management and Disposal."

2.5 BUILDING MAINTENANCE AND OPERATION

- A. Section 5.410.2.3, 4. Commissioning and Functional Performance Testing: Participate in Commissioning and provide functional performance testing as required by these code sections.
- B. Section 5.410.2.5. Documentation and Training: Provide Operations Training as required by these code sections.

2.6 POLLUTANT CONTROL

- A. Section 5.504.3 Indoor Air Quality: Comply with requirements of this code section, local ordinances.
 - 1. During storage, rough installation and until final start-up of HVAC equipment, securely cover all ducts and air distribution component openings with plastic, tape, sheet metal or other methods acceptable to enforcing agency to reduce dust or debris collected in the system.

SUSTAINABLE DESIGN REQUIREMENTS

01 81 13 - 2

Fontana City Hall – Phase II

- B. Section 5.504.4 Finish Material Pollutant Control: All Finish materials shall comply with requirements of this code section, local ordinances and Section 01 61 16 "Volatile Organic Compound (VOC) Restrictions."

PART 3 - EXECUTION

3.1 GENERAL

- A. Comply with execution requirements of related sections and applicable local codes and ordinances.

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SECTION 01 81 19
INDOOR AIR QUALITY (IAQ) MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing protection of indoor air quality (IAQ), absorbent materials, and mechanical system from contamination during demolition and building flush out along with baseline indoor air quality testing prior to Owner occupancy.

1.2 REFERENCES

- A. ASHRAE Standard 52.2-Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 1999.
- B. SMACNA (OCC) - IAQ Guideline for Occupied Buildings under Construction; 2nd Edition, 2007, ANSI/SMACNA 008-2008 (Chapter 3).
- C. EPA Compendium of Methods for the Determination of Air Pollutants in Indoor Air.

1.3 DEFINITIONS

- A. Absorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.4 SUBMITTALS

- A. Construction Indoor Air Quality Management Plan
 - 1. Credit IEQ 3 Construction Indoor Air Quality Management Plan: An IAQ plan based upon SMACNA IAQ Guidelines. The plan shall describe in detail measures specific to this project to be taken during construction to promote adequate indoor air quality upon completion.
 - a. HVAC Protection: Describe steps to 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: 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.
 - f. Prohibit the use of tobacco products during construction inside the building and within 25 feet of building entrances.
 - 2. Quality Assurance and IAQ Monitoring: Describe steps to ensure compliance by Contractor and subcontractors.
 - 3. Photograph Documentation - six photographs of the 5 SMACNA measures taken throughout construction and on submitted on a monthly basis. Identify date and SMACNA measure featured in each photograph.
- B. Credit IEQ 4 Indoor Air Quality Assessment: An IAQ plan based upon ASHRAE Standard 62.1-2004. The plan describes in detail measures specific to this project to be taken before occupancy to promote adequate indoor air quality upon completion.
- 1. Indoor Air Quality Flush-Out:
 - a. Narrative describing the Project's specific flush-out procedures.
 - 2. Indoor Air Quality Testing
 - a. Narrative describing IAQ testing process.
- C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to absorption of odors and vapors, and indicate air handling zone, sequence of application and curing times.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Credit IEQ 2 Low-Emitting Materials: See Section 01 81 13 Sustainable Design Requirements for specific requirements – emissions testing requirements and VOC limits.
- B. Air Filters: MERV 13, minimum, when tested in accordance with ASHRAE 52.2, 1992.

PART 3 - EXECUTION

3.1 CREDIT IEQ 3: CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

- A. Refer to SMACNA IAQ Guideline for Occupied Buildings under Construction for avoiding unnecessary contamination due to construction procedures.
- B. Building HVAC system and supply air ductwork may be used for ventilation during construction:
 - 1. Begin construction ventilation when building is substantially enclosed.
 - 2. Operate HVAC system with 100 percent outside air and with 1.5 air changes per hour, minimum.
 - 3. Ensure that air filters are correctly installed prior to starting use; replace filters when they lose efficiency.

INDOOR AIR QUALITY (IAQ) MANAGEMENT

01 81 19 - 2

Fontana City Hall – Phase II

4. Do not use return air ductwork for ventilation unless absolutely necessary.
 5. Where return air ducts shall be used for ventilation, install MERV 8 filters at return inlets, sealed to ducts; replace filters when they lose efficiency.
- C. Prevent the absorption of moisture and humidity by adsorptive materials by:
- a. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - b. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 - c. Provide sufficient ventilation for drying within reasonable time frame.
- D. HVAC Protection:
1. Protect air handling and distribution equipment, and air supply and return ducting during demolition.
 2. Adequately cover and protect exposed air inlets and outlets, openings, grilles, ducts, plenums, as required to prevent water, moisture, and other contaminant intrusion.
 3. Apply protection immediately after installation of equipment and ducting.
 4. Do not store construction materials or waste in mechanical or electrical rooms.
 5. Prior to using return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
 - a. Inspect duct intakes, return air grilles, and terminal units for dust.
 - b. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.
 - c. Clean tops of doors and frames.
 - d. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 - e. Clean return air plenums of air handling units.
 - f. Remove air intake filters only after cleaning is complete.
 6. Do not perform dust or dirt- producing work after starting use of return air ducts without intake filters on return air ducts.
- E. Pathway Interruption:
1. Provide solid physical barriers to isolate areas of construction. Securely attach and seal at floor and structure above.
 2. Openings within the designated work area shall be sealed.
 3. Adequate exhaust ventilation equipment shall be installed to maintain a negative pressure differential between the work area and adjacent areas of the building.
 4. Ventilation units shall be exhausted to the outside of the building.
- F. 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 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 entryway to remove moisture and contaminants from entering the building.
11. Prevent the ingress of rodents and pests.
12. Prohibit the use of tobacco products during construction inside the building and within 25 feet of building entrances.

G. Housekeeping:

1. Provide temporary ventilation during demolition to minimize accumulation of dust fumes, vapors, or gases in the building.
2. Suppress dust with wetting agents or sweeping compounds.
3. Clean-up dust using a wet rag or damp mop.
4. Increase the cleaning frequency when dust build-up is noted.
5. Remove spills or excess applications of solvent-containing products as soon as possible.
6. Remove accumulated water and keep work areas as dry as possible.
7. Store volatile liquid containers closed when the container is inside of the building and not in use.
8. Keep volatile liquid containers closed when the container is inside of the building and not in use.
9. HEPA vacuuming and duct cleaning.
10. Use nontoxic cleaning materials and procedures.

H. 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 8 filters at the central fan system, immediately prior to the first phase of building occupancy. Install new MERV 8 filters at fan systems serving limited areas immediately prior to occupancy for each respective area.

3.2 CREDIT IEQ 4: INDOOR AIR QUALITY ASSESSMENT

- A. Prior to flush-out or air testing, the building shall have interior finishes installed including, but not limited to, millwork, doors, paint, carpet, acoustic tiles and movable furnishings (e.g. workstations, partitions), and major VOC punch-list items must be finished.
- B. Option 1, Path 1: Flush-out, Before Occupancy
 - 1. After construction ends, prior to occupancy and with interior finishes and furniture installed, perform a building flush-out by supplying a total volume of 14000 cu. ft. of outdoor air per sq. ft. (sq. m) of floor area while maintaining an internal temperature of at least 60 degrees F (16 degrees C) 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.
 - 2. Follow the manufacturer operating procedures for each HVAC system and piece of equipment and the operating duration required for flush out.
- C. Option 1, Path 2: Flush-out, During Occupancy
 - 1. 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. (sq. m) of floor area to the space.
 - 2. Once a space is occupied, it shall be ventilated at a minimum rate of 0.30 cfm per sq. ft. (1.52 L/s per sq. m) of outside air or the design minimum outside air rate determined in EQ Prerequisite 1, whichever is greater.
 - 3. During each day of the flush-out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy.
 - 4. These conditions shall be maintained until a total of 14000 cu. ft./sq. ft. (4 300 000 L/sq. m) of outside air has been delivered to the space.
 - 5. Follow the manufacturer operating procedures for each HVAC system and piece of equipment and the operating duration required for flush out.
- D. Option 2: Air Testing:
 - 1. Conduct baseline indoor-air-quality testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's Compendium of Methods, or ISO Methods, as detailed in the USGBC's "Reference Guide for Building Design and Construction," version 4 (v4).
 - 2. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
 - a. Formaldehyde: 27 ppb.
 - b. Particulates (PM10): 50 micrograms/cu. m.
 - c. Ozone: 0.075 ppm.
 - d. Total Volatile Organic Compounds (TVOCs): 500 micrograms/cu. m.
 - e. Target Chemicals listed in CDPH Standard Method v1.1, Table 4, except formaldehyde: CHPH Standard Method v1.1, Allowable Concentrations, Table 4-1.
 - f. Formaldehyde: 27 ppb.
 - g. Carbon Monoxide (CO): 9 ppm and no greater than 2 ppm above outdoor levels.
 - h. * NOTE: The target volatile organic compounds are from CDPH Standard Method v1.1, Table 4-1. The Maximum concentration limits for these target compounds are the full CREL adopted by Cal/EPA OEHHA in effect on June 2014 (<http://oehha.ca.gov/air/allrels.html>)
 - i. Measurements shall be conducted prior to occupancy but during normal occupied hours, and with 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.

INDOOR AIR QUALITY (IAQ) MANAGEMENT

01 81 19 - 5

Fontana City Hall – Phase II

- j. Prior to testing, the building shall have interior finishes installed including, but not limited to, millwork, doors, paint, carpet, acoustic tiles and movable furnishings (e.g. workstations, partitions), and major VOC punch-list items must be finished.
 - k. Test at least one location per ventilation system for each occupied space type. There must be a minimum of one test per floor. The locations selected for testing must represent the worst-case zones where the highest concentrations of contaminants of concern are likely to occur.
 - l. For offices, retail, schools, hospitality, and multifamily residential projects, test areas no larger than 5,000 square feet. For warehouses or large open spaces in other building types (e.g., ballrooms in hospitality, gymnasiums in schools), a limit of 50,000 square feet may be used. If there is evidence that the air in the space is well mixed and sources of contaminants of concern are uniform, project teams may test a single location in that space.
 - m. Determine whether the project includes spaces (e.g., offices, school classrooms, or multifamily residential units) that are identical in their construction, finishes, configuration, square footage, and HVAC systems. Project teams may sample identical spaces by testing one in seven. If the sampled space fails the test, all seven must be tested. For buildings with a large number of identical spaces (more than 21 spaces in a sample group), test a minimum of three spaces in the sample group."
3. For each sampling point where the maximum concentration limits are exceeded, take corrective action and retest for the noncompliant contaminants at the same sampling points. Repeat until all requirements are met.

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-gassing 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's acceptance of building to prevent contamination of systems by construction wastes and other deleterious substances.
- B. Finish Types:
- 1. Type 1: 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.

INDOOR AIR QUALITY (IAQ) MANAGEMENT

01 81 19 - 6

Fontana City Hall – Phase II

- f. Sealants and associated filler materials.
- 2. Type 2: Finishes: 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.
 - g. 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 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.

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SECTION 02 41 00
DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.
 - 4. Disposal of materials.
 - 5. Identification of utilities.

- B. Related Requirements:

- 1. Section 31 10 00 "Site Clearing" for site clearing and removal of above- and below-grade improvements not part of selective demolition.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.
- C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREDEMOLITION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.
 - 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.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Engineering Survey: Submit engineering survey of condition of building.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations.
- E. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

- A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.
- C. Conduct demolition to minimize interference with adjacent and occupied building areas.
- D. Use all means necessary to protect existing objects, construction and plantings designated to remain. In the event of damage, make all repairs and replacements necessary for approval of Architect at no additional cost to the Owner.
- E. Protective measures: Provide all necessary safeguards, including warning signs and lights, barricades, and the like, for protection of the public, Contractor's employees and existing improvements during demolition. Prevent access of unauthorized persons to area of work
- F. Provide at least one person who shall be present at all times during execution of this portion of the work, be thoroughly familiar with the type of work being performed and the best methods for its execution and who shall direct all work performed under this Section.

- G. Control the use of water to prevent damage to the existing facilities to remain. Provide wet vacuum equipment where water, such as waste cooling water from concrete sawing or water used as dust emollient, is used adjacent to and in existing buildings.
- H. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Engage a professional engineer to perform an engineering survey of 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 building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: 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.
 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 52 00 "Construction Facilities" and Section 01 57 00 "Temporary Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- 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. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next 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. 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, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain fire watch during and for minimum number of hours required by local department after flame-cutting operations.
 6. Maintain adequate ventilation when using cutting torches.
 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Examine substrates and surfaces exposed by demolition for water damage, dry rot, decay, termite infestation or other structural failure. Request direction from the Architect if these conditions are discovered. Additional demolition beyond scope originally indicated may be required to fully remove damaged or unsuitable materials.
- C. Work not mentioned to be removed that interferes with new construction shall be cut to clean cut lines to provide for proper interface with new construction, or patching and repair, as required.
- 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.
- E. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- F. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- G. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable,

protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section <Insert Section number and title> for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.
- F. Mechanical, Plumbing and Electrical Systems: Demolish existing improvements as required to permit installation of new systems indicated. Refer to Drawings for additional specific demolition required for mechanical, plumbing and electrical systems.
 - 1. Securely seal exposed ends of existing ductwork systems left open by demolition operations. Prevent entry of foreign matter. Protect these seals from damage until connected to new work.
- G. Remove all fasteners, anchors, supports and similar appurtenances from substrates indicated to remain. Leave substrates in good condition to receive new work.
 - 1. Pull nails from wood framing. Unthread screws, do not pull out. Do not drive existing nails or screws flush.
 - 2. Remove suspended ceiling support wires.
 - 3. Remove staples, screws, and miscellaneous anchors from all gypsum board, wood paneling, masonry wall surfaces indicated to remain.
- H. Modular materials such as ceiling, resilient and ceramic tile: Remove to a natural point of division in whole units to a joint line with no damaged or defective unit remaining to adjoin new construction.
- I. Gypsum Wallboard: Remove to a joint line on a support.
- J. Wood Trim: Remove to a natural existing joint line.
- K. All holes or trenches created by removal of underground piping or other facilities demolished shall be filled with clean soil and compacted to the density for fills specified. Do not backfill if

subsequent excavation will occur at the same location. Do not backfill hole or trenches until inspected by the Soils Engineer or Architect.

3.6 SALVAGE

- A. Items indicated to be salvaged shall be removed carefully, cleaned and stored in a protected location on or off the site until re installed; salvaged items to be delivered to the Owner shall also be removed carefully and presented to the Owner's designated representative.
- B. Owner may take possession of any items of salvage for his use if he desires. Provide incidental labor to relocate designated salvage for Owner's storage.

3.7 PATCHING

- A. Patch materials to remain when damaged by this work. Finish materials and appearance of the patch or repair work shall match the existing contiguous materials and finishes in all respects and shall be approved by Architect.
- B. Where openings are cut oversize or in improper location, replace the excess removed material as instructed by Architect at no additional cost to the Owner.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site and recycle or dispose of them according to Section 01 74 19 "Construction Waste Management and Disposal."
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

3.9 CLEANING

- A. 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.

END OF SECTION 02 41 00

SECTION 03 30 00
CAST-IN-PLACE 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. Section Includes:
 - 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of manufactured material and product indicated.
- B. Sustainable Design Submittals:
 - 1. If available, Environmental Product Declarations (EPDs) for all structural products and materials as listed on the drawings.
- C. Design Mixtures: For each concrete mixture, include the following:
 - 1. Mixture identification.
 - 2. Minimum 28-day compressive strength.
 - 3. Durability exposure class.
 - 4. Maximum w/cm.
 - 5. Slump limit.
 - 6. Air content.
 - 7. Nominal maximum aggregate size.
 - 8. Indicate amounts of mixing water to be withheld for later addition at Project site.
 - 9. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- D. Shop Drawings:

- a. Construction Joint Layout: Indicate proposed construction joints required to construct the structure. Location of construction joints is subject to approval of the Architect.
- b. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For the following:
 - 1. Welding certificates.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Vapor retarders.
 - 4. Repair materials.
- C. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.
- E. Field quality-control reports.
- F. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Concrete Flatwork Technician.
- B. 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."
- C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete,"
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.8 FIELD CONDITIONS

- A. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:
 - 1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Source Limitations:
 - 1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 - 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
 - 3. Obtain aggregate from single source.
 - 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type II.
 - 2. Fly Ash: ASTM C618, Class F.
 - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
 - 4. Blended Hydraulic Cement: ASTM C595/C595M, Type IL, portland-limestone cement.

- C. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches (38 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C330/C330M, 3/4-inch (25-mm) nominal maximum aggregate size.
- E. Water: ASTM C 94/C 94M and potable.
- F. Air-Entraining Admixture: ASTM C260/C260M.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do 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 C494/C494M, Type A.
 - 2. Retarding Admixture: ASTM C494/C494M, Type B.
 - 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 - 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- H. WATERSTOPS
 - I. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Greenstreak.
 - b. Williams Products, Inc.
 - 2. Profile: Ribbed with center bulb.
 - 3. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick); nontapered.
 - J. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. JP Specialties, Inc.; Earth Shield TPE-Rubber.
 - b. Vinylex Corp.; PetroStop.
 - c. WESTEC Barrier Technologies, Inc.; 600 Series TPE-R.
 - 2. Profile: Ribbed with center bulb.
 - 3. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick); nontapered.
 - K. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BoMetals, Inc.
 - b. Greenstreak.
 - c. Paul Murphy Plastics Company.
 - d. Vinylex Corp.

2. Profile: Ribbed with center bulb.
3. Dimensions: 4 inches by 3/16 inch thick (100 mm by 4.75 mm thick); nontapered.

2.3 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 1. Products: Subject to compliance with geotechnical requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Meadows, W. R., Inc.; Perminator 15 mil.
 - b. Stego Industries, LLC; Stego Wrap 15 mil.
 - c. Husky; Yellow Guard 15 mil.
- A. Sand Cushion (under floor slabs): Not used, slab applied directly to vapor retarder.

2.4 LIQUID FLOOR TREATMENTS

- A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ChemMasters; Chemisil Plus.
 - b. ChemTec Int'l; ChemTec One.
 - c. Conspec by Dayton Superior; Intraseal.
 - d. Curecrete Distribution Inc.; Ashford Formula.
 - e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - f. Edoco by Dayton Superior; Titan Hard.
 - g. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
 - h. Meadows, W. R., Inc.; LIQUI-HARD.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.
 - b. BASF Construction Chemicals - Building Systems; Confilm.
 - c. ChemMasters; SprayFilm.
 - d. Conspec by Dayton Superior; Aquafilm.
 - e. Dayton Superior Corporation; Sure Film (J-74).
 - f. Edoco by Dayton Superior; BurkeFilm.
 - g. Euclid Chemical Company (The), an RPM company; Eucobar.
 - h. Meadows, W. R., Inc.; EVAPRE.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

- C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 22% solids. Euclid Chemical Co. "Diamond Clear VOX", Master Builders "MasterKure-N-Seal W", or approved equal. Do not use on floor slabs.
- E. Water: Potable or complying with ASTM C1602/C1602M.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

2.7 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand, as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 3500 psi at 28 days when tested in accordance with ASTM C109/C109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested in accordance with ASTM C109/C109M.

2.8 CONCRETE MIXES

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301 (ACI 301M).

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Adjustments to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by the Architect and Engineer. Laboratory test data and strength results for revised mix design must be submitted to and accepted by Architect and Engineer before using in Work.
- C. Concrete Strength: Proportion normal-weight concrete mix as follows:
 1. Compressive Strength (28 Days) and Maximum Slump: As indicated in the structural drawing notes.
 2. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows, unless otherwise indicated:
 - a. Ramps, slabs, and sloping surfaces: Not more than 4 inches.
 - b. Maximum slump of concrete containing mid-range water-reducing admixtures shall be not more than 8 inches after adding admixture to site-verified 3-to-4-inch slump concrete. Maximum allowable water-cementitious ratio of the approved mix design shall not be exceeded.
 - c. Maximum slump of concrete containing high-range water-reducing admixtures (superplasticizer) shall be not more than 10 inches after adding admixture to site-verified 2-to-3-inch slump concrete. Maximum allowable water-cementitious ratio of the approved mix design shall not be exceeded.
 - d. Other concrete: Not more than 4 inches.
- D. Cementitious Materials and Admixtures: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 1. Biogenic Limestone: Limit use not to exceed 40% of cement content by weight. Basis of Design Product: ProZero Carbon Negative Blend by Prometheus, www.prometheusmaterials.com, contact Leo Atencio, leo@prometheusmaterials.com, m: +1.720.955.2405
 - a. Achieves ASTM C1157 Ready Mix Specifications
 - b. Meets ASTM C595 Type 1C
 2. Fly Ash: Limit use of fly ash to not exceed 30 percent of cement content by weight unless otherwise indicated on structural drawings.
- E. Maximum Water-Cementitious Materials Ratio: As indicated on structural drawings; 0.50 for all other concrete not indicated on drawings.
- F. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 2 to 4 percent, unless otherwise indicated.
- G. Do not air entrain concrete to trowel-finished interior floors and suspended slabs. Do not allow entrapped air content to exceed 3 percent.
- H. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- I. Admixtures: Use admixtures according to manufacturer's written instructions.
 1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete required to be water-tight, and concrete with a water-cementitious materials ratio below 0.45.

2.9 FABRICATING REINFORCEMENT

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

2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.
 1. When air temperature is between 85 and 90 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 degrees F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
 2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
 1. Daily access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
 4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.4 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
 - 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
 - 2. Face laps away from exposed direction of concrete pour.
 - 3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
 - 4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
 - 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
 - 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
 - 7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides, and sealing to vapor retarder.

3.5 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
 - 2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

- D. Isolation Joints in Slabs-on-Ground: 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 on Drawings.
 2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "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.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M), but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
 2. Deposit concrete to avoid segregation.
 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.

- d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Do not place concrete floors and slabs in a checkerboard sequence.
 - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 3. Maintain reinforcement in position on chairs during concrete placement.
 - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 5. Level concrete, cut high areas, and fill low areas.
 - 6. Slope surfaces uniformly to drains where required.
 - 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 - 8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

Retain types of formed finishes required in this article. Coordinate finishes retained with Drawing Room Finish Schedule, or indicate location of each finish on Drawings.

A. As-Cast Surface Finishes:

- 1. ACI 301 (ACI 301M) Surface Finish SF-3.0:
 - a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
 - b. Remove projections larger than 1/8 inch (3 mm).
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 (ACI 117M) Class A.
 - e. Locations: Apply to concrete surfaces exposed to public view.

3.8 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish:
 - 1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
 - 2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch (6 mm) in one direction.
- C. Float Finish:
 - 1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
 - 2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighthen until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:
 - a. Slabs on Ground:
 - 1) Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch (6 mm).

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

F. Slip-Resistive Finish: Before final floating, apply slip-resistive finish to concrete stair treads, platforms, ramps as indicated on Drawings. Apply in accordance with manufacturer's written instructions and as follows:

1. Uniformly spread dampened slip-resistive granules over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
2. After broadcasting and tamping, apply float finish.
3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior 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.

3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.

B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
 - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12-inches (300-mm).
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 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 (300 mm), and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.

CAST-IN-PLACE CONCRETE

03 33 00 - 13

Fontana City Hall Renovation – Phase II

- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 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 (300 mm), and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- d. Floors to Receive Chemical Stain:

- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
- 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
- 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
- 4) Leave curing paper in place for duration of curing period, but not less than 28 days.

e. Floors to Receive Urethane Flooring:

- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
- 2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches (150 mm) and sealed in place.
- 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
- 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

3.11 TOLERANCES

- A. Conform to ACI 117 (ACI 117M).

3.12 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.
 - a. Limit cut depth to 3/4 inch (19 mm).
 - b. Make edges of cuts perpendicular to concrete surface.
 - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
 - d. Fill and compact with patching mortar before bonding agent has dried.
 - e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.
 - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.

CAST-IN-PLACE CONCRETE

03 33 00 - 15

Fontana City Hall Renovation – Phase II

- b. Compact mortar in place and strike off slightly higher than surrounding surface.
- 3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces:
 - 1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
 - a. Correct low and high areas.
 - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - 2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - 3. After concrete has cured at least 14 days, correct high areas by grinding.
 - 4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
 - a. Finish repaired areas to blend into adjacent concrete.
 - 5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.
 - a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - b. Feather edges to match adjacent floor elevations.
 - 6. Correct other low areas scheduled to remain exposed with repair topping.
 - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.
 - b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - 7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.
 - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
 - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
 - c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
 - d. Place, compact, and finish to blend with adjacent finished concrete.
 - e. Cure in same manner as adjacent concrete.
 - 8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.
 - a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.

- b. Dampen cleaned concrete surfaces and apply bonding agent.
 - c. Place patching mortar before bonding agent has dried.
 - d. Compact patching mortar and finish to match adjacent concrete.
 - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 - 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:

1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
 5. Verification of concrete strength before removal of shores and forms from beams and slabs.
 6. Batch Plant Inspections: On a random basis, as determined by Architect.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. Slump: ASTM C143/C143M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast and laboratory cure two sets of two 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
 - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of three laboratory-cured specimens at seven days and one set of two specimens at 28 days.
 7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).

8. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
9. Additional Tests:
 - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.14 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

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SECTION 03 35 00
CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Polished concrete finishing .
 - 2. Exposed aggregate concrete finishing.
 - 3. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 03 30 00 "Cast-in-Place Concrete."

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Section 03 30 00 "Cast-in-Place Concrete" for concrete not designated as polished concrete.

1.4 PREINSTALLATION MEETINGS

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

1.5 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.6 ACTION SUBMITTALS

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

- B. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.
- C. Samples for Initial Selection: For each type of product requiring color selection.
- D. Samples for Verification: For each type of exposed color.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Repair materials.
 - 2. Liquid floor treatments.

1.8 QUALITY ASSURANCE

- A. Field Sample Panels: After approval of verification sample and before casting concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches (1200 by 1200 mm) minimum, to demonstrate the expected range of finish, color, and appearance variations.
 - 1. Locate panels as indicated or, if not indicated, as directed by Architect.
 - 2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Demolish and remove field sample panels when directed.
- B. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build integrated mockups in the location and of the size indicated or, if not indicated, as directed by Architect, in conjunction with concrete mockup.
 - 2. Demonstrate curing, finishing, and protecting of polished concrete.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 STAIN MATERIALS

- A. Reactive Stain: Acidic-based stain with wetting agents and high-grade, UV-stable metallic salts that react with calcium hydroxide in cured concrete to produce permanent, variegated, or translucent color effects.
- B. Penetrating Stain: Water-based, acrylic latex, penetrating stain with colorfast pigments.

2.2 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.

2.3 EXPOSED AGGREGATE CONCRETE FINISHING

- A. Basis of Design Manufacturer: Topcast product manufactured by Dayton Superior.
- B. Alternative Manufacturers:
 - 1. GCP Applied Technologies.
 - 2. W.R. Meadows
- C. Color: As indicated on Drawings.

PART 3 - EXECUTION

3.1 POLISHING

- A. Polish: Match design reference sample.
- B. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.
 - 1. Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate to match approved mockup.
 - 2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
 - 3. Apply penetrating stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
 - 4. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
 - 5. Control and dispose of waste products produced by grinding and polishing operations.
 - 6. Neutralize and clean polished floor surfaces.

3.2 EXPOSED AGGREGATE CONCRETE FINISHING

- A. Place and finish concrete to specified tolerance.
- B. After bleed water has dissipated and initial set begins, uniformly apply surface retarder using low-pressure sprayer in accordance with manufacturer's instructions.
- C. Do not cover with plastic sheeting.
- D. Allow surface to dry undisturbed per product data sheet.
- E. Remove surface mortar by pressure-washing or scrubbing to reveal desired aggregate exposure.

END OF SECTION 03 35 43

SECTION 03 35 13
CONCRETE SEALING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface hardening, sealing, and repair materials for cast-in-place concrete.
 - 1. Slabs-on-grade.
 - 2. Suspended slabs.

1.3 RELATED REQUIREMENTS

- A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 03 10 00 "Concrete Forms and Accessories" for concrete formwork and accessories.
- C. Section 03 20 00 "Concrete Reinforcing."
- D. Section 03 30 00 "Cast-In-Place Concrete" for concrete materials, concrete mixture design, placement procedures, tests and inspections.
- E. Pertinent Sections specifying floor finishes installed over concrete.
- F. Pertinent Sections specifying exterior concrete finishes.

1.4 REFERENCES

- A. "California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. "California Building Code (CBC)", International Building Code, with California Amendments, California Code of Regulations, Title 24, Part 2."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010. (ADA)

1.5 DEFINITIONS

- A. 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.

- B. Defective Finished Surfaces: Architectural concrete surfaces, including slabs, not meeting requirements of this section, as determined by the Architect.
- C. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

1.6 SUBMITTALS

- A. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.
- B. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
- C. Field Sample Panels: Before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, cast vertically, approximately 48 inches by 48 inches by 6 inches (1200 mm by 1200 mm by 150 mm) minimum, to demonstrate the expected range of finish, color, and texture variations.
 - 1. Locate panels as indicated or, if not indicated, as directed by Architect.
 - 2. Demonstrate methods of curing, aggregate exposure, sealers, and coatings, as applicable.
 - 3. In presence of Architect, damage part of an 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.
 - 4. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
 - 5. Demolish and remove field sample panels when directed.

1.7 PROTECTION OF MATERIALS

- A. Protect materials from damage, weather, and contaminants such as grease, oil, and dirt.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in Section 01 61 16.

2.2 SURFACE HARDENERS / SEALERS (SLR)

- A. Surface Hardener / Sealer: Water-based chemically-reactive penetrating sealer and hardener, that seals by densifying concrete so that water molecules cannot pass through but air and water vapor can, while allowing concrete to achieve full compressive strength, minimizing surface crazing, and eliminating dusting.
 - 1. Colorless, transparent, odorless, non-toxic, non-flammable.
 - 2. Containing no solvents or volatile organic compounds.

3. Allowing traffic on floors within 2 to 3 hours, with chemical process complete within 3 months.
4. No change to surface appearance except a sheen developed due to traffic and cleaning.
5. Liquid finish giving a matte sheen.
6. Basis of Design Product:
 - a. Ashford Formula™, CURECRETE Distribution, Inc., Springville, UT; tel: (800) 998-5664; web: www.ashfordformula.com, or equal.
 - b. Substitutions: Per Section 01 25 00.

2.3 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, non redispersible, 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.
- C. Repair Underlayment – Under Floor Coverings: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 inch to 1/4 inch (3.2 mm to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 6000 psi at 28 days when tested according to ASTM C 109.
- D. Repair Overlayment – Exposed: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.
 1. Cement Binder: ASTM C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 inch to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 6000 psi at 28 days when tested according to ASTM C109.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Installer present for compliance with requirements, installation tolerances, and other conditions affecting performance of the work.
- B. Verify preparatory work by other trades is complete.

- C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 PREPARATION

- A. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants.

3.3 REPAIRS

- A. Propose repair methods for Architect's approval, and perform proposed repair testing on approved mockups before repairing permanent work.
 - 1. Patch a test area on approved mockup location(s) to verify mixture and color match before proceeding with patching.
 - 2. Obtain Architect's written approval of repair method before commencing permanent repair.
 - 3. Revise rejected repair methods and re-submit, or at Architect's option, replace defective concrete.
- B. Repair and cure defective finished surfaces of cast-in-place architectural concrete only when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 - 1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.

3.4 SURFACE HARDENER / SEALER INSTALLATION

- A. Treat interior slabs where scheduled.
 - 1. Do not install surface hardener / sealer on surfaces scheduled to receive finishes specified in other Sections.
- B. Install in accordance with manufacturer's written instructions after recommended minimum concrete cure period.

3.5 PROTECTION AND CLEANING

- A. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- B. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.
- C. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
 - 1. Wash and rinse surfaces according to concrete hardener / sealer manufacturer's written instructions. Protect other Work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

- D. Protect sealed concrete surfaces from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering.

END OF SECTION 03 35 13

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SECTION 03 53 00
CONCRETE TOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Concrete floor topping for standard applications.
 - 2. Decorative concrete floor topping.
 - 3. Polishable concrete floor topping.

- B. Related Requirements:

- 1. Section 033000 "Cast-In-Place Concrete" for general and structural building concrete with finish texture, curing methods, and contraction and isolation joints of base floor slabs.
 - 2. Section 079200 "Joint Sealants" for elastomeric sealants for isolation joints if any.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: Manufacturers samples for finishes in a consistent base color.
- C. Samples for Verification: For each floor system required, 12 inch square to match Architect's custom color in selected finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each concrete floor topping, for tests performed by manufacturer and witnessed by a qualified testing agency.
- B. Field quality-control reports by Owner.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.7 MOCKUPS

- A. Build mockups to set quality standards for materials and execution and for preconstruction testing.
 - 1. Build mockups approximately 100 sq. ft. (9.3 sq. m) in the location indicated or, if not indicated, as directed by Architect.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order. If Architect determines that mockups do not meet requirements, demolish and remove them from the site and cast others until mockups are approved.
- B. Concrete floor topping mockups are to demonstrate typical joints where applicable, surface finish, bonding, texture, tolerances, and standard of workmanship.
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete floor topping performance.
 - 1. Place concrete floor topping only when ambient temperature and temperature of base slabs are between 50 and 86 deg F (10 and 30 deg C).
- B. Close areas to traffic during topping application and, after application, for time period recommended in writing by manufacturer.

1.10 WARRANTY

- A. Manufacturers Standard Warranty: Manufacturer agrees to provide a standard five year warranty against delamination and any other defects.

PART 2 - PRODUCTS

2.1 CONCRETE FLOOR TOPPINGS

- A. Concrete Floor Topping for Standard Applications: Non-industrial, cement-based self-leveling interior concrete topping or resurfacing.
 - 1. Basis of Design Product: X-Bond Microcement as manufactured by Semco, web: www.semco.com.
 - 2. Other Acceptable Manufacturers: Subject to compliance with requirements, provide approved products from one of the following manufacturers:
 - a. Duraamen Engineered Products.
 - b. TB Pennicks.
 - c. Substitution: As per Division 01.
 - 3. Performance Criteria:
 - a. Application: Barrel mix or pump.
 - b. Flow Time: Minimum 10 minutes.
 - c. Initial Set: Not less than 10 minutes.
 - d. Final Set: Not less than 45 minutes.
 - e. Compressive Strength (28 Days): Minimum 3,800 psi (27MPa) as per ASTM C109/C109M.
 - f. Water content: 48.9%.
 - g. Non volatile residue: 25.9% as per ASTM D2369.
 - h. Coefficient of friction (mineral): 0.93 dry, 0.92 wet as per ASTM C1028-6.
 - i. Coefficient of friction (all finishes): 0.78 dry, 0.63 wet as per ASTM C1028-6.
 - j. Surface Burning Classification: Class A as per ASTM E84.
 - k. Abrasion Resistance: 0.05 mil loss on 1022 cycles as per ASTM D4060-07
 - 4. Materials:
 - a. Color: Custom color as per Architect.
 - b. Finish: As selected by Architect by manufacturer's full range.
 - c. Primer: As recommended by manufacturer.
 - d. Sealer: As recommended by manufacturer.
 - 5. Thickness: As indicated on Drawings.

2.2 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq m) when dry.
- C. Water: Potable.

2.3 RELATED MATERIALS

- A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids aromatic polyurea with a Type A Shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.
- B. Portland Cement: ASTM C150/C150M, Type I or II.
- C. Sand: ASTM C404, fine aggregate passing No. 16 (1.18 mm) sieve.
- D. Water: Potable.
- E. Bond-Breaker Membrane: ASTM D2178/D2178M, asphalt-glass felt, Type III, standard ply sheet.
- F. Crack and Joint Repair:
 - 1. Crack repair materials as recommended in writing by concrete topping manufacturer.
 - 2. Joint sealant materials as recommended in writing by concrete topping manufacturer.
- G. Nonslip Aggregate Materials: As recommended in writing by concrete topping manufacturer.
- H. Moisture Control System: As required for Project, and as recommended in writing by manufacturer.
- I. Semi-Rigid Joint Sealant: As recommended in writing by manufacturer.
- J. Integral Color: As selected by Architect. Pigment type as recommended in writing by manufacturer.

2.4 MIXING

- A. Bonding Slurry:
 - 1. Mix 1 part portland cement and 1-1/2 parts sand with water and an acrylic-bonding agent in accordance with manufacturer's written instructions to a thick paint consistency.
- B. Floor Topping: Mix concrete floor topping materials and water in appropriate drum-type batch machine mixer or truck mixer in accordance with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance of the Work.
- B. Verify that base concrete slabs comply with scratch finish requirements specified in Section 03 30 00 "Cast-in-Place Concrete."
- C. Verify that base slabs are visibly dry and free of moisture. Test for capillary moisture by the plastic sheet method in accordance with ASTM D4263.
- D. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Primers: Provide priming at locations indicated on Drawings, and as recommended in writing by manufacturer.

3.3 APPLICATION OF FLOOR TOPPING

- A. Begin floor topping application in presence of manufacturer's technical representative.
- B. Deferred Floor Topping: Within 72 hours of placing base slabs, mix and scrub bonding slurry into dampened concrete to a thickness of 1/16 to 1/8 inch (1.6 to 3 mm), without puddling. Place floor topping while slurry is still tacky.
- C. Aggregate Concrete Topping: Place concrete floor topping continuously in a single layer, tamping and consolidating to achieve tight contact with bonding surface. Do not permit cold joints or seams to develop within pour strip.
 - 1. Screed surface with a straightedge and strike off to correct elevations.
 - 2. Slope surfaces uniformly where indicated.
 - 3. Begin initial floating, using bull floats to form a uniform and open-textured surface plane free of humps or hollows.
- D. Overlay or Micro-Topping: Apply in strict compliance with manufacturer's written installation instructions. Mix and spread material on to the surface with recommended squeegees and trowels.
- E. Finishing: Consolidate surface with power-driven floats as soon as concrete floor topping can support equipment and operator. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until concrete floor topping surface has a uniform, smooth, granular texture.
 - 1. Hand Trowel Finish: After floating surface, apply first trowel finish and consolidate concrete floor topping by trowel without allowing blisters to develop. Continue troweling passes and restraighten until surface is smooth and uniform in texture.
 - a. Finish and measure surface, so gap at any point between surface and an unleveled freestanding 10-ft.- (3-m-) long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed 1/4 inch (6 mm).
- F. Construction Joints: Construct joints true to line with faces perpendicular to surface plane of concrete floor topping, at locations indicated or as approved by Architect.
 - 1. Coat face of construction joint with epoxy adhesive at locations where concrete floor topping is placed against hardened or partially hardened concrete floor topping.
- G. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete floor topping when cutting action will not tear, abrade, or otherwise damage surface and before random contraction cracks develop.
 - 1. Form joints in concrete floor topping over contraction joints in base slabs unless otherwise indicated.
 - 2. Construct contraction joints for a combined depth equal to topping thickness and not less than one-fourth of base-slab thickness.

3. Construct contraction joints for a depth equal to one-half of concrete floor topping thickness, but not less than 1/2 inch (13 mm) deep.

3.4 PROTECTING AND CURING

- A. General: Protect freshly placed concrete floor topping from premature drying and excessive cold or hot temperatures.
- B. Evaporation Retarder: Apply evaporation retarder to concrete floor topping surfaces in hot, dry, or windy conditions before and during finishing operations. Apply in accordance with manufacturer's written instructions after placing, screeding, and bull floating or darbying floor topping, but before float finishing.
- C. Begin curing immediately after finishing concrete floor topping. Cure by one or a combination of the following methods, in accordance with concrete floor topping manufacturer's written instructions:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with water.
 2. Curing Compound: Apply uniformly in two coats in continuous operations by power spray or roller in accordance with 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.

3.5 JOINT FILLING

- A. Prepare and clean contraction joints and install semirigid joint filler, in accordance with manufacturer's written instructions, once topping has fully cured.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth of contraction joints. Overfill joint and trim semirigid joint filler flush with top of joint after hardening.

3.6 REPAIR

- A. Defective Topping: Repair and patch defective concrete floor topping areas, including areas that have not bonded to concrete substrate.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Services: Testing and inspecting of completed applications of concrete floor toppings to take place in successive stages, in areas of extent and using methods as follows:
 1. Sample Sets: At point of placement, a set of three molded-cube samples to be taken from the topping mix for the first 1000 sq. ft. (93 sq. m), plus one set of samples for each subsequent 5000 sq. ft. (464 sq. m) of topping, or fraction thereof, but not less than six

- samples for each day's placement. Samples to be tested in accordance with ASTM C109/C109M for compliance with compressive-strength requirements.
2. Concrete floor topping to be tested for delamination by dragging a steel chain over the surface.
 3. Concrete floor topping to be tested for compliance with surface flatness and levelness tolerances.
- C. Remove and replace applications of concrete floor topping where test results indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 03 53 00

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SECTION 04 22 00
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete masonry units.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Miscellaneous masonry accessories.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
- C. Samples for Verification: For each type and color of the following:
 - 1. Exposed CMUs.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

- B. Material Certificates: For each type and size of the following:
1. Masonry units.
 - a. Include data on material properties
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 3. Mortar admixtures.
 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 5. Grout mixes. Include description of type and proportions of ingredients.
 6. Reinforcing bars.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.
- C. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- D. CMUs: ASTM C90.
 - 1. Unit Compressive Strength: Per Contract Documents
 - 2. Density Classification: Per Contract Documents
 - 3. Size (Width): As mentioned in Drawings.
 - 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
 - 5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: Per Contract Documents.
 - 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C91/C91M.
- E. Mortar Cement: ASTM C1329/C1329M.
- F. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Aggregate for Grout: ASTM C404.

H. Epoxy Pointing Mortar: ASTM C395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

I. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.6 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into masonry but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A641/A641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
3. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 (Z180) zinc coating.
4. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
5. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

2.7 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and Contract Documents

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
 - 4. Verify that substrates are free of substances that would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:
 - 1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
 - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
 - 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
 - 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.

5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- G. Fill cores in CMUs with grout.
- H. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- I. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- J. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- K. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.6 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry Per Contract Documents

3.7 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 12.67 ft.

3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform

tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

- B. Inspections: Special inspections Per Contract Documents
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

3.9 PARGING

- A. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.
- B. Damp-cure parging for at least 24 hours and protect parging until cured.

3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.11 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
 - 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 31 20 00 "Earth Moving."
 - 3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Shrinkage-resistant grout.
- B. Related Requirements:
 - 1. Section 03 30 00 Cast-in-Place Concrete
 - 2. Section 05 40 00 Cold-Formed Metal Framing
 - 3. Section 05 50 00 Metal Fabrications

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.
- B. Seismic-Force-Resisting System: Elements of structural-steel frame designated as "SFRS" or along grid lines designated as "SFRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches (38 mm).
 - 2. Welded built-up members with plates thicker than 2 inches (50 mm).
 - 3. Column base plates thicker than 2 inches (50 mm).
- D. Protected Zone: Structural members or portions of structural members indicated as "protected zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.
- E. Demand-Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the seismic-load-resisting system and which are indicated as "demand critical" or "seismic critical" on Drawings.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data:
 - 1. Structural-steel materials.
 - 2. High-strength, bolt-nut-washer assemblies.
 - 3. Anchor rods.
 - 4. Threaded rods.
 - 5. Forged-steel hardware.
 - 6. Prefabricated building columns.
 - 7. Shop primer.
 - 8. Galvanized-steel primer.
 - 9. Etching cleaner.
 - 10. Galvanized repair paint.
 - 11. Shrinkage-resistant grout.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declarations (EPDs) as specified on the drawings, if available.
- C. Shop Drawings: Show fabrication of structural-steel components.
 - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - 2. Include embedment Drawings.
 - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
 - 5. Identify members and connections of the seismic-load-resisting system.
 - 6. Indicate locations and dimensions of protected zones.
 - 7. Identify demand-critical welds.
 - 8. Identify members not to be shop primed.
- D. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide in accordance with AWS D1.1/D1.1M for each welded joint whether prequalified or qualified by testing, including the following:
 - 1. Power source (constant current or constant voltage).

2. Electrode manufacturer and trade name, for demand-critical welds.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Welding certificates.
- C. Mill test reports for structural-steel materials, including chemical and physical properties.
- D. Survey of existing conditions.
- E. Source quality-control reports.
- F. Field quality-control reports.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.
- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.
 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. ANSI/AISC 303.
 - 2. ANSI/AISC 341.
 - 3. ANSI/AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
 - 1. Option 1: Connection designs have been completed and connections indicated on the Drawings.
- C. Moment Connections: Type FR, fully restrained.
- D. Construction: Combined system of moment frame and braced frame.

2.2 STRUCTURAL-STEEL MATERIALS

- A. Refer to the plans.
- B. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. Refer to the plans.

2.4 RODS

- A. Refer to the plans.

2.5 PRIMER

- A. Steel Primer:
 - 1. Comply with Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

2.6 SHRINKAGE-RESISTANT GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

STRUCTURAL STEEL FRAMING

05 12 00 - 4

Fontana City Hall – Phase II

2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
 - 1. Camber structural-steel members where indicated.
 - 2. Fabricate beams with rolling camber up.
 - 3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
 - 4. Mark and match-mark materials for field assembly.
 - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Pretensioned.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 2. Surfaces to be field welded.
 3. Surfaces of high-strength bolted, slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
 6. Corrosion-resisting (weathering) steel surfaces.
 7. Surfaces enclosed in interior construction.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
1. SSPC-SP 2.
 2. SSPC-SP 3.
 3. SSPC-SP 7 (WAB)/NACE WAB-4.
 4. SSPC-SP 14 (WAB)/NACE WAB-8.
 5. SSPC-SP 11.
 6. SSPC-SP 6 (WAB)/NACE WAB-3.
 7. SSPC-SP 10 (WAB)/NACE WAB-2.
 8. SSPC-SP 5 (WAB)/NACE WAB-1.
 9. SSPC-SP 8.
- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner.
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.

4. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates: Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
- E. Splice members only where indicated.
- F. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
 - 1. Joint Type: Pretensioned.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 REPAIR

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
 - 1. Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Cleaning and touchup painting are specified in Section 09 91 13 "Exterior Painting."
- C. Touchup Priming: Cleaning and touchup priming are specified in Section 09 96 00 "High-Performance Coatings."

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
 - 1. Verify structural-steel materials and inspect steel frame joint details.
 - 2. Verify weld materials and inspect welds.
 - 3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - 1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 05 12 00

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SECTION 05 12 13

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Architecturally exposed structural steel (AESS).
- 2. Section 05 12 00 "Structural Steel Framing" requirements that also apply to AESS.

B. Related Requirements:

- 1. Section 05 50 00 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
- 2. Section 09 91 13 "Exterior Painting" Section 09 91 23 "Interior Painting" and Section 09 96 00 "High-Performance Coatings" for surface preparation and priming requirements.

1.3 DEFINITIONS

- A. Category AESS 1: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 1 and may be designated AESS 1 or Category AESS 1 in the Contract Documents.
- B. Category AESS 2: Structural steel that is categorized by ANSI/AISC 303, Section 10, as AESS 2 and is designated as AESS 2 or Category AESS 2 in the Contract Documents.
- C. SEAC/RMSCA Guide Specification: SEAC/RMSCA's "Sample Specification, Section 05 02 13: Architecturally Exposed Structural Steel."

1.4 COORDINATION

- A. Coordinate surface preparation requirements for shop-primed items.
- B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

1.5 PREINSTALLATION MEETINGS

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

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

05 12 13 - 1

Fontana City Hall – Phase II

1.6 ACTION SUBMITTALS

A. Product Data:

1. Tension-control, high-strength, bolt-nut-washer assemblies.
2. Corrosion-resisting (weathering steel), tension-control, high-strength, bolt-nut-washer assemblies.
3. Filler.
4. Primer.
5. Galvanized-steel primer.
6. Etching cleaner.
7. Galvanized repair paint.

B. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.

1. Identify AESS category for each steel member and connection, including transitions between AESS categories and between AESS and non-AESS.
2. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
3. Include embedment Drawings.
4. Indicate orientation of mill marks and HSS seams.
5. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.
6. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections. Indicate orientation and location of bolt heads.
7. Indicate exposed surfaces and edges and surface preparation being used.
8. Indicate special tolerances and erection requirements.
9. Indicate weep holes for HSS and vent holes for galvanized HSS.
10. Indicate surface preparation, primer, and coating requirements, including systems specified in other Sections.

C. Samples: Submit Samples to set quality standards for AESS.

1. Two steel plates, 3/8 by 8 by 4 inches, with long edges joined by a groove weld and with weld ground smooth.
2. Steel plate, 3/8 by 8 by 8 inches, with one end of a short length of rectangular steel tube, 4 by 6 by 3/8 inches, welded to plate with a continuous fillet weld and with weld ground smooth and blended.
3. Steel tube or pipe, minimum 8 inches in diameter, with end of another steel tube or pipe, approximately 4 inches in diameter, welded to its side at a 45-degree angle with a continuous fillet weld and with weld ground smooth and blended.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, and shop-painting applicator.

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

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172) and is experienced in fabricating AECS similar to that indicated on this Project.
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program, is designated an AISC-Certified Erector, Category CSE, and is experienced in erecting AECS similar to that indicated on this Project.
- C. Mockups: Build mockups of AECS to set quality standards for fabrication and installation.
 - 1. Build mockup of typical portion of AECS as shown on Drawings.
 - 2. Coordinate painting requirements with Section 099113 "Exterior Painting." Section 099123 "Interior Painting."
 - 3. Coordinate high-performance coatings requirements with Section 099600 "High-Performance Coatings."
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling AECS to prevent twisting, warping, nicking, and other damage during fabrication, delivery, and erection. Store materials to permit easy access for inspection and identification. Keep AECS members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect AECS members and packaged materials from corrosion and deterioration.
 - 1. Do not store AECS materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.10 FIELD CONDITIONS

- A. Field Measurements: Where AECS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of ANSI/AISC 303, Sections 1 through 9 and as modified in Section 10, "Architecturally Exposed Structural Steel."

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Tension-Control, High-Strength, Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, round-head assemblies consisting of steel structural bolts with splined

ends; ASTM A563, Grade DH, (ASTMA563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating.

- B. Corrosion-Resisting (Weathering) Steel, Tension-Control, High-Strength, Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 3, round-head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH3, (ASTM A563M, Class 10S3) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 3, hardened carbon-steel washers.

2.3 FILLER

- A. Polyester filler intended for use in repairing dents in automobile bodies.

2.4 PRIMER

- A. Steel Primer:

1. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

- B. Galvanized-Steel Primer: **[MPI#26] [MPI#80] [MPI#134]**.

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: **[MPI#18, MPI#19, or SSPC-Paint 20] [ASTM A780/A780M]**.

2.5 FABRICATION

- A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

1. Use special care handling and fabricating AESS before and after shop painting to minimize damage to shop finish.

- B. Category AESS 1:

1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

05 12 13 - 4

Fontana City Hall – Phase II

11. Remove backing and runoff tabs, and grind welds smooth.

C. Category AESS 2:

1. Comply with overall profile dimensions of AWS D1.1/D1.1M for welded built-up members. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
2. Prepare surfaces according to Part 2 "Shop Priming" Article and SSPC-SP 6 (WAB)/NACE WAB-3.
3. Grind sheared, punched, and flame-cut edges to remove burrs and provide smooth surfaces and eased edges.
4. Make intermittent welds appear continuous, using filler or additional welding.
5. Seal weld open ends of hollow structural sections with 3/8-inch closure plates.
6. Limit butt and plug weld projections to 1/16 inch.
7. Install bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
8. Remove weld spatter, slivers, and similar surface discontinuities.
9. Remove blemishes and surface irregularities resulting from temporary braces or fixtures by filling or grinding, before cleaning, treating, and shop priming.
10. Grind tack welds smooth unless incorporated into final welds.
11. Remove backing and runoff tabs, and grind welds smooth.
12. Limit as-fabricated straightness tolerance to one-half that permitted for structural-steel materials in ANSI/AISC 303.
13. Limit as-fabricated curved structural steel tolerance to that permitted for structural-steel materials in ANSI/AISC 303.
14. Limit as-fabricated straightness tolerance of welded built-up members to one-half that permitted by AWS D1.1/D1.1M.
15. Conceal fabrication and erection markings from view in the completed structure.
16. Make welds uniform and smooth.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened or Pretensioned as indicated on drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.7 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A123/A123M.
1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:
1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
 2. Surfaces to be field welded.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Corrosion-resisting (weathering) steel surfaces.
 5. Galvanized surfaces.
- B. Surface Preparation: Clean nongalvanized surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2.
 2. SSPC-SP 3.
 3. SSPC-SP 7 (WAB)/NACE WAB-4.
 4. SSPC-SP 14 (WAB)/NACE WAB-8.
 5. SSPC-SP 11.
 6. SSPC-SP 6 (WAB)/NACE WAB-3.
 7. SSPC-SP 10 (WAB)/NACE WAB-2.
 8. SSPC-SP 5 (WAB)/NACE WAB-1.
 9. SSPC-SP 8.
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner [**or according to SSPC-SP 16**].
- D. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
1. Stripe paint corners, crevices, bolts, welds, and eased edges.
 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments, showing dimensions, locations, angles, and elevations.
- B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Take special care during erection to avoid marking or distorting the AESS and to minimize damage to shop painting. Set AESS accurately in locations and to elevations indicated and according to ANSI/AISC 303 and ANSI/AISC 360.
 - 1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Take care to avoid any blemishes, holes, or unsightly surfaces resulting from the use or removal of temporary elements.
 - 2. Grind tack welds smooth.
 - 3. Remove backing and runoff tabs, and grind welds smooth.
 - 4. Orient bolt heads on the same side of each connection and maintain orientation consistently from one connection to another.
 - 5. Remove erection bolts in **[Category AESS 4]** <Insert category> AESS, fill holes with weld metal or filler, and grind or sand smooth to achieve surface quality approved by Architect.
 - 6. Fill weld access holes in **[Category AESS 4]** <Insert category> AESS with weld metal or filler and grind, or sand smooth to achieve surface quality as approved by Architect.
 - 7. Conceal fabrication and erection markings from view in the completed structure.
- B. In addition to ANSI/AISC 303, Section 10 requirements, comply with the following.
 - 1. Erection of **[Category AESS 1]** [and **Category AESS 2**]:
 - a. Erect AESS to the standard frame tolerances specified in ANSI/AISC 303 for non-AESS.
 - b. Comply with AWS D1.1/D1.1M. Keep appearance and quality of welds consistent. Maintain true alignment of members without warp exceeding specified tolerances.
 - c. Remove weld spatter, slivers, and similar surface discontinuities.
 - d. Grind off butt and plug weld projections larger than 1/16 inch.
 - e. Continuous welds shall be of uniform size and profile.
 - f. Ream holes that must be enlarged. Use of drift pins or burning is not permitted. Replace misaligned connection plates where holes cannot be aligned with acceptable appearance.
 - g. Splice members only where indicated on Drawings.
 - h. No torch cutting or field fabrication is permitted.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened or Pretensioned as indicated on plans.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

05 12 13 - 7

Fontana City Hall – Phase II

3.5 REPAIR

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and touchup galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting, to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting." Section 099123 "Interior Painting." Section 099600 "High-Performance Coatings."
- C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to inspect AESS as specified in Section 051200 "Structural Steel Framing." The testing agency is not responsible for enforcing requirements relating to aesthetic effect.
- B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

END OF SECTION 051213

SECTION 05 31 00
STEEL DECKING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Roof deck.
- 2. Composite floor deck.

- B. Related Requirements:

- 1. Section 05 12 00 "Structural Steel Framing" for shop- and field-welded shear connectors.
- 2. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
- 3. Section 09 91 13 "Exterior Painting" for repair painting of primed deck and finish painting of deck.
- 4. Section 09 91 23 "Interior Painting" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:

- 1. Roof deck.
- 2. Composite floor deck.

- B. Sustainable Design Submittals:

- 1. Environmental Product Declarations (EPDs) as indicated on the drawings, if available.

- C. Shop Drawings:

- 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck, accessory, and product indicated.

- C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
- D. Research Reports: For steel deck, from ICC-ES.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those steel deck units tested for fire resistance per ASTM E 119 by a testing and inspection agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Calculate structural characteristics of steel deck according to AISI's "Specification for the Design of Cold-Formed Steel Structural Members."
- E. FM Listing: Provide steel roof deck evaluated by FM and listed in FM's "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 50, G60 zinc coating unless otherwise indicated.
 2. Deck Profile: As indicated.
 3. Profile Depth: As indicated.
 4. Design Uncoated-Steel Thickness: As indicated.
 5. Span Condition: As indicated.
 6. Side Laps: As indicated.

2.3 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS) Grade 50, G60 (Z180) zinc coating unless otherwise indicated.
 2. Profile Depth: As indicated.
 3. Design Uncoated-Steel Thickness: As indicated.
 4. Span Condition: As indicated.
 5. Vent Tabs: Steel deck supporting concrete fill shall have factory punched vent tabs, unless otherwise noted on the Drawings. Steel deck without concrete fill shall not be vented.

2.4 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

- H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.
- I. Galvanizing Repair Paint: ASTM A780/A780M.
- J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

- A. Fasten roof-deck panels to steel supporting members as indicated on the Drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on drawings.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints lapped 2 inches minimum or butted at Contractor's option.
- D. Roof Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld at each corner.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

3.4 INSTALLATION OF FLOOR DECK

- A. Fasten floor-deck panels to steel supporting members as indicated on the Drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as indicated on Drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches with end joints lapped 2 inches minimum or butted at Contractor's option.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.5 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Repair Painting:
 - 1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
 - 2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."
 - 4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 09 91 13 "Exterior Painting" and Section 09 91 23 "Interior Painting."

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

END OF SECTION 05 31 00

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.
2. Interior non-load-bearing wall framing.
3. Ceiling joist framing.
4. Soffit framing.

B. Related Requirements:

1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 09 21 16.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
3. Section 09 22 16 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing.
4. Vertical deflection clips.
5. Single deflection track.
6. Double deflection track.
7. Drift clips.

- B. Sustainable Design Submittals: Environmental Product Declarations (EPDs) as listed on the drawings, if available.

C. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

D. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Research Reports:

1. For nonstandard cold-formed steel post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
2. For sill sealer gasket/termite barrier, showing compliance with ICC-ES AC380.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency[, **or in-house testing with calibrated test equipment,**] indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association.

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Furnish products as Manufactured by a Manufacturing member of the Steel Stud Manufacturers Association (SSMA) www.ssma.com.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on the Drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Framing:
 - 1) Members supporting gypsum board or metal panels: 1/240 of the span.
 - 2) Members supporting plaster or stucco: 1/360 of the span.
 - 3) Members supporting brick or stone: 1/600 of the span.
 - b. Interior Framing:
 - 1) Deflection of 1/360 of the span for live load only
 - 2) Deflection of 1/240 of the span for dead plus live loads
 - 3) Interior framing shall be designed for a minimum lateral load of 5-psf.
 - 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 80 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 1/2 inch.
 - 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 - 1. Floor and Roof Systems: AISI S210.
 - 2. Wall Studs: AISI S211.
 - 3. Headers: AISI S212.
 - 4. Lateral Design: AISI S213.

2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Studs: ASTM C955, formed to "C" shape, punched web, in sizes and gauges noted on drawings.
 - 1. 18 gauge and lighter: Grade 33 ksi.
 - 2. 16 gauge and heavier: 50 ksi.
 - 3. Protective coating conforming to ASTM A1003, G60 minimum, or equivalent corrosion resistance, or shall have a rust inhibitive coating providing equivalent corrosion resistance.
- B. Track: Formed steel; channel shaped; same width as studs, tight fit; per construction documents.
- C. Framing Connectors: Factory-made, formed steel sheet.
 - 1. Material: ASTM A653/A653M SS Grade 33 and 40 (minimum), with G90/Z275 hot dipped galvanized coating for base metal thickness less than 10 gage, 0.1345 inch, and factory punched holes and slots.
 - 2. Structural Performance: Maintain load and movement capacity required by applicable code, when evaluated in accordance with AISI S100.
 - 3. Movement Connections: Provide mechanical anchorage devices that accommodate movement using slotted holes, shouldered screws or screws and anti-friction or stepped bushings, while maintaining structural performance of framing. Provide movement connections where indicated on drawings.
 - a. Where continuous studs bypass elevated floor slab, connect stud to slab in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - b. Where top of stud wall terminates below structural floor or roof, connect studs to structure in manner allowing vertical and horizontal movement of slab without affecting studs; allow for minimum movement of 1/2 inch.
 - c. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.
 - 4. Fixed Connections: Provide non-movement connections for tie-down to foundation, floor-to-floor tie-down, roof-to-wall tie-down, joist hangers, gusset plates, and stiffeners.
 - 5. Wall Stud Bridging Connections: Provide mechanical load-transferring devices that accommodate wind load torsion and weak axis buckling induced by axial compression loads. Provide bridging connections where indicated on the drawings.

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.
 - 4. Anchor clips.
 - 5. End clips.
 - 6. Foundation clips.
 - 7. Gusset plates.
 - 8. Stud kickers and knee braces.

9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C or mechanically deposition according to ASTM B 695, Class 50.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.
 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or ASTM A780.
- B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

2.7 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 1. Fabricate framing assemblies using jigs or templates.
 2. Cut framing members by sawing or shearing; do not torch cut.
 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

- b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Grout bearing surfaces uniform and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

3.3 ERECTION:

- A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" (AISI S200-12), ASTM C 1007, accepted shop drawings, and to manufacturer's written instructions.
- B. Align floor and ceiling tracks; locate to wall and partition layout. Secure in place with fasteners or welding at maximum 16 inches O.C. Coordinate installation of sealant with floor and ceiling tracks.
- C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
- D. Cut framing members by sawing or shearing; do not torch cut.
- E. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting.
 - 1. Wire tying of framing members is not permitted.
 - 2. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 3. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

COLD-FORMED METAL FRAMING

05 40 00 - 6

Fontana City Hall – Phase II

- F. Place studs as indicated on drawings; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using fastener or welding method.
- G. Construct corners using minimum three studs. Double stud wall openings, door and window jambs.
- H. Erect load bearing studs one-piece full length. Splicing of studs is not permitted.
- I. Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.
- J. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- K. Install intermediate studs above and below openings to align with wall stud spacing.
- L. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- M. Attach cross studs to studs for attachment of fixtures anchored to walls.
- N. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- O. Backing:
 - 1. Provide sheet metal backing/blocking for support of all wall mounted equipment and fixtures including, but not limited to, plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, handrails, grab bars, mirrors, marker and tack boards, draperies and other wall mounted items.
 - 2. Coordinate with other trades for proper size, spacing, thickness and attachment requirements.
 - 3. Provide 20 gauge sheet metal unless otherwise shown on the drawings or required by a specific item.
- P. Touch-up field welds and damaged galvanized and primed surfaces with primer.
- Q. Refer to drawings for locations of partitions extending to ceiling only and partitions extending through ceiling to structure above.
- R. Provide double studs, back to back, for location of expansion joints in gypsum board at 30 foot O.C. Maximum.

3.4 INSTALLATION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and 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.

3.5 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Exterior Sheathing: Protect paper-surfaced gypsum sheathing that will be exposed to weather for more than 30 days by covering exposed exterior surface of sheathing with a securely fastened weather barrier as specified, or other approved temporary cover. Apply covering immediately after sheathing is installed. Protect cutouts, corners, and joints in sheathing by filling with a flexible sealant or by applying tape recommended by sheathing manufacturer at time sheathing is applied.
- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Miscellaneous framing and supports.
- 2. Metal ladders.
- 3. Miscellaneous steel trim.
- 4. Metal wire mesh screen
- 5. Custom steel and cables fence.
- 6. Custom metal wall base.

- B. Products furnished, but not installed, under this Section include the following:

- 1. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

1.3 RELATED REQUIREMENTS

- A. Section 05 12 00 "Structural Steel Framing" for steel framing, supports, and other steel items attached to the structural-steel framing.

1.4 COORDINATION

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

1.5 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. Include this article as a reference in all pertinent sections of projects with CAL-Green sustainable requirements.
- C. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- D. Include the following reference in sections specifying work related to accessibility, stairs, flooring, guardrails, tactile paving, etc. Suitable for all jobs.
- E. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.6 ACTION SUBMITTALS

- A. Product Data:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Fasteners.
 - 3. Shop primers.
 - 4. Shrinkage-resisting grout.
 - 5. Metal Ladder
 - 6. Metal wire mesh screen.
 - 7. Miscellaneous steel trim.
 - 8. Custom metal wall base.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
 - 2. Metal ladders.
 - 3. Miscellaneous steel trim.
 - 4. Custom metal wall base.
- C. Delegated Design Submittals: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Mill Certificates: Signed by stainless steel manufacturers, certifying that products furnished comply with requirements.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

- D. Research Reports: For post-installed anchors.
- E. Delegated design engineer qualifications.

1.8 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following welding codes:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.9 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design ladders.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304 .
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304 .
- E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: As indicated.

2. Galvanized Steel: ASTM A653/A653M, structural steel, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.
 3. Cold-Rolled Steel: ASTM A1008/A1008M, structural steel, Grade 33 (Grade 230); minimum thickness; hot-dip galvanized after fabrication.
- H. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.
- I. Aluminum Plate and Sheet: ASTM B209 (ASTM B209M), Alloy 6061-T6.
- J. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063-T6.
- K. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.
- L. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
1. Provide stainless steel fasteners for fastening aluminum, stainless steel, or nickel silver.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A (ISO 898-1, Property Class 4.6); with hex nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325 (Grade A325M), Type 3, heavy-hex steel structural bolts; ASTM A563, Grade DH3, (ASTM A563M, Class 10S3) heavy-hex carbon-steel nuts; and where indicated, flat washers.
- D. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593 (ISO 3506-1); with hex nuts, ASTM F594 (ASTM F836M); and, where indicated, flat washers; Alloy Group 1 (A1).
- E. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563 (ASTM A563M); and, where indicated, flat washers.
1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Anchors, General: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.
- G. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- H. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 (ISO 3506-1), and nuts, ASTM F594 (ASTM F836M).
- I. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 09 91 23 "Interior Painting," and Section 09 96 00 "High-Performance Coatings."
- B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- C. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- D. Primer: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints and coatings specified to be used over it.
1. Material: Tnemec Series 94-H₂O Hydro-Zinc Primer, or an equivalent product meeting requirements.
 - a. Substitutions: Per Division 01.
 2. Generic Class: Organic Zinc-Rich Urethane, single component.
 3. VOC Content: All paints and coatings within the vapor barrier must meet the VOC levels listed in pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
 4. Volume Solids: 62 percent.
 5. Salt Spray (Fog) Testing (30,000 Hours): Passed, per ASTM B 117.
 6. Prohesion Testing (15,000 Hours): Passed, per ASTM G 85.
 7. Surface Preparation: SSPC-SP6/NACE No. 3.
 - a. For severe (immersion) exposure SSPC-SP 10/NACE No. 2 is required.
 8. Application: Follow coating manufacturer's printed instructions.
 - a. Number of Coats: One.
 - b. Dry Film Thickness: 2.5 to 3.5 mils DFT.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- F. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts for units installed after concrete is placed.

- C. Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 METAL LADDERS

A. General:

1. Comply with ANSI A14.3, except for elevator pit ladders.

B. Steel Ladders:

1. Space siderails 18 inches (457 mm) apart unless otherwise indicated.
2. Siderails: Continuous, steel flat bars, size as indicated on Drawings, with eased edges.
3. Rungs: 3/4-inch- (19-mm-) diameter, steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch (12 mm) in least dimension.
7. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets.
8. Prime exterior ladders, including brackets and fasteners, with primer specified in Section 09 96 00 "High-Performance Coatings."

2.8 METAL WIRE MESH SCREEN

- A. Produce the same pattern wire mesh screen as indicated on Drawings.

2.9 CUSTOM METAL WALL BASE (MB1)

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Size: 6-inches high
- C. Finish: As indicated on Drawings.

2.10 CUSTOM STEEL AND CABLES FENCE

- A. Unless otherwise indicated, fabricate steel and cable fence from steel shapes, and bars of profiles shown with continuously welded joints.

- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- C. Galvanize and prime exterior miscellaneous steel trim.

2.11 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize and prime exterior miscellaneous steel trim.
- D. Prime exterior miscellaneous steel trim with primer specified in Section 09 96 00 "High-Performance Coatings."

2.12 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.13 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean galvanized surfaces of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless primers specified in Section 09 96 00 "High-Performance Coatings" are indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 3. Items Indicated to Receive Primers Specified in Section 09 96 00 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 4. Other Steel Items: SSPC-SP 3, "Power Tool Cleaning."
 5. Galvanized-Steel Items: SSPC-SP 16, "Brush-off Blast Cleaning of Coated and Uncoated Galvanized Steel, Stainless Steels, and Non-Ferrous Metals."
- E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- F. Primer: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints and coatings specified to be used over it.
1. Material: Tnemec Series 94-H₂O Hydro-Zinc® Primer, or an equivalent product meeting requirements.
 - a. Substitutions: Section 01 25 00.
 2. Generic Class: Organic Zinc-Rich Urethane, single component.
 3. VOC Content: All paints and coatings within the vapor barrier must meet the VOC levels listed in pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
 4. Volume Solids: 62 percent.
 5. Salt Spray (Fog) Testing (30,000 Hours): Passed, per ASTM B 117.
 6. Prohesion Testing (15,000 Hours): Passed, per ASTM G 85.
 7. Surface Preparation: SSPC-SP6/NACE No. 3.
 - a. For severe (immersion) exposure SSPC-SP 10/NACE No. 2 is required.
 8. Application: Follow coating manufacturer's printed instructions.
 - a. Number of Coats: One.
 - b. Dry Film Thickness: 2.5 to 3.5 mils DFT.
- 2.15 ALUMINUM FINISHES
- A. As-Fabricated Finish: AA-M12.
 - B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

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

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

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

3.3 INSTALLATION OF METAL LADDERS

- A. Secure ladders to adjacent construction with the clip angles attached to the stringer.
- B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

3.4 INSTALALTION OF METAL WIRE MESH SCREEN

- A. Anchor to masonry construction to comply with manufacturer's written instructions.

3.5 INSTALLATION OF CUSTOM STEEL AND CABLE FENCE

- A. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
- B. Secure fence to adjacent construction with manufacturer's written instructions.
- C. Top Rail: Install in accordance with ASTM F567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
- D. Intermediate and Bottom Rails: Secure to posts with fittings.

3.6 INSTALLATION OF MISCELLANEOUS STEEL TRIM

- A. Anchor to concrete construction to comply with manufacturer's written instructions.

3.7 INSTALLATION OF LOOSE BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.8 REPAIRS

- A. Touchup Painting:

1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
 2. Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 96 00 "High Performance Coating" and Section 09 91 23 "Interior Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 05 51 13
METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel stairs with concrete-filled treads.

1.3 ACTION SUBMITTALS

- A. Product Data: For metal pan stairs.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: Per drawings.
- C. Steel Tubing: Per drawings.
- D. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, structural steel, Grade 30 (Grade 205), unless another grade is required by design loads.

2.2 FASTENERS

- A. Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

2.3 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with" Section 09 91 23 "Interior Painting," and Section 09 96 00 "High-Performance Coatings."
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.4 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

2.5 STEEL-FRAMED STAIRS

- A. Stair Framing:
 - 1. Fabricate stringers of steel members per drawings.
 - a. Provide closures for exposed ends of channel stringers.
 - 2. Construct platforms of steel member headers and miscellaneous framing members as indicated on drawings.
 - 3. Weld or bolt stringers to headers per drawings; weld or bolt framing members to stringers and headers per drawings.If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

- B. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness indicated per drawings.

2.6 FINISHES

- A. Finish metal stairs after assembly.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints.
- D. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- E. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place Concrete."

3.2 ADJUSTING AND CLEANING

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

END OF SECTION 05 51 13

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SECTION 05 52 13
PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel railings.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-In-Place Concrete"
 - 2. Section 05 12 00 "Structural Steel Framing"
 - 3. Section 05 51 13 "Metal Pan Stairs."
 - 4. Section 06 10 53 "Miscellaneous Rough Carpentry"
 - 5. Section 09 29 00 "Gypsum Board"
 - 6. Section 09 96 00 "High Performance Coating"

1.3 COORDINATION

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

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."

1.5 ACTION SUBMITTALS

- A. Product Data:

1. Manufacturer's product lines of mechanically connected railings.
2. Metal fabric infill.
3. Fasteners.
4. Post-installed anchors.
5. Handrail brackets.
6. Bituminous paint.
7. Nonshrink, nonmetallic grout.
8. Anchoring cement.
9. Metal finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
2. Fittings and brackets.
3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
 - a. Show method of connecting and finishing members at intersections.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For delegated design professional engineer .
- B. Welding certificates.
- C. Product Test Reports: For tests on railings performed by a qualified testing agency, in accordance with ASTM E894 and ASTM E935.
- D. Research Reports: For post-installed anchors, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.7 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.9 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Infill load and other loads need not be assumed to act concurrently.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 STEEL RAILINGS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Tubing: ASTM A500/A500M (cold formed) or ASTM A513/A513M, Type 5.
- C. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- D. Plates, Shapes, and Bars: ASTM A36/A36M.
- E. Cast Iron Fittings: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.4 FASTENERS

A. Fastener Materials:

1. Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
2. Stainless Steel Railing Components: Type 304 stainless steel fasteners.
3. Finish exposed fasteners to match appearance, including color and texture, of railings.

B. Fasteners for Anchoring Railings to Other Construction: Countersink bolt heads and screws on finished surface or cut flush with surface.

C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Handrail Brackets:

1. Steel brackets as detailed at steel handrails.

B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. For stainless steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

C. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Section 09 96 00 "High-Performance Coatings."

E. Bituminous Paint: Cold-applied asphalt emulsion, complying with ASTM D1187/D1187M.

F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations and where indicated on Drawings, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
 1. Clearly mark units for reassembly and coordinated installation.
 2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
 1. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated.
 2. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water.
 1. Provide weep holes where water may accumulate.
 2. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.
- I. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 1. Fabricate splice joints for field connection, using an epoxy structural adhesive, if this is manufacturer's standard splicing method.
- J. Form changes in direction as follows:
 1. As detailed.

- K. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.
 - 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
 - 2. Coordinate anchorage devices with supporting structure.
- P. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.
- Q. For removable railing posts, fabricate slip-fit sockets from stainless steel tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height.
 - 1. Provide socket covers designed and fabricated to resist being dislodged.
 - 2. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
- R. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

2.7 STEEL AND IRON FINISHES

- A. Galvanized Railings:
 - 1. Hot-dip galvanize exterior steel railings, including hardware, after fabrication.
 - 2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
 - 3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
 - 4. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - 5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
 - 1. Comply with SSPC-SP 16.
- D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1 for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
- E. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1 for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - 1. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
 - 1. Fit exposed connections together to form tight, hairline joints.
 - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
 - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 - 4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
 - 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches (50 mm) beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches (150 mm) of post.

3.4 ANCHORING POSTS

- A. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.
- B. Install removable railing sections, where indicated, in slip-fit stainless steel sockets cast in concrete.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends to concrete and masonry with flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends .
- C. Attach handrails to walls with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch (38-mm) (unless noted otherwise on Drawings) clearance from inside face of handrail and finished wall surface.
 - 1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as indicated on Drawings.
- E. Woven-Wire Mesh: Install per manufacturer's written instructions and as shown on the Drawings.

3.6 CLEANING

- A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

PIPE AND TUBE RAILINGS

05 52 13 - 8

Fontana City Hall – Phase II

- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 13

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SECTION 05 73 13
GLAZED DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glazed decorative metal railings.

1.3 RELATED REQUIREMENTS

- A. Section 01 81 13 "Sustainable Design Requirements."

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.
- D. International Code Council Evaluation Service (ICC-ES):
 - 1. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements.
 - 2. ICC-ES AC308 – Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
- E. The Society for Protective Coatings (SSPC):
 - 1. SSPC-PA 1 - Shop, Field and Maintenance Coating of Metals.

1.5 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas and exterior deck areas and for pedestrian guidance and support, visual separation, or wall protection.

1.6 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not meet structural performance requirements.

1.7 PREINSTALLATION MEETINGS

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

1.8 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
 - 1. Glass products.
 - 2. Metal railings assembled from standard components.
 - 3. Glazing cement and accessories for structural glass railings.
 - 4. Sealant and accessories for structural glass railings.
 - 5. Fasteners.
 - 6. Shop primer.
 - 7. Bituminous paint.
 - 8. Nonshrink, nonmetallic grout.
 - 9. Anchoring cement.
- B. Shop Drawings: Include plans, elevations, sections, and attachment details.
- C. Samples: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, posts, and balusters.
 - 2. Each type of infill panel required.
 - 3. Fittings and brackets.
 - 4. Welded connections.
 - 5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.

1.9 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Evaluation Reports: From ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
 - 1. For glazed decorative metal railings.
 - 2. For post-installed anchors.

1.10 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches (600 mm) in length.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.11 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in pertinent Section.
- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Infill load and other loads need not be assumed to act concurrently.
 - 3. Glass-Supported Railings: Support each section of top rail by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior railings by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Regulatory Requirements: Conform to 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991;

GLAZED DECORATIVE METAL RAILINGS

05 73 13 - 3

Fontana City Hall – Phase II

updated 2010, ANSI A117.1 and local code for requirements applicable for installing work for disabled accessibility.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods, including structural analysis, preconstruction testing, field testing, and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

2.3 DECORATIVE GLASS METAL GUARDRAIL

2.4 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
 - 1. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.

2.5 STAINLESS STEEL

- A. Pipe: ASTM A312/A312M, Grade TP 304.
- B. Sheet, Strip, Plate, and Flat Bar: ASTM A 666 or ASTM A 240/A 240M, Type 304.
- C. Bars and Shapes: ASTM A276, Type 304.

2.6 GLASS AND GLAZING MATERIALS

- A. Safety Glazing: Glazing shall comply with 16 CFR 1201, Category II.
- B. Laminated Glass: ASTM C 1172, Condition A (uncoated), Type I (transparent flat glass), Quality-Q3 with two plies of glass and polyvinyl butyral interlayer not less than 0.060 inch (1.52 mm) thick.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide:
 - 2. Decorative Glass: As selected by Architect.
 - 3. Kind: Laminated Tempered.
 - 4. Glass Color: Clear, low iron.

GLAZED DECORATIVE METAL RAILINGS

05 73 13 - 4

Fontana City Hall – Phase II

5. Interlayer Color: Clear.

- C. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- D. Glazing Cement and Accessories for Structural Glazing: Glazing cement, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal subrails.
 - 1. Glazing Cement: Nonshrinking organic cement designed for curing by passing an electric current through metal subrail holding glass panel, as standard with manufacturer.

2.7 FASTENERS

- A. Fastener Materials:
 - 1. Aluminum Components: Type 304 stainless-steel fasteners.
 - 2. Stainless-Steel Components: Type 304 stainless-steel fasteners.
 - 3. Galvanized-Steel Components: Type 304 stainless-steel fastener..
 - 4. Dissimilar Metals: Type 304 stainless-steel fastener..
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are unavoidable.
 - 1. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.

2.8 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.9 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- F. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- G. Form changes in direction as follows:
 - 1. As detailed.
- H. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- I. Close exposed ends of hollow railing members with welded end fittings.
- J. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns.
- K. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and to prevent bracket or fitting rotation and crushing of substrate.

2.10 GLAZING PANEL FABRICATION

- A. General: Fabricate to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
 - 1. Clean-cut or flat-grind edges at butt-glazed sealant joints to produce square edges with slight chamfers at junctions of edges and faces.
 - 2. Grind smooth exposed edges, including those at open joints, to produce square edges with slight chamfers at junctions of edges and faces.

GLAZED DECORATIVE METAL RAILINGS

05 73 13 - 6

Fontana City Hall – Phase II

2.11 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.
- C. Directional Satin Finish: No. 4.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- E. High-Performance Organic Finish: Three-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Colors and Gloss: As indicated on the Drawings, if none are shown, Architect will select from manufacturer's full range.
 - 2. Coatings Manufacturers:
 - a. PPG Industries, Inc.
 - b. Sherwin-Williams.
 - c. Valspar Corporation.
- F. Exposed surfaces shall be free of scratches and other serious blemishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Installer present for compliance with requirements, installation tolerances, and other conditions affecting performance of the work.
- B. Verify preparatory work by other trades is complete.
 - 1. Verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

GLAZED DECORATIVE METAL RAILINGS

05 73 13 - 7

Fontana City Hall – Phase II

- C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 INSTALLING GLASS PANELS

- A. Glass-Supported Railings: Install assembly to comply with railing manufacturer's written instructions.
 - 1. Attach base channel to building structure, then insert and connect factory-fabricated and -assembled glass panels.
 - a. Support glass panels in base channel at quarter points with channel-shaped setting blocks that also act as shims to maintain uniform space for glazing cement. Fill remaining space in base channel with glazing cement for uniform support of glass.
 - 2. Adjust spacing of glass panels so gaps between panels are equal before securing in position.
 - 3. Erect glass railings under direct supervision of manufacturer's authorized technical personnel.
 - 4. Do not cut, drill, or alter glass panels in field. Protect edges from damage.

3.4 ATTACHING RAILINGS TO WALLS

- A. As noted on drawings.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and to prepare test reports.
- B. Extent and Testing Methodology: Testing agency will randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Test railings according to ASTM E 894 and ASTM E 935 for compliance with performance requirements.

- C. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to Architect and comply with specified requirements.
- D. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

3.6 CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with water and soap, rinsing with clean water, and wiping dry.
- B. Clean and polish glass as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion.

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 73 13

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SECTION 06 10 53
MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Framing with dimension lumber.
 - 2. Wood blocking and nailers.
 - 3. Plywood backing panels.

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

1.5 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater size but less than 5 inches nominal (114 mm actual) size in least dimension.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include

physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.7 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

1.8 QUALITY ASSURANCE

- ### A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.9 DELIVERY, STORAGE, AND HANDLING

- ### A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- ### A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Dress lumber, S4S, unless otherwise indicated.
- ### B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPAC U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 - 2. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 3. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
 - 1. Concealed blocking.
 - 2. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Spruce-pine-fir; NLGA.
 - 3. Hem-fir; WCLIB or WWPA.
 - 4. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 - 5. Western woods; WCLIB or WWPA.
- C. Concealed Boards: 15 percent maximum moisture content of any of the following species and grades:
 - 1. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 - 2. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 - 3. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Screws for Fastening to Metal Framing: ASTM C1002 length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308 as appropriate for the substrate.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- E. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
- F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- H. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
 - a. Table 2304.9.1, "Fastening Schedule," in California Building Code.
 - 2. ICC-ES evaluation report for fastener.
- J. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

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SECTION 06 16 00
SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wall sheathing.
 - 2. Parapet sheathing.
 - 3. Sheathing joint and penetration treatment.
- B. Related Requirements:
 - 1. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
 - 1. Wall sheathing.
 - 2. Parapet sheathing.
 - 3. Sheathing joint-and-penetration treatment materials.
- B. Product Data Submittals: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- C. Shop Drawings: For glass-mat gypsum sheathing assemblies.
 - 1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
 - 2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing and inspecting agency.

- B. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - 1. Installer is to be licensed by ABAA in accordance with ABAA's Quality Assurance Program and is to employ ABAA-certified installers and supervisors on Project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WALL SHEATHING

- A. Paper-Surfaced Gypsum Sheathing: ASTM C1396/C1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.
 - 1. Acceptable Manufacturers: Subject to compliance to requirements, provide an approved product from one of the following manufacturers:
 - a. Georgia-Pacific Gypsum
 - b. American Gypsum
 - c. CertainTeed Corporation.
 - d. USG Corporation.
 - 2. Type and Thickness: As indicated on Drawings.
 - 3. Edge and End Configuration: Square.
 - 4. Size: As per manufacturers standard size for vertical installation.
- B. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.
 - 1. Basis-of-Design Product: DensGlass Sheathing product as manufactured by Georgia-Pacific Gypsum, LLC; web: www.gp.com.
 - 2. Other Acceptable Manufacturers: Subject to compliance to requirements, provide an approved product from one of the following manufacturers:
 - a. CertainTeed Corporation.

- b. Continental Building Products, LLC.
 - c. National Gypsum Company.
 - d. USG Corporation.
- 3. Thickness: As indicated on Drawings.
 - 4. Size: As per manufacturer's standard size.
 - 5. Edge and End Configuration: Square.

2.3 PARAPET SHEATHING

- A. Basis-of-Design Product: DensGlass Sheathing product as manufactured by Georgia-Pacific Gypsum, LLC; web: www.gp.com.
 - 1. Other Acceptable Manufacturers: Subject to compliance to requirements, provide an approved product from one of the following manufacturers:
 - a. CertainTeed Corporation.
 - b. National Gypsum Company.
 - c. USG Corporation.
 - 2. Size: As per manufacturer's standard size.
 - 3. Type and Thickness: As indicated on Drawings.
- B. Parapets, Roof Membrane Application: Provide roof board at roof-side of parapet walls scheduled to receive roof membrane full height of parapet wall, refer to Section 07 54 23.

2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
 - 1. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C954.

2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Paper-Surfaced and Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 079200 "Joint Sealants."
- B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 1. Table 2304.10., "Fastening Schedule," in the ICC's California Building Code (CBC).
 2. ICC-ES evaluation report for fastener.
- D. Coordinate wall and parapet sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 INSTALLATION OF GYPSUM SHEATHING

- A. Comply with GA-253 and with manufacturer's written instructions.
 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 2. Install panels with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
 3. Install panels with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
 1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.
- D. Seal sheathing joints in accordance with sheathing manufacturer's written instructions.
 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.

2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 06 16 00

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SECTION 06 20 23
INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- 1. Interior wood trim, including wood door frames.
- 2. Interior solid wood base.
- 3. Interior wood veneer paneling.

1.3 RELATED REQUIREMENTS:

- A. Section 01 43 39 "Mockup Requirements"
- B. Section 09 91 23 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- C. ADA Standards – Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. North American Architectural Woodwork Standards - 3.1 (NAAWS), 2017 edition, published jointly by:
 - 1. Woodwork Institute, <http://woodworkinstitute.com>.
 - 2. Architectural Woodwork Manufacturers Association of Canada, <http://awmac.com>.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product indicated, demonstrate compliance with specified attributes.
- B. Samples for Verification:
 - 1. For each species and cut of lumber and panel products with non-factory-applied finish, with half of exposed surface finished; 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

1.6 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup of typical door frame as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in pertinent section.
- B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in pertinent section.
- C. Lumber: DOC PS 20.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece.

- D. Softwood Plywood: DOC PS 1.
- E. Hardboard: ANSI A135.4.
- F. Composite Wood and Agrifiber Products: Provide materials that meet or exceed requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Particleboard: Not Permitted.
 - 2. Hardboard: Comply with American Hardboard Association AHA A135.4.
 - 3. Industrial Grade Medium Density Fiberboard (MDF) manufactured with a formaldehyde-free adhesive system which meets the physical properties of ANSI A208.2, Grade 155 specifications.
 - a. Product: Medite II MDF as manufactured by Roseburg, Dillard, OR; tel: (800) 245-1115, web: www.roseburg.com .
 - b. SCS certified for pre-consumer recycled wood fiber content.
 - 4. Interior High Moisture Areas: Industrial Grade Medium Density Fiberboard (MDF) manufactured with a formaldehyde-free adhesive system which meets the physical properties of ANSI A208.2, Grade 155 specifications.
 - a. Product: Medex MDF as manufactured by Roseburg, Dillard, OR; tel: (800) 245-1115, web: www.roseburg.com .
 - b. SCS certified for pre-consumer recycled wood fiber content.
 - 5. Class 1 (A) Rated Interior Finish Areas: Industrial Grade Medium Density Fiberboard (MDF) manufactured with a formaldehyde-free adhesive system and certified as a Class 1 Flame Retardant panel in accordance with ASTM E84.
 - a. Product: Medite FR MDF as manufactured by Roseburg, Dillard, OR; tel: (800) 245-1115, web: www.roseburg.com .
 - b. SCS certified for pre-consumer recycled wood fiber content.

2.2 INTERIOR SOLID WOOD BASE

- A. Architectural Woodwork Standards Grade: Premium.
- B. Wood Base: 16 inch solid maple base.
- C. Finish: As indicated on Drawings.

2.3 INTERIOR WOOD VENEER PANELING

- A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1.
 - 1. Face Veneer Species and Cut: quarter cut maple veneer.
 - 2. Veneer Matching: Selected for similar color and grain.
 - 3. Backing Veneer Species: ¾ inch MDF
 - 4. Construction: Veneer core.
 - 5. Thickness: As indicated on Drawings.
 - 6. Panel Size: As indicated on Drawings.

7. Glue Bond: Type II (interior).
8. Face Pattern: Manufacturer's standard V-grooved pattern, with grooves at edges, center, and third points of panels, and at other locations to provide pattern resembling random-width boards.
9. Finish: As indicated on Drawings.

2.4 MISCELLANEOUS MATERIALS

- A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- B. Multipurpose Construction Adhesive: Formulation complying with ASTM D3498 that is recommended for indicated use by adhesive manufacturer.
- C. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

2.5 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 1. Interior standing and running trim, except shoe and crown molds.
 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 1. Use concealed shims where necessary for alignment.
 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.

3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.

3.3 INSTALLATION OF INTERIOR TRIM

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 1. Do not use pieces less than 24 inches (610 mm) long, except where necessary.
 2. Stagger joints in adjacent and related standing and running trim.
 3. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
 4. Use scarf joints for end-to-end joints.
 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 7. Install trim after gypsum-board joint finishing operations are completed.
 8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
 9. Fasten to prevent movement or warping.
 10. Countersink fastener heads on exposed carpentry work and fill holes.

3.4 INSTALLATION OF INTERIOR WOOD BASE

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long, except where necessary.

3.5 INSTALLATION OF INTERIOR WOOD VENEER PANELING

- A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels.
 1. Leave 1/4-inch (6-mm) gap to be covered with trim at top, bottom, and openings.
 2. Install with uniform tight joints between panels.
 3. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners.
 4. Space fasteners and adhesive as recommended by panel manufacturer.
 5. Conceal fasteners to greatest practical extent.
 6. Arrange panels with grooves and joints over supports.
 - a. Fasten to supports with nails of type and at spacing recommended by panel manufacturer.
 - b. Use fasteners with prefinished heads matching groove color.

3.6 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.

1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

B. Adjust joinery for uniform appearance.

3.7 CLEANING

A. Clean interior finish carpentry on exposed and semiexposed surfaces.

B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.8 PROTECTION

A. Protect installed products from damage from weather and other causes during construction.

B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.

1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 20 23

SECTION 06 41 13
WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood cabinets for transparent finish.
2. Wood cabinets for opaque finish.
3. Wood materials.
4. Fire-retardant-treated material.
5. Cabinet hardware and accessories.
6. Miscellaneous materials.
7. Shop finishing.

B. Related Requirements:

1. Section 06 10 00 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.2 COORDINATION

- A.** Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

A. Product Data:

1. Wood cabinets for transparent finish.
2. Wood cabinets for opaque finish.
3. Wood materials.
4. Fire-retardant-treated material.
5. Cabinet hardware and accessories.
6. Miscellaneous materials.
7. Shop finishing.

B. Product Data Submittals: For each product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

- C. Shop Drawings: For architectural cabinets.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show full-size details.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
 - 5. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
 - 6. Apply WI Certified Compliance Program label to Shop Drawings.
- D. Samples: For each exposed product and for each color and finish specified, in manufacturer's standard size.
- E. Samples for Initial Selection: For each type of exposed finish.
- F. Samples for Verification: For the following:
 - 1. Lumber for Transparent Finish: Not less than 5 inches wide by 24 inches long, for each species and cut, finished on one side and one edge.
 - 2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished cabinets.
 - 3. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches wide by 12 inches long for lumber and one full cabinet door panel, for each finish system and color.
 - a. Finish one-half of exposed surface.
 - 4. Thermally Fused Laminate (TFL) Panels: 12 by 12 inches, for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
 - 5. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
 - 6. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Certificates: For each type of product.
- C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

06 41 13 - 2

Fontana City Hall – Phase II

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.
- B. Installer Qualifications: Licensed participant in WI's Certified Compliance Program.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.9 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 20 and 50 percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINETS

- A. Source Limitations: Engage a qualified woodworking firm to assume responsibility for production of architectural cabinets.

2.2 CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide labels and certificates from AWI and Wlcertification program indicating that woodwork and installation complies with requirements of grades specified.
 - 2. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.3 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Premium.
- B. Certified Wood: Wood products shall be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004.
- C. Certified Wood: Wood products shall be labeled according to the AF&PA's Sustainable Forestry Initiative, be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004, or be certified and labeled according to the standards of the Programme for Endorsement of Forest Certification.
- D. Certified Wood: Wood products shall be made from certified wood tracked through a chain-of-custody process. Certified wood documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59 or the World Trade Organization's "WTO Agreement on Technical Barriers to Trade."
- E. Certified Wood: Wood products shall be certified according to the American Tree Farm System's "AFF Standard," the AF&PA's Sustainable Forestry Initiative, FSC STD-01-001 and FSC STD-40-004, or the standards of the Programme for Endorsement of Forest Certification.
- F. Type of Construction: As indicated on Drawings.
- G. Door and Drawer-Front Style: As indicated on Drawings. Reveal Dimension: As indicated on Drawings.
- H. Wood for Exposed Surfaces: As indicated on Drawings.
 - 1. Species: As indicated on Drawings.
 - 2. Blueprint Matching: Comply with veneer and other matching requirements indicated for blueprint-matched paneling.
 - 3. Cut: Plain sliced/plain sawn.
 - 4. Grain Direction: As indicated on Drawings.
 - 5. Matching of Veneer Leaves: Book match.
 - 6. Veneer Matching within Panel Face: Balance match.
 - 7. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
- I. Semiexposed Surfaces:

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

06 41 13 - 4

Fontana City Hall – Phase II

1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
 - a. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
 2. Drawer Subfronts, Backs, and Sides: Solid-hardwood lumber, same species indicated for exposed surfaces.
 3. Drawer Bottoms: Hardwood plywood.
- J. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- K. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.4 WOOD CABINETS FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: Premium.
- B. Regional Materials: Wood products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.
- C. Indigenous Materials: Wood products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site. If materials are transported by rail or water, the distance transported by rail or water shall be multiplied by 0.25 to determine the distance to Project site.
- D. Certified Wood: Wood products shall be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004.
- E. Certified Wood: Wood products shall be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004.
- F. Certified Wood: Wood products shall be labeled according to the AF&PA's Sustainable Forestry Initiative, be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004, or be certified and labeled according to the standards of the Programme for Endorsement of Forest Certification.
- G. Certified Wood: Wood products shall be made from certified wood tracked through a chain-of-custody process. Certified wood documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59 or the World Trade Organization's "WTO Agreement on Technical Barriers to Trade."
- H. Certified Wood: Wood products shall be certified according to the American Tree Farm System's "AFF Standard," the AF&PA's Sustainable Forestry Initiative, FSC STD-01-001 and FSC STD-40-004, or the standards of the Programme for Endorsement of Forest Certification.
- I. Type of Construction: As indicated on Drawings.

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

06 41 13 - 5

Fontana City Hall – Phase II

- J. Door and Drawer-Front Style: As indicated on Drawings.
 - 1. Reveal Dimension: As indicated on Drawings.
- K. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.
- L. Panel Product for Exposed Surfaces: MDF.
- M. Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: Match materials indicated for exposed surfaces.
 - a. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- N. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- O. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.5 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
 - 2. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Composite Wood Products: Products shall be made without urea formaldehyde.
 - 2. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.6 FIRE-RETARDANT-TREATED MATERIAL

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 - 1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

06 41 13 - 6

Fontana City Hall – Phase II

2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
 2. For items indicated to receive a stained or natural finish, use organic resin chemical formulation.
 3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
 4. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of architectural cabinets.
- C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E84.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Arauco North America
 - b. Timber Products, Inc.
 2. For panels 3/4 inch thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
 3. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.

2.7 CABINET HARDWARE AND ACCESSORIES

- A. Cabinet Hardware: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 71 00 "Door Hardware."
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Accuride International Inc.

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

06 41 13 - 7

Fontana City Hall – Phase II

- b. CompX International, Inc.
 - c. Grass America
 - d. Hardware Resources
 - e. Hettich America L.P.
 - f. Julius Blum & Co., Inc.
 - g. Knape & Vogt Manufacturing Company
- B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
 - 1. Semiconcealed Hinges for Flush Doors: ANSI/BHMA A156.9, B01361.
 - 2. Semiconcealed Hinges for Overlay Doors: ANSI/BHMA A156.9, B01521.
- C. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 100 degrees of opening.
- D. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.
- E. Wire Pulls: Back mounted, solid metal, 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter.
- F. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- G. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- H. Shelf Rests: ANSI/BHMA A156.9, B04013; plastic.
- I. Drawer Slides: ANSI/BHMA A156.9.
 - 1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount.
 - a. Type: Full extension.
 - b. Material: Aluminum slides.
 - 2. Pencil drawers not more than 3 inches high and not more than 24 inches wide, provide 50 lb load capacity.
 - 3. General purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide 75 lb load capacity.
 - 4. File drawers more than 6 inches high or more than 24 inches wide, provide 100 lb load capacity.
 - 5. Lateral file drawers more than 6 inches high and more than 30 inches wide, provide 200 lb load capacity.
 - 6. Computer keyboard tray, provide 75 lb load capacity.
- J. Door Locks: ANSI/BHMA A156.11, E07121.
- K. Drawer Locks: ANSI/BHMA A156.11, E07041.
- L. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
 - 1. Thickness: 3.0 mm.
 - 2. Tint Color: As indicated on Drawings.

- M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated.
- N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.8 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

2.9 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease edges and corners to 1/16-inch radius unless otherwise indicated.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.10 SHOP FINISHING

- A. Finish architectural cabinets at manufacturer's shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Shop-finish transparent-finished architectural cabinets at manufacturer's shop as specified in this Section. See Section 09 91 23 "Interior Painting" for field finishing of opaque-finished architectural cabinets.

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

06 41 13 - 9

Fontana City Hall – Phase II

- C. Drawings indicate items that are required to be shop finished. Finish these items at manufacturer's shop as specified in this Section. See Section 09 91 23 "Interior Painting" for field finishing of architectural cabinets.
- D. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. See Section 099123 "Interior Painting" for material and application requirements.
- E. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural cabinets, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.
- F. Transparent Finish:
 - 1. Architectural Woodwork Standards Grade: Same as item to be finished.
 - 2. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to cabinets made from closed-grain wood before staining and finishing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with cabinet surface.
 - 1. For shop-finished items, use filler matching finish of items being installed.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings 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.

WOOD-VENEER-FACED ARCHITECTURAL CABINETS

06 41 13 - 10

Fontana City Hall – Phase II

4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.
- E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.
 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.
- F. Field Finishing: See Section 09 91 23 "Interior Painting" for finishing of installed architectural cabinets.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 1. Inspection entity is to prepare and submit report of inspection.

3.4 ADJUSTING AND CLEANING

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

END OF SECTION 06 41 13

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SECTION 06 41 16
PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-clad architectural cabinets (PL1 and PL2).
 - 2. Cabinet hardware and accessories.
 - 3. Miscellaneous materials.

1.3 RELATED REQUIREMENTS:

- A. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.4 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.5 PREINSTALLATION MEETINGS

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

1.6 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.7 ACTION SUBMITTALS

A. Product Data:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Miscellaneous materials.

B. Product Data Submittals: For each product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

C. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
5. Apply WI Certified Compliance Program label to Shop Drawings.

D. Samples for Verification: For the following:

1. Plastic Laminates: 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish required.
 - a. Provide one sample applied to core material with specified edge material applied to one edge.
2. Thermally Fused Laminate (TFL) Panels: Provide one full cabinet door panel, for each color, pattern, and surface finish.
 - a. Provide edge banding on one edge.
3. Corner Pieces:
 - a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
 - b. Miter joints for standing trim.
4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Certificates: For the following:

1. Composite wood products.
2. Thermally fused laminate panels.
3. High-pressure decorative laminate.
4. Glass.

5. Adhesives.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.9 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.10 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in WI's Certified Compliance Program.

B. Installer Qualifications: Licensed participant in WI's Certified Compliance Program.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.12 FIELD CONDITIONS

A. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from WI certification program indicating that woodwork complies with requirements of grades specified.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

06 41 16 - 3

Fontana City Hall – Phase II

2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
- B. Architectural Woodwork Standards Grade: Premium .
- C. Type of Construction: Frameless.
- D. Door and Drawer-Front Style: Flush overlay.
- E. High-Pressure Decorative Laminate: ISO 4586-3, grades as indicated or if not indicated, as required by quality standard.
1. Basis-of-Design Manufacturer (PL1): Wilsonart LLC, web: www.wilsonart.com
 2. Basis-of-Design Manufacturer (PL2): Polilam, web: www.polilam.com
 3. Subject to compliance with requirements, provide alternative products by one of the following:
 - a. Panolam Industries Internation, Inc.
 - b. Decotone Surfaces.
- F. Exposed Surfaces:
1. Plastic-Laminate Grade: HGS.
 2. Edges: PVC tape, 0.018-inch (0.460-mm) minimum thickness, matching laminate in color, pattern, and finish.
 3. Pattern Direction: Vertically for doors and fixed panels, horizontally for drawer fronts.
- G. Semiexposed Surfaces:
1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, ISO 4586-3.
 - a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch (0.460-mm) minimum thickness, matching laminate in color, pattern, and finish.
 - b. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
 - c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, ISO 4586-3, grade to match exposed surface.
 2. Drawer Sides and Backs: Thermally fused laminate panels with PVC or polyester edge banding.
 3. Drawer Bottoms: Thermally fused laminate panels.
- H. Dust Panels: 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, ISO 4583-3, grade to match exposed surface.
- J. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

06 41 16 - 4

Fontana City Hall – Phase II

- K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Reference Material Finish Schedule for manufacturers and products and Drawings for locations.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
 - 1. Core Material: Industrial Grade Medium Density Fiberboard (MDF) manufactured with a formaldehyde-free adhesive system, ANSI A208.2, Grade 130.
 - a. Basis of Design: Medite II MDF as manufactured by Roseburg, Springfield, OR; tel: (800) 245-1115, web: www.roseburg.com .
 - b. Acceptable Manufacturers: Subject to compliance with requirements, provide named product or an equivalent product by one of the following:
 - 1) Georgia-Pacific; www.buildgpc.com
 - 2) Weyerhaeuser; www.weyerhaeuser.com

2.3 CABINET HARDWARE AND ACCESSORIES

- A. Cabinet Hardware: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, B01602, 170 degrees of opening, self-closing.
- C. Wire Pulls: Back mounted, solid metal, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.
- D. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.
- E. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: ANSI/BHMA A156.9, B04013; metal .
- G. Drawer Slides: ANSI/BHMA A156.9.
 - 1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200):
 - a. Acceptable Manufacturer: Accuride International Inc., Santa Fe Springs, CA; tel: (866) 823-1695; web: www.accuride.com, or equal.

- 1) Drawer capacity up to 200 lb and up to 24 inches wide: Accuride #3640A.
- 2) Drawer capacity up to 350 lb and up to 42 inches wide: Accuride #7957.
- 3) Drawer capacity up to 600 lb and up to 60 inches wide: Accuride #9301E.

b. Motion Feature: Push to open and soft close dampener .

H. Door Locks: ANSI/BHMA A156.11, E07121.

I. Drawer Locks: ANSI/BHMA A156.11, E07041.

J. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

K. Grommets for Cable Passage: 2-inch (51-mm) OD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black.

L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.

1. Satin Chromium Plated: ANSI/BHMA 626 for brass or bronze base; ANSI/BHMA 652 for steel base.

2. Satin Stainless Steel: ANSI/BHMA 630.

M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber fire-retardant-treated softwood lumber where required, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Type I, waterproof type or Type II water-resistant type as selected by fabricator to comply with requirements.

1. Adhesive for Bonding Edges: Hot-melt adhesive.

2.5 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.

PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

06 41 16 - 6

Fontana City Hall – Phase II

2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm) using concealed shims.
 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 2. Install cabinets without distortion so doors and drawers fit openings 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. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through WI's Certified Compliance Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
 1. Inspection entity is to prepare and submit report of inspection.

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 06 41 16

SECTION 06 42 00
WOOD PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Solid wood with veneer backer wall paneling.
 - 2. Installation materials.

- B. Related Requirements:

- 1. Section 01 43 39 "Mockup Requirements"
 - 2. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing paneling that is concealed within other construction before paneling installation.

1.3 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- C. Architectural Woodwork Standards (AWS), 1st ed. 2009, published jointly by:
 - 1. Architectural Woodwork Institute, www.awi.net.org.
 - 2. Woodwork Institute, www.woodworkinstitute.com.

1.4 COORDINATION

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

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
 - 1. Include data for panel products, finishing materials and processes.
- B. Shop Drawings: For wood paneling.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show details full size.
 - 3. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
 - 4. For paneling produced from premanufactured sets, show finished panel sizes, set numbers, sequence numbers within sets, and method of cutting panels to produce indicated sizes.
 - 5. For paneling veneered in fabrication shop, show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
 - 6. Apply WI Certified Compliance Program label to Shop Drawings.
- C. Samples: For each exposed product and for each color and finish specified, in manufacturer's or fabricator's standard size.
- D. Samples for Initial Selection: For each type of exposed finish.
- E. Samples for Verification: For the following:
 - 1. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished paneling.
 - 2. Veneer-Faced Panel Products for Transparent Finish: 8 by 10 inches (200 by 250 mm), for each species and cut. Include at least one face-veneer seam and finish as specified.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product.
- C. Quality Standard Compliance Certificates: WI Certified Compliance Program.
- D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Shop Certification: WI's Certified Compliance Program licensee.
- C. Installer Qualifications: WI's Certified Compliance Program licensee.

1.9 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups of typical paneling as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver paneling until painting and similar operations that might damage paneling have been completed in installation areas. Store paneling in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.11 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install paneling until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Environmental Limitations with Humidity Control: Do not deliver or install paneling until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 30 and 50 percent during the remainder of the construction period.
- C. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed/concealed by construction and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where paneling is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of paneling.

2.1 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives sealants, fillers, primers, and coatings. Comply with limits specified in related Section.

- B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related Section.
- C. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI/AWMAC/WI Architectural Woodwork Standards (AWS) for Premium Grade.

2.2 WOOD WALL PANELING

- A. Basis of Design Product: Curved slatted wood wall paneling as manufactured by Urban evolutions, web: www.urbanevolutions.com.
- B. Description: Solid wood slats and select plain sawn veneer backer on flexible core.
- C. Grade: Premium
- D. Wood Species and Cut: As indicated on Drawings.
- E. Veneer Matching Method:
 - 1. Adjacent Veneer Leaves: Book match.
 - 2. Within Panel Face: Running match.
- F. Panel-Matching Method:
 - 1. Made-to-order, blueprint-matched panels and components within each separate area.
 - a. See Section 01 10 00 "Summary" for requirements concerning flitches reserved by Architect.
- G. Vertical Panel-Matching Method: Panel end book match; panels are book matched from lower panels to upper panels
- H. Panel Core Construction: As per manufacturers standard core.
 - 1. Thickness: As indicated on Drawings.

2.3 MATERIALS

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B. Wood Moisture Content: 5 to 10 percent.
- C. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
 - 1. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.4 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.

2.5 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Arrange paneling in shop or other suitable space in proposed sequence for examination by Architect. Mark units with temporary sequence numbers to indicate position in proposed layout.
 - 1. Lay out one elevation at a time if approved by Architect.
 - 2. Notify Architect seven days in advance of the date and time when layout will be available for viewing.
 - 3. Provide lighting of similar type and level as that of final installation for viewing layout unless otherwise approved by Architect.
 - 4. Rearrange paneling as directed by Architect until layout is approved.
 - 5. Do not trim end units and other nonmodular-size units to less than modular size until after Architect's approval of layout.
 - 6. Obtain Architect's approval of layout before start of assembly. Mark units and Shop Drawings with assembly sequence numbers based on approved layout.
- C. Complete fabrication, including assembly, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times paneling fabrication will be complete.
- D. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition paneling to humidity conditions in installation areas.
- B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install paneling to comply with quality standard grade of paneling to be installed.
- B. Install paneling level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Install with no more than 1/16 inch in 96-inch (1.6 mm in 2400-mm) vertical cup or bow and 1/8 inch in 96-inch (3 mm in 2400-mm) horizontal variation from a true plane.
- C. Anchor paneling to supporting substrate with concealed panel-hanger clips
 - 1. Do not use face fastening unless otherwise indicated.
- D. Complete finishing work specified in this Section to extent not completed at shop or before installation of paneling. Fill nail holes with matching filler where exposed.
 - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective paneling, where possible, to eliminate defects. Where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 42 00

SECTION 06 60 00
ACRYLIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Acrylic privacy screen.
 - 2. Exterior site furnishings.
- B. Related Requirements:
 - 1. Section 06 10 00 "Rough Carpentry" for wood furring for installing acrylic paneling.
 - 2. Section 06 20 23 "Interior Finish Carpentry"

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Meeting: Conduct a preinstallation meeting on Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Submit manufacturer's product data; include product description, fabrication information, and compliance with specified performance requirements.
- B. Shop Drawings: Include plans, elevations, sections, panel dimensions, details, and attachments to other work.
- C. Submit product test reports from a qualified testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products.
 - 1. Test reports required are:
 - a. Rate of Burning (ASTM D635)
 - b. Self-Ignition Temperature (ASTM D1929)
 - c. Density of Smoke (ASTM D2843)
 - d. Steiner Tunnel (ASTM E84)
 - e. Dynamic environmental testing (ASTM standards D5116 or D6670)
 - f. Coefficient of Friction (ASTM 2047)

- D. Building Approvals: Plastic Fabrications shall be evaluated and registered with and comply to requirements of the following jurisdictions:
 - 1. Los Angeles Department of Building and Safety [Product must have a LARR (Los Angeles Research Report) number] for use as Light-transmitting Panels.
 - 2. ICC-ES Report for Light Transmitting Plastics and Interior Finishes.
- E. Samples for Initial Selection: Minimum 2-inch by 2-inch samples. Indicate full color, texture and pattern variation.
- F. Samples for Verification: Minimum 4-inch by 4-inch sample for each type, texture, pattern and color of solid plastic fabrication.
- G. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications

- 1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least three (3) consecutive years and which can show evidence of those materials being satisfactorily used on at least three (3) projects of similar size, scope and location. At least one (1) of the projects shall have been successful for use one year or longer.
- 2. Manufactured panels must be produced from a minimum of 38% pre-consumer recycle content and 9% post-consumer recycled content or a minimum total recycled content factor of 0.20. This recycle content must be certified by a recognized 3rd party certification group.
- 3. Completely PVC – Free product
- 4. Manufacturer shall offer a documented reclaim process that will take back, at the manufacturers cost, panels that are at their end-of life cycle.
- 5. Manufacturer shall have a completed Life Cycle Analysis
- 6. Manufacturer shall have an Environmental Product Declaration (EPD).

1.6 MOCKUPS

- A. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
- B. Build mockup of each type of Plastic Fabrication.
- C. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver acrylic panels, systems and specified items in manufacturer's standard protective packaging.
- B. Do not deliver acrylic panels, system, components and accessories to Project site until areas are ready for installation.

- C. Store materials in a flat orientation in a dry place that is not exposed to exterior elements. Materials are to be protected against damage from moisture and direct sunlight.
- D. Store acrylic panels in area of installation minimum of 24 hours prior to installation.
- E. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.
- F. Before installing acrylic panels, permit them to reach room temperature.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install acrylic panels until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.
- B. Warranty Period: 1 year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain acrylic panels from single manufacturer.

2.2 ACRYLIC PANELING

- A. Basis of Design Product: Chroma product as manufactured by 3form LLC, web: www.3-form.com.
- B. Material: Engineered acrylic resin product.
- C. Sheet Size: As indicated on Drawings.
- D. Minimum Thickness: 1/2 inch.
- E. Rate of Burning (ASTM D635): Material must attain CC2 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
- F. Self-Ignition Temperature (ASTM D1929): Greater than 850°F.
- G. Density of Smoke (ASTM D 2843): Less than 10%.
- H. Coefficient of Friction (ASTM 2047): 0.73 Dry, 0.79 Wet.

- I. Dynamic environmental testing (ASTM D5116/D6670): Panels must not have detectable VOC off-gassing agents and shall be Greenguard Indoor Air Quality Children and Schools certified.
- J. Product must be fused using heat and pressure, not laminated with adhesives.
- K. Color must be PVC-Free and be an acrylic resin made with pigments, not dyes. Must be UV stable colors
- L. Vellum surface should be completely renewable onsite.

2.3 FABRICATION

- A. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings, additional fabrication and installation details can be found on the 3form Fabrication Drawings.
- B. Comply with manufacturer's written recommendations for fabrication.
- C. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.
 - 1. Sawing: Select equipment and blades suitable for type of cut required.
 - 2. Drilling: Drills compatible with plastic products.
 - 3. Routing
 - 4. Laser Cutting
 - 5. Laser Etching
- D. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.
 - 1. Cold Bending
 - 2. Hot Bending
 - 3. Thermoforming: Acceptable only on uncoated material.
 - 4. Drape Forming
 - 5. Matched Mold Forming
 - 6. Mechanical Forming
- E. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.
- F. Bonding: Manufacturer must have an in-field seaming process and fabrication kit including necessary adhesive and tools.

2.4 ACCESSORIES

- A. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaner: Type recommended by manufacturer.
- C. Adhesives: May be achieved with 2-part adhesives or silicones, suitable for use with product and application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where installation of Plastic Fabrications will occur, with Installer present, for compliance with manufacturer's requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for the installation of Plastic Fabrications. Sizes, profiles and other characteristics are indicated on the drawings.
- B. Manufacturer's shop to fabricate items to the greatest degree possible.
- C. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods shall be rejected.
- D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
- E. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

3.4 CLEANING AND PROTECTION

- A. Protect surfaces from damage until date of substantial completion. Repair or replace damaged work, which cannot be repaired.

END OF SECTION 06 64 00

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SECTION 06 64 00
FIBERGLASS REINFORCED PLASTIC WALL PANELS (FRP)

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 covers the installation of fiberglass reinforced plastic wall panels (FRP1)

1.3 RELATED SECTIONS

- A. Section 09 29 00 "Gypsum Board".

1.4 SUBMITTALS

- A. Product Data: Manufacturer's Specifications and installation instructions for each material and accessory.
- B. Shop Drawings: Show location and dimension of joints and fastener attachments.
- C. Samples for Verification: Submit specified color and texture sample of wall panel and trim pieces for verification.
- D. Closeout Submittal: Submit cleaning and maintenance instructions.

1.5 QUALITY ASSURANCE

- A. Provide panels and accessories by one manufacturer to ensure warranty and color match.

1.6 SYSTEM DESCRIPTION

- A. Performance Requirements: Provide fiberglass reinforced plastic (FRP) panels which have been manufactured and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.7 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide wall panels and adhesives with the following fire-test-response characteristics as determined by testing identical products applied with identical

adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Surface-Burning Characteristics: As follows, Class I per ASTM E 84:

- a. Flame-Spread Index: 25 or less.
- b. Smoke-Developed Index: 450 or less

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials clearly labeled to identify Manufacturer, brand name, quality or grade and fire hazard classification.
- B. Store horizontally in original undamaged packages.
- C. Remove foreign matter from face of panel with soft bristle brush, avoiding abrasive action.

1.9 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Install materials when temperature and humidity conditions approximate conditions that will exist when building is occupied.
- B. Provide ventilation to disperse fumes during application of adhesive as recommended by adhesive manufacturer.

1.10 EXTRA MATERIALS

- A. Supply two percent of each type used, two sheets minimum in clean condition, marked for Owner's use. Material must be in manufactures package, unopened.
- B. Supply 10% of each type of moldings. Moldings must be packaged in a round tube to be sealed on both ends to protect the moldings from damages. Container must identify the quantity and type of each piece.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: Marlite, FRP series, web: www.marlite.com.
- B. Manufacturers: Subject to compliance with requirements, provide products from one of the following manufacturer:
 - 1. Glasbord with Surfaseal, Kemlite Corporation
 - 2. LascoBoard , Lasco Panel Products, Florence, KY

2.2 MATERIALS

- A. Panels and Accessories: Provide the following:

FIBERGLASS REINFORCED PLASTIC WALL PANELS (FRP)

06 64 00 - 2

Fontana City Hall – Phase II

1. Fiberglass reinforced plastic, 0.09 inches thick, minimum. Product shall meet or exceed the following:
 - a. Bearing Strength (ASTM D953): 20,000 psi
 - b. Flexural Strength (ASTM D790): 1.7×10^4 psi
 - c. Flexural Modulus (ASTM D790): 6.0×10^6 psi
 - d. Tensile Strength (ASTM D638): 8.0×10^3 psi
 - e. Coefficient of Lineal Thermal Expansion (ASTM D696): 1.57×10^{-5} in/inF
 - f. Water Absorption (ASTM D570): < 0.5%
 - g. Thermal Conductivity (K-factor) (ASTM C177): BTU/in/1.2 hr/ft²/F
 - h. Flame Spread (ASTM E84): <200
 - i. Smoke Developed (ASTM E84): <450
 2. Color/Texture: As indicated on Drawings.
 3. Location: As indicated on Drawing.
- B. Adhesive: Manufacturer's recommended type for use with selected materials, waterproof, mildew resistant nonstaining type.
- C. Sealant: Latex type as approved by adhesive and wall paneling manufacturer.
- D. Moldings:
1. Use extruded aluminum molding trim pieces at internal and external corners, including end cap molding.
 2. Use plastic molding at panel divisions.
- E. Miscellaneous Items: Furnish and install supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation, whether or not specified or indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
1. Examine substrate and conditions under which the material is to be installed.
 2. Verify that surfaces, when tested with moisture meter, have proper moisture content.
 3. Verify that nails and screws are recessed, with joints and depressions taped, finish and sealed.
 4. Remove contaminants from areas to be covered.
 5. Do not proceed with Work until work of other trades which passes through wall covering has been completed and unsatisfactory conditions have been corrected.
 6. Start of Work indicates acceptance of responsibility for performance and any required remedial Work.

3.2 INSTALLATION

- A. Install panels in accordance with manufacturer's printed instructions using full sheet mastic coverage method with no exposed fasteners or "buttons."

FIBERGLASS REINFORCED PLASTIC WALL PANELS (FRP)

06 64 00 - 3

Fontana City Hall – Phase II

- B. Make joints with 1/8 inch space for expansion and use moldings designed for each condition for the Project.
- C. Bevel edges of panels with block plane to permit proper fit into moldings.
- D. If one end of panel must be nailed, do not nail the other end.
- E. Remove plumbing escutcheons, switchplates, wall plates, and surface-mounted fixtures, and cut wall paneling evenly to fit. Replace items after completion of Work.
- F. Where applicable, install paneling before installation of plumbing, casings, bases, cabinets and other items to be applied over paneling.
- G. Install panels as indicated. If not indicated install in vertical format and cut panels at inside corners. Arrange panels so that no panel is less than 1/2 panel size.

3.3 CLEANING

- A. Remove excess adhesive and smudges with soft cloth and mineral spirits, or with product recommended by wall panel manufacturer.

END OF SECTION 06 64 00

SECTION 07 05 43
CLADDING SUPPORT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Cladding support system for attachment of rainscreen cladding.
- B. Related Requirements:
 - 1. Section 05 40 00 "Cold Formed Metal Framing" for back-up wall substrate.
 - 2. Section 061600 "Sheathing" for structural wood sheathing substrate.
 - 3. Section 07 21 00 "Thermal Insulation" for continuous insulation.

1.3 DEFINITIONS

- A. Cladding: Products used as the outer layer of a rainscreen assembly, forming the external finish of the wall and acting as the primary water shedding element.
- B. Cladding Support System: Engineered components acting as the structural support system for the cladding, including subframe profiles, brackets, thermal isolators, fasteners and anchors.
- C. Rainscreen Assembly: An assembly applied to an exterior wall which consists of, at minimum, an outer layer, an inner layer, and a cavity between them sufficient for the passive removal of liquid water and water vapor.
- D. Rainscreen Component: Materials or assemblies within a rainscreen assembly, such as air and water-resistive barrier assemblies, cladding, insulation, supports, and anchors.
- E. Subframe Profile: Metal support rail which is part of the cladding support system and is connected to bracket assembly, having inward and outward adjustability for mounting of cladding.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate façade anchorage requirements with cladding support system and back-up structure locations.
 - 2. Coordinate service penetration locations with bracket locations.

- B. Preinstallation Conference: Conduct at Project site.
 - 1. Meet with Owner, Architect, Installer, air barrier assembly installer, insulation installer, rainscreen cladding installer, and other installers whose work interfaces with or supports the work of this section.
 - 2. Review and finalize construction schedule and sequencing to avoid delays.
 - 3. Examine support conditions for compliance with requirements, including alignment with and attachment to structural supports and tolerances.
 - 4. Review rainscreen cladding fastening patterns and requirements, special details, air barrier assembly protection, and tolerances of rainscreen assembly.
 - 5. Review mockup requirements.
 - 6. Document proceedings, including corrective measures and actions required, and furnish a copy of record to each participant.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include each profile, size, and type of component and fastener.
 - 2. Include documentation or an Engineering Analysis Extension confirming assembly meets the acceptance criteria of NFPA 285.
- B. Shop Drawings:
 - 1. Include attachment details coordinated with each rainscreen cladding manufacturer, showing bracket and subframe profile layout, connection details, fasteners, and accessories.
 - 2. Show service penetration locations.
 - 3. Include attachment information, including fastener types, sizes, and spacing.
- C. Delegated-Design Submittal: For cladding support system.
- D. Structural Calculations: Submit cladding support system manufacturer's structural design analysis signed and sealed by a Professional Engineer registered in the state in which the Project is located.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Qualification Data: For Design Engineer.
- C. Product Test Reports: For each of the following standards, for tests performed by a qualified testing agency.
 - 1. Gravity load test report.
- D. Field Quality Control Submittals: Field testing reports.
- E. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD).

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: An entity having a minimum of five years of experience in the manufacturing of products specified in this Section.
- B. Installer Qualifications: Company specializing in performing the work of this Section with a minimum five years of documented experience and approved by manufacturer.
- C. Mockups: Build mockup to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build integrated mockup of exterior wall assembly as indicated on Drawings.
 - a. Coordinate construction of mockup to permit inspection and testing of air barrier before external insulation and cladding are installed.
 - b. If Architect determines mockup does not comply with requirements, reconstruct until mockup is approved.
 - 2. Approval of mockup does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product, and directions for storage.
- B. Unload, store, and handle materials in a manner to prevent bending, warping, twisting, and surface damage.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of cladding support system to be performed according to manufacturers' written instructions.
- B. Field Measurements: Verify actual supporting and adjoining construction conditions before fabrication and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where field measurements cannot be made without delaying work, guarantee dimensions and proceed with fabrication of affected systems corresponding to established dimensions.

1.10 WARRANTY

- A. Material Warranty: Provide manufacturer's standard warranty, in which manufacturer agrees to repair or replace components of cladding support system that fail within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Structural failures when all components are installed per manufacturer's requirements.
 - b. Deterioration of metals and components within the cladding support system beyond normal weathering.
- 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Installation Warranty: Provide a two (2) year installation warranty from date of Substantial Completion, covering repair or replacement of materials found to be defective as a result of installation error.
 - 1. Include labor to remove and reinstall rainscreen assembly, flashings, closures, and accessories necessary to access defective installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Crossfix Substructure System as manufactured by EJOT Fastening Systems, LP , web: www.ejot-usa.com.
- B. Other Acceptable Manufacturers: Subject to compliance with requirements, provide approved product from one of the following manufacturers:
 - 1. Elemex Unity Attachment system as manufactured by Ceramitex SCFS.
 - 2. Substitution: As per Division 01.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design cladding support system in conformance with structural performance requirements.
- B. Structural Performance: Provide system capable of withstanding design loads within limits and under conditions indicated.
 - 1. Rainscreen Assembly Dead Loads: As required for each type of cladding.
 - 2. Wind Loads: Comply with the requirements of ASCE 7.
 - 3. Deflection Limits: For wind loads, no greater than L/240 of the span.
 - 4. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

2.3 CLADDING SUPPORT SYSTEM

- A. Subframe Profiles: Cladding support system manufacturer's standard profiles formed from extruded aluminum.
 - 1. Panel Attachment: Adhesive or Concealed fastner.

2. Subframe Orientation: Manufacturer's recommended configuration meeting performance requirements.
3. Inward/Outward Adjustability: Minimum 1-1/2 inch (40 mm).
4. Finish: Anodized or Mill finish.

B. Bracket Assembly: Preassembled assembly consisting of stainless steel or galvanized steel brackets and plates with manufacturer's standard polymer thermal isolator.

1. Bracket Depth: As required by wall assembly and per manufacturer's information.
2. Hanger Rod: Manufacturer's recommended support as needed to conform with performance requirements.

2.4 MATERIALS

A. Aluminum Framing: ASTM B221 (ASTM B221M), with alloy and temper required to suit structural requirements.

B. Stainless Steel: ASTM A666, Type 304.

2.5 FASTENERS

A. Mechanical Fasteners: Manufacturer's recommended stainless steel fasteners including the following.

1. Self-drilling, self-tapping type for securing brackets to metal framing.
2. Self-drilling type for securing subframe profiles to brackets.

B. Post-Installed Anchors: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing in accordance with ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Uses: Securing brackets to structural concrete substrates.

2.6 ACCESSORIES

A. Sealants: ASTM C920, elastomeric type approved by air barrier manufacturer and compatible with air barrier system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Examine back-up wall to verify that structural substrates and support members have been installed within alignment tolerances required by cladding support system manufacturer.

2. Verify that air barrier system has been installed continuously over sheathing or substrates, without gaps or undetailed openings or seams.
 3. Examine roughing-in for components and systems penetrating rainscreen assembly to verify actual locations of openings and penetrations relative to joint locations prior to installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install cladding support system according to manufacturer's written instructions and requirements indicated on approved Shop Drawings. Anchor brackets, subframe profiles, and other components of the Work securely in place, with provisions for thermal and structural movement.
- B. Set components plumb, square, and true to line, and with connections securely fastened.
1. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by cladding support system manufacturer.
- D. Detailing at Fastener Penetrations for Air-Tightness: Install sealant to ensure air and water tightness at each fastener location:
1. Install sealant on back side of rail at each fastener location prior to installing rail.
 2. Install sealant over each fastener head after rails have been installed.
- E. Install continuous insulation, as specified in Section 07 21 00 "Thermal Insulation."

3.3 TOLERANCES

- A. Install rails level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
1. Space individual members no more than plus or minus 1/8 inch (3 mm) from plan location.

3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing agency to perform field tests and prepare test reports.
1. Air Leakage Testing (Bubble Gun): Test in accordance with ASTM E1186.
 2. Perform test on mockup.
 3. Perform tests on 3 brackets at locations determined by Architect at 10% and 50% completion of installation.
- B. Testing agency shall report test results promptly and in writing to Contractor and Architect.
- C. Work will be considered defective if it does not pass tests and inspections.

- D. If testing reveals any defects or deficiencies, promptly remove and replace defective work and retest until satisfactory results are obtained at Contractor's expense.

END OF SECTION 07 05 43

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SECTION 07 13 26
SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Blindsight sheet waterproofing applied to formwork.
 - 2. Accessory waterproofing system materials.
 - 3. Protection course.
 - 4. Molded-sheet drainage panels.
- B. Related Requirements:
 - 1. Section 07 21 00 "Thermal Insulation" for below-grade foundation insulation.
 - 2. Section 07 92 00 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
 - 3. Section 33 46 00 "Subdrainage" for molded-sheet drainage panels.

1.3 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

1.4 DEFINITIONS

- A. Compatible: Material that will not adversely affect adjacent materials, is chemically compatible with adjacent materials, and where required for bond, achieves adhesive compatibility with adjacent materials.
- B. Chemical Compatibility: Material that will not break down, deteriorate, degrade, or prematurely fail when in contact with another material. Material that will not cause chemical breakdown, deterioration, degradation, staining, or premature failure of another material.
- C. Adhesive Compatibility: Material that will develop bond strength or provide a suitable surface for another material to develop bond strength complying with requirements when in contact with another material.

1.5 COORDINATION

- A. Coordinate Work under this Section with adjacent concrete foundation work, including fill , under-slab insulation and subdrainage systems.
- B. Coordinate formwork and form bracing requirements for blindside sheet waterproofing. Coordinate restrictions on use of form ties and other components as necessary to eliminate or minimize penetrations through blindside sheet waterproofing.

1.6 PREINSTALLATION MEETINGS

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

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written installation instructions for evaluating, preparing, and treating substrate.
- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, expansion joints, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, air barrier, and other termination conditions.
- C. Samples: For the following materials:
 - 1. 8-by-8-inch (200-by-200-mm) square of waterproofing.

1.8 INFORMATIONAL SUBMITTALS

- A. Field quality control reports.
- B. Qualification Statements: For Installer.
- C. Sample warranties.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and certified by waterproofing manufacturer.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to frozen, damp, or wet substrates.
 - 1. Do not apply waterproofing when snow, rain, fog, or mist is present.

SELF-ADHERING SHEET WATERPROOFING

07 13 26 - 2

Fontana City Hall – Phase II

- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.11 WARRANTY

- A. Manufacturer's Special Warranty:

- 1. Waterproofing Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

- a. Warranty Period: Five years from date of Substantial Completion.

- B. Installer's Special Warranty: Specified form, on warranty form at end of this Section, signed by Installer, covering Work of this Section, for warranty period of two years.

PART 2 - PRODUCTS

2.1 BLINDSIDE SHEET WATERPROOFING

- A. Blindside Sheet Waterproofing for Vertical and Horizontal Applications: Uniform, flexible, multilayered-composite sheet membrane that forms a permanent bond with fresh concrete placed against it; complete with accessories and preformed shapes for an unbroken waterproofing assembly; with the physical properties as specified below:

- 1. Basis of Design Product: Preprufe 800PA membrane as manufactured by GCP Applied Technologies, web: www.gcpat.com.
 - 2. Description: Self-adhering, cold-applied composite sheet consisting of synthetic non-asphaltic adhesive and multi-layer cross-laminated, high density polyethylene film.
 - 3. Physical Properties:
 - a. Sheet Thickness: 30 mils (0.8 mm)
 - b. Color: White
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D1970/D1970M.
 - d. Peel Adhesion to Concrete: 5 lbf/in. (875 N/m) minimum; ASTM D903, modified.
 - e. Lap Adhesion: 5 lbf/in. (875 N/m) minimum; ASTM D1876, modified.
 - f. Hydrostatic-Head Resistance: 230 ft. (70 m); ASTM D5385/D5385M, modified.
 - g. Puncture Resistance: 100 lbf (445 N) minimum for vertical application and 200 lbf (890 N) minimum (for horizontal applications); ASTM E154/E154M.
 - h. Water Vapor Permeance: 0.1 perm (6 ng/Pa x s x sq. m) maximum; ASTM E96/E96M, Water Method.
 - i. Ultimate Elongation: 150 percent minimum; ASTM D412, modified.

- B. Mastic, Adhesives, and Detail Tape for Vertical Application: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

2.2 ACCESSORY WATERPROOFING SYSTEM MATERIALS

- A. General: Accessory materials as recommended in writing by waterproofing manufacturer for intended use and compatibility with one another and with sheet waterproofing.

SELF-ADHERING SHEET WATERPROOFING

07 13 26 - 3

Fontana City Hall – Phase II

1. Furnish liquid-type accessory materials that comply with VOC limits of authorities having jurisdiction.
- B. Surface Conditioner: Liquid, waterborne surface conditioner as recommended in writing for substrate by waterproofing manufacturer.
- C. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity as recommended in writing for substrate by waterproofing manufacturer.
- D. Joint Sealant: As specified in Section 07 92 00 "Joint Sealants"; and as recommended in writing by waterproofing manufacturer for substrate and joint conditions.

2.3 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panels with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21 mm) sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft. (112 to 261 L/min. per m).
 1. Basis of Design Product: Hydroduct 220 (for vertical applications) and Hydroduct 660 (for horizontal applications) drainage composite as supplied by GCP Applied Technologies.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of waterproofing.
 1. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates in accordance with waterproofing manufacturer's written installation instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks in accordance with ASTM D4258.
- D. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

3.3 INSTALLATION OF BLINDSIDE SHEET WATERPROOFING

- A. Install blindside sheet waterproofing in accordance with waterproofing manufacturer's written installation instructions.
- B. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.
- C. Vertical Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by membrane manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.
 - 1. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detail tape.
 - 2. Ensure transition with other waterproofing membrane.
- D. Horizontal Applications: Install sheet with face against substrate. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required by waterproofing manufacturer. Overlap and seal seams, and stagger and tape end laps to ensure watertight installation.
- E. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
- F. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.
- G. Install sheet waterproofing and accessory materials to produce a continuous watertight tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending 6 inches (150 mm) beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.

3.4 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, in accordance with manufacturer's written installation instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.5 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

SELF-ADHERING SHEET WATERPROOFING

07 13 26 - 5

Fontana City Hall – Phase II

- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 13 26

SECTION 07 14 16
COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Polyurethane waterproofing.
2. Accessory waterproofing system materials.
3. Protection course.
4. Molded-sheet drainage panels.

B. Related Requirements:

1. Section 07 21 00 "Thermal Insulation" for below-grade foundation insulation.
2. Section 07 92 00 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.2 DEFINITIONS

- A. Compatible:** Material that will not adversely affect adjacent materials, is chemically compatible with adjacent materials, and where required for bond, achieves adhesive compatibility with adjacent materials.
- B. Chemical Compatibility:** Material that will not break down, deteriorate, degrade, or prematurely fail when in contact with another material. Material that will not cause chemical breakdown, deterioration, degradation, staining, or premature failure of another material.
- C. Adhesive Compatibility:** Material that will develop bond strength or provide a suitable surface for another material to develop bond strength complying with requirements when in contact with another material.

1.3 COORDINATION

- A. Coordinate Work** under this Section with adjacent concrete foundation work, including fill, other waterproofing systems , under-slab vapor retarders and , subdrainage systems.
- B. Coordinate requirements** for concrete formwork to provide suitable substrate for waterproofing and to minimize penetrations in waterproofing.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements, including, but not limited to, the following:
 - a. Surface preparation specified in other Sections.
 - b. Minimum concrete curing period.

- c. Forecasted weather conditions.
- d. Special details and sheet flashings.
- e. Repairs.
- f. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
- 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.

B. Shop Drawings:

- 1. Indicate locations and extent of waterproofing.
- 2. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, expansion-joint conditions, tie-ins with adjoining waterproofing, and other termination conditions.
- 3. Include setting drawings indicating layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.

C. Samples: For the following materials:

- 1. Cured sample of waterproofing membrane on suitable rigid substrate, 8 by 8 inches (200 by 200 mm).
- 2. Flashing sheet, 8 by 8 inches (200 by 200 mm).
- 3. Drainage panel, 4 by 4 inches (100 by 100 mm).

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Field quality control reports.

C. Sample warranties.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to set quality standards for installation.

- 1. Build mockup for each typical waterproofing installation, including accessories to demonstrate surface preparation, crack and joint treatments, inside and outside corner treatments, and protection.

COLD FLUID-APPLIED WATERPROOFING

07 14 16 - 2

Fontana City Hall – Phase II

- a. Size: As indicated on Drawings.
 - b. Description: Each type of wall, deck and plaza deck installation.
- 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer. Protect stored materials in accordance with manufacturer's written instructions.
- B. Remove and replace materials that cannot be applied within their stated shelf life.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer.
 - 1. Do not apply waterproofing to frozen, damp, or wet substrates, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
 - 2. Do not apply waterproofing when snow, rain, fog, or mist are present, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.11 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or remove and replace waterproofing that fails to remain watertight within specified warranty period.
 - 1. Warranty includes leak remediation, including repair, removal, and replacement of protection course and drainage panels.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Installer's Special Warranty: Submit warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, for warranty period of two years from date of Substantial Completion.
 - 1. Warranty includes leak remediation, including repair, removal, and replacement of protection course and drainage panels.

PART 2 - PRODUCTS

2.1 PERFORMANCE CRITERIA

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with the most stringent limited specified in pertinent section and tested and determined compliant per the referenced standards for each material type.
- B. Fluid applied membranes shall meet or exceed the performance requirements of ASTM C836 and other ASTM standards as published by manufacturer.
 - 1. VOC Content: 250 g/L maximum per 40 CFR 59, Subpart D (EPA Method 24) and complying with requirements of authorities having jurisdiction.
 - 2. Coverage: Minimum 60 mils.
 - 3. Flexibility: 180-degree bend over 1-inch mandrel at -25 degrees F with no affect, when tested in accordance with ASTM D1970.
- C. Compatibility: Provide waterproofing system materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by waterproofing manufacturer based on testing and field experience.

2.2 SOURCE LIMITATIONS

- A. Waterproofing System: Obtain waterproofing materials and protection course molded-sheet drainage panels from same manufacturer as waterproofing membrane or manufacturer approved by waterproofing membrane manufacturer.

2.3 POLYURETHANE WATERPROOFING

- A. Two-Component, Spray Applied Polyurethane Waterproofing: ASTM C836/C836M.
 - 1. Basis-of-Design Product: Silcor 900MP as manufactured by GCP, Saint Gobain, web: www.gcpat.com.
 - 2. Physical Properties:
 - a. Tensile Strength: 4090 psi as per ASTM D412
 - b. Tear Resistance: 487 lb/in. as per ASTM D751
 - c. Adhesion to Concrete: 479 psi as per ASTM D4541
 - 3. Subject to compliance with requirements, provide alternative product from one of the following manufacturer:
 - a. Carlisle Coatings and Waterproofing, Inc., a division of Carlisle Syntec.
 - b. Henry Roofing Systems
 - c. W.R. Meadows, Inc.

2.4 ACCESSORY WATERPROOFING SYSTEM MATERIALS

- A. General: Accessory materials as recommended in writing by waterproofing manufacturer for intended use and compatible with one another and with waterproofing.

- B. Primer: Provide two component epoxy primer as recommended in writing for substrate by waterproofing manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner as recommended in writing for substrate by waterproofing manufacturer.
- D. Sheet Flashing: Manufacturer's standard flashing sheet.
 - 1. Adhesive: Manufacturer's standard contact adhesive.
- E. Metal Termination Bars: Manufacturer's standard, predrilled, stainless steel or aluminum termination bars; approximately 1 by 1/8 inch (25 by 3.2 mm) thick; with stainless steel anchors.
- F. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing; as specified in Section 07 92 00 "Joint Sealants"; and as recommended in writing by waterproofing manufacturer for substrate and joint conditions.
- G. Backer Rod: Closed-cell polyethylene foam.

2.5 PROTECTION COURSE

- A. Protection Course, Asphaltic: ASTM D6506/D6506M; semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners:
 - 1. Thickness: Nominal 1/8 inch (3.2 mm).

2.6 DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Drainage Panels: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, HDPE drainage core; with a needle-punched nonwoven-geotextile facing with an apparent opening size not exceeding No. 70 (0.21 mm) sieve laminated to one side of the core, without a polymeric film bonded to the other side; and with a vertical flow rate through the core of 8 to 9 gpm per ft.
 - 1. Basis of Design Product: j Drain 300 as manufactured by JDR Enterprise, Inc.
 - 2. Alternate Products: Subject to compliance with requirements, provide an alternative product from following options:
 - a. Delta Drain as manufactured by Dorken systems, Inc.
 - b. Mira Drain as manufactured by Carlisle coating and waterproofing.
 - 3. Compressive Strength: 40,000 psf as per ASTM D1621
 - 4. Thickness: As per manufacturers standard product thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that concrete has cured and aged for minimum time period as recommended in writing by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and within the moisture limits as recommended in writing by waterproofing manufacturer. Test for capillary moisture by plastic sheet method in accordance with ASTM D4263.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates in accordance with waterproofing manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate in accordance with ASTM D4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces in accordance with ASTM D4258.
- E. Remove fins, ridges, and other projections, and fill honeycomb, aggregate pockets, holes, and other voids.
- F. Coordinate with Owner for impact to air-intake equipment in the vicinity of the Work. Cover or filter air-intake louvers before proceeding with work that could affect indoor air quality or that could activate smoke detectors in the ductwork.

3.3 PREPARATION AT TERMINATIONS, PENETRATIONS, AND CORNERS

- A. Prepare surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, sleeves, and corners in accordance with waterproofing manufacturer's written instructions and to recommendations in ASTM C898/C898M.

3.4 TREATMENT OF JOINTS AND CRACKS

- A. Prepare, treat, rout, and fill joints and cracks in substrate in accordance with waterproofing manufacturer's written instructions and recommendations in ASTM C898/C898M. Before coating surfaces, remove dust and dirt from joints and cracks in accordance with ASTM D4258.
1. Comply with ASTM C1193 for joint-sealant installation.
 2. Apply bond breaker on sealant surface, beneath preparation strip.
 3. Prime substrate along each side of joint and apply a single thickness of preparation strip at least 6 inches (150 mm) wide along each side of joint. Apply waterproofing in two separate applications and embed a joint-reinforcing strip in first preparation coat.

- B. Install sheet flashing and bond to deck and wall substrates where required in accordance with waterproofing manufacturer's written instructions.
 - 1. Extend sheet flashings for 4 inches (100 mm) onto perpendicular surfaces and items penetrating substrate.

3.5 INSTALLATION OF COLD FLUID-APPLIED WATERPROOFING

- A. General: Apply waterproofing in accordance with manufacturer's written instructions and to recommendations in ASTM C898/C898M.
- B. Start installing waterproofing in presence of manufacturer's technical representative.
- C. Apply primer over prepared substrate at manufacturer's recommended rate and allow it to dry.
- D. Unreinforced Waterproofing Membrane Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
 - 1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases and pinholes, with a minimum dry film thickness of 60 mils (1.5 mm).
 - 2. Apply waterproofing to prepared wall terminations and vertical surfaces.
- E. Cure waterproofing, taking care to prevent contamination and damage to membrane.

3.6 INSTALLATION OF PROTECTION COURSE

- A. Cover waterproofing with protection course with butted joints before membrane is subject to construction or vehicular traffic.
 - 1. For horizontal applications, install protection course loose laid over fully cured membrane.
 - 2. For vertical applications, set protection course in nominally cured membrane, which will act as an adhesive. If membrane cures before application of protection course, use adhesive.

3.7 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels in accordance with waterproofing manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections:
 - 1. Testing agency to verify thickness of waterproofing during application for each 600 sq. ft. (56 sq. m) of installed waterproofing or part thereof.
- B. Manufacturer's Field Service: Engage a full-time site representative qualified by waterproofing system manufacturer to inspect substrate conditions, surface preparation, membrane

COLD FLUID-APPLIED WATERPROOFING

07 14 16 - 7

Fontana City Hall – Phase II

application, flashings, protection, and drainage components and to furnish daily reports to Architect.

1. Final Inspection: Arrange for waterproofing system manufacturer's technical personnel to inspect system installation on completion, in presence of Architect, and to prepare inspection report.
2. Notify Architect and Owner 48 hours in advance of date and time of inspection.
3. Repair or remove and replace components of waterproofing system where inspections indicate that they do not comply with specified requirements.

C. Prepare test and inspection reports.

3.9 PROTECTION, REPAIR, AND CLEANING

- A. Protect waterproofing system from damage and wear during remainder of construction period.
- B. Protect installed protection course from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where material is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- C. Correct deficiencies in or remove waterproofing system that does not comply with requirements, repair substrates, and repair or reinstall waterproofing system to a condition free of damage and deterioration at time of Substantial Completion and in accordance with warranty requirements.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 14 16

SECTION 07 18 00
TRAFFIC COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Traffic coatings and pavement markings for the following applications:
 - 1. Pedestrian traffic.
- B. Related Requirements:
 - 1. Section 07 19 00 "Water Repellents" for penetrating and film-forming water repellents applied on traffic-bearing surfaces.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: Traffic coatings and pavement markings for the following applications:
 - 1. Pedestrian traffic.
- B. Product Data Submittals: For each product.
 - 1. Include installation instructions and details, material descriptions, dry- or wet-film thickness requirements, and finish.
- C. Shop Drawings: For traffic coatings.
 - 1. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions that are not included in manufacturer's product data.
 - 2. Include plans showing layout of pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- D. Samples for Initial Selection: For each type of exposed finish.
- E. Samples for Verification: For each type of exposed finish, prepared on rigid backing.
 - 1. Provide stepped Samples on backing to illustrate buildup of traffic coatings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: For each type of traffic coating.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For traffic coatings to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build mockup for each traffic coating and substrate to receive traffic coatings.
 - 2. Size: 200 sq. ft. (18.5 sq. m) of each substrate to demonstrate surface preparation, joint and crack treatment, thickness, texture, color, and standard of workmanship.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Apply traffic coatings within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply traffic coatings to damp or wet substrates, when temperatures are below 40 deg F (5 deg C), when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
 - 1. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of substrate.
- B. Do not install traffic coating until items that penetrate membrane have been installed.
- C. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 50 deg F (10 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace traffic coating that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Adhesive or cohesive failures.

- b. Abrasion or tearing failures.
- c. Surface crazing or spalling.
- d. Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into deck substrate.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain traffic coatings from single source from single manufacturer.
- B. Obtain primary traffic-coating materials, including primers, from traffic-coating manufacturer. Obtain accessory materials including aggregates, sheet flashings, joint sealants, and substrate repair materials of types and from sources recommended in writing by primary material manufacturer.
- C. Obtain pavement-marking paint from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Material Compatibility: Provide primers; base coat, intermediate coat, and topcoat; and accessory materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 TRAFFIC COATINGS

- A. Traffic Coating: Manufacturer's standard, traffic-bearing, seamless, high-solids-content, cold liquid-applied, elastomeric, water-resistant membrane system with integral wearing surface for pedestrian traffic service condition; according to ASTM C957/C957M.
- B. Primer: Liquid primer as recommended in writing for substrate and conditions by traffic-coating manufacturer.
 - 1. Material: Polyurethane.
- C. Preparatory and Base Coats: Polyurethane.
 - 1. Thicknesses: Minimum dry- or wet-film thickness as recommended in writing by manufacturer for substrate and service conditions indicated.
- D. Intermediate Coat: Polyurethane.
 - 1. Thicknesses: Minimum dry- or wet-film thickness as recommended in writing by manufacturer for substrate and service conditions indicated, measured excluding aggregate.
 - 2. Aggregate Content: As recommended in writing by traffic-coating manufacturer for substrate and service conditions indicated.

- E. Topcoat: Polyurethane.
 - 1. Thicknesses: Minimum dry- or wet-film thickness as recommended in writing by manufacturer for substrate and service conditions indicated, measured excluding aggregate.
 - 2. Aggregate Content: As recommended in writing by traffic-coating manufacturer for substrate and service conditions indicated.
 - 3. Color: Match Architect's sample.
- F. Aggregate: Manufacturer's standard aggregate for each use indicated of particle sizes, shape, and minimum hardness recommended in writing by traffic-coating manufacturer.
- G. Fire-Test-Response Characteristics: Provide traffic-coating materials with the fire-test-response characteristics as determined by testing identical products according to test method below for deck type and slopes indicated by an independent testing and inspecting agency that is acceptable to authorities having jurisdiction.
 - 1. Class A roof covering according to ASTM E108.
 - 2. <
- H. Energy Star Listing: Provide traffic coating that is listed on the DOE's Energy Star "Roof Products Qualified Product List" for low-slope roof products.

2.4 ACCESSORY MATERIALS

- A. Joint Sealants: As specified in Section 07 92 00 "Joint Sealants."
- B. Sheet Flashing: Nonstaining sheet material recommended in writing by traffic-coating manufacturer.
 - 1. Thickness: Minimum 60 mils (1.5 mm).
- C. Adhesive: Contact adhesive recommended in writing by traffic-coating manufacturer.
- D. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic-coating manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, surface smoothness, and other conditions affecting performance of traffic-coating work.
- B. Verify that substrates are visibly dry and free of moisture.
 - 1. Test for moisture according to ASTM D4263.
 - 2. Test for moisture content by measuring with an electronic moisture meter.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of traffic-coating work.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after substrate construction and penetrating work have been completed.
 - 2. Begin coating application only after minimum concrete-curing and -drying period recommended in writing by traffic-coating manufacturer has passed and after substrates are dry.
 - 3. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Clean and prepare substrates according to ASTM C1127 and manufacturer's written instructions to produce clean, dust-free, dry substrate for traffic-coating application. Remove projections, fill voids, and seal joints if any, as recommended in writing by traffic-coating manufacturer.
- B. Priming: Unless manufacturer recommends in writing against priming, prime substrates according to manufacturer's written instructions.
 - 1. Limit priming to areas that will be covered by traffic-coating material on same day. Reprime areas exposed for more time than recommended by manufacturer.
- C. Schedule preparation work so dust and other contaminants from process do not fall on wet, newly coated surfaces.
- D. Mask adjoining surfaces not receiving traffic coatings to prevent overspray, spillage, leaking, and migration of coatings. Prevent traffic-coating materials from entering deck substrate penetrations and clogging weep holes and drains.
- E. Concrete Substrates: Mechanically abrade surface to a uniform profile acceptable to manufacturer, according to ASTM D4259. Do not acid etch.
 - 1. Remove grease, oil, paints, and other penetrating contaminants from concrete.
 - 2. Remove concrete fins, ridges, and other projections.
 - 3. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
 - 4. Remove remaining loose material to provide a sound surface, and clean surfaces according to ASTM D4258.

3.3 TERMINATIONS AND PENETRATIONS

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C1127 and manufacturer's written instructions.
- B. Provide sealant cants at penetrations and at reinforced and nonreinforced, deck-to-wall butt joints.
- C. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.
- D. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C1127 and manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D4258.
 - 1. Comply with recommendations in ASTM C1193 for joint-sealant installation.
- B. Apply reinforcing strip in traffic-coating system where recommended in writing by traffic-coating manufacturer.

3.5 INSTALLATION OF TRAFFIC COATINGS

- A. Apply traffic coating according to ASTM C1127 and manufacturer's written instructions.
- B. Apply coats of specified compositions for each type of traffic coating at locations as indicated on Drawings.
- C. Start traffic-coating application in presence of manufacturer's technical representative.
- D. Verify that wet-film thickness of each coat complies with requirements every 100 sq. ft. (9 sq. m).
- E. Uniformly broadcast and embed aggregate in each coat indicated to receive aggregate according to manufacturer's written instructions. After coat dries, sweep away excess aggregate.
- F. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated; omit aggregate on vertical surfaces.
- G. Cure traffic coatings. Prevent contamination and damage during coating application and curing.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform the following field tests and inspections:
 - 1. Materials Testing:
 - a. Samples of material delivered to Project site are to be taken, identified, sealed, and certified in presence of Owner and Contractor.
 - b. Testing agency must perform tests for characteristics specified, using applicable referenced testing procedures.
 - c. Testing agency must verify thickness of coatings during traffic-coating application for each 600 sq. ft. (56 sq. m) of installed traffic coating or part thereof.
 - 2. Electronic Leak-Detection Testing:
 - a. Testing agency must test each deck area indicated for testing on Drawings for leaks using an electronic leak-detection method that locates discontinuities in the traffic-coating membrane.
 - b. Testing agency must perform tests on abutting or overlapping smaller areas as necessary to cover entire test area.

- c. Testing agency must create a conductive electronic field over the area of traffic coating to be tested and electronically determine locations of discontinuities or leaks, if any, in the traffic coating.
 - d. Testing agency must provide survey report indicating locations of discontinuities, if any.
 - B. Final Traffic-Coating Inspection: Arrange for traffic-coating manufacturer's technical personnel to inspect membrane installation on completion.
 - 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.
 - C. Waterproofing will be considered defective if it does not pass tests and inspections.
 - D. Prepare test and inspection reports.
- 3.7 PROTECTING AND CLEANING
- A. Protect traffic coatings from damage and wear during remainder of construction period.
 - B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 18 00

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SECTION 07 21 00
THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber blanket.
 - 2. Glass-fiber board.
 - 3. Mineral-wool board.
 - 4. Spray-applied cellulosic insulation.
- B. Related Requirements:
 - 1. Section 06 16 00 "Sheathing"
 - 2. Section 07 54 23 "Thermoplastic Polyolefin (TPO) Roofing"
 - 3. Section 09 29 00 "Gypsum Board"

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than Class A, 25 and 450 when tested in accordance with ASTM E84.

- B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.
- C. Thermal-Resistance Value (R-Value): R-value as indicated on Drawings in accordance with ASTM C518.

2.2 MANUFACTURERS

- A. Subject to compliance with requirements, provide alternative products by one of the following:
 - 1. Owens Corning Insulating Systems, LLC
 - 2. CertainTeed Corporation.
 - 3. Johns Manville; a Berkshire Hathaway company.
 - 4. Knauf Insulation of North America.
 - 5. Substitutions: Per Division 01.
- B. Source Limitation: Obtain insulation from a single manufacturer.

2.3 GLASS-FIBER BLANKET

- A. Glass-Fiber Blanket, Unfaced : ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Basis-of-Design Product: EcoTouch® Certified R Metal Building Insulation as manufactured by Owens Corning Insulating Systems, LLC, One Owens Corning Parkway, Toledo, OH 43659, +1 (800) 438-7465, <https://ownescorning.com>.
 - a. Thermal Resistance: ASTM C177 / C518.
 - b. Thickness: As indicated on Drawings.
 - c. Flame Spread Index: Less than 25, ASTM E84 / UL7231.
 - d. Smoke Developed Index: Less than 50, ASTM E84 / UL7231.
 - e. Combustion Characteristics: Non-combustible, ASTM E136.
 - f. Water Vapor Sorption: Less than 0.2% by volume, ASTM C1104.
 - g. Fungi Resistance: Passes ASTM C1338.
 - h. Corrosiveness: Passes ASTM C665, Section 13.8.
 - i. Odor Emission: Passes ASTM C1304.
 - j. Dimensional Tolerances: ASTM C167.
 - 1) Length: - 0-inches / + 1/2-inches.
 - 2) Width: - 1/4-inches / + 1/4-inches.
 - 2. Subject to compliance with requirements and with prior approval from the Architect, provide an equivalent product from one of the following manufacturers:
- B. Glass-Fiber Blanket, Reinforced-Foil Faced: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.

2.4 GLASS-FIBER BOARD

- A. Glass-Fiber Board, Faced: ASTM C 612, Type IA; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84. Nominal density of 2.25 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Owens Corning.
 - d. Or Approved Equal

2.5 MINERAL-WOOL BOARD

- A. Mineral-Wool Board, Types IA and IB, Unfaced: ASTM C 612, Types IA and IB; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics. Nominal density of 4 lb/cu. ft.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Industrial Insulation Group, LLC (IIG-LLC).
 - b. Roxul Inc.
 - c. Thermafiber, Inc.; an Owens Corning company.
 - d. Or Approved Equal
- B. Mineral-Wool Board, Types IA and IB, Faced: ASTM C 612, Types IA and IB; faced on one side with foil-scrim or foil-scrim-polyethylene vapor retarder; with maximum flame-spread and smoke-developed indexes of 15 and zero, respectively, per ASTM E 84. Nominal density of 4 lb/cu. ft.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Industrial Insulation Group, LLC (IIG-LLC).
 - b. Thermafiber, Inc.; an Owens Corning company.
 - c. Or Approved Equal

2.6 SPRAY-APPLIED CELLULOSIC INSULATION

- A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), chemically treated for flame-resistance, processing, and handling characteristics.
- B. Basis of Design Product: K-13 thermal insulation as manufactured by International Cellulose Corporation, web: www.spray-on.com
- C. Other Acceptable Manufacturers:
1. Carlisle Companies Inc.

2. Owens Corning company
3. Or Approved Equal

2.7 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGM Industries, Inc.
 - b. Cal-Fasteners, Inc.
 - c. Integrity Fasteners, Inc.
 2. Plate: Perforated, galvanized carbon-steel sheet, 0.030-inch thick by 2 inches square.
 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. AGM Industries, Inc.
 - b. Cal-Fasteners, Inc.
 - c. Integrity Fasteners, Inc.
 2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Crawl spaces.
 - b. Ceiling plenums.
 - c. Attic spaces.
- C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AGM Industries, Inc.
 - b. Cal-Fasteners, Inc.
 - c. Gemco.
- D. Insulation Fastener Accessories: Provide double-pointed weld pins, lagging pins, quilting pins, duct liner pins, insulation hangers, specialty washers, special caps, j-hooks, capacitor discharge annular weld pins, capacitor discharge acoustical lagging pins, and other accessory materials that are recommended in writing by insulation fastener manufacturer to produce complete insulation supports.

2.8 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
- B. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 - 6. For wood-framed construction, install blankets according to ASTM C1320 and as follows:

- a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- 7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
 - a. Exterior Walls: Set units with facing placed toward as indicated on Drawings.
 - b. Interior Walls: Set units with facing placed as indicated on Drawings.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.

3.4 INSTALLATION OF SPRAY-APPLIED CELLULOSIC INSULATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Clips, hangers, supports, sleeves and other attachments to spray bases are to be placed by other trades prior to the application of sprayed insulation.
- C. Ducts, piping, conduit or other suspended equipment shall not be positioned until after the application of sprayed insulation.
- D. Roof penetrations to be installed prior to application."

3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 25 00
WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fluid applied, vapor permeable air and water barrier.
 - 2. Foil faced sheet membrane flashing.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. For each type of product.
- B. Product Data Submittals: For fluid applied air and water barrier, include data on air and water-vapor permeance based on testing in accordance with referenced standards.
- C. Shop Drawings: Show details of fluid applied air and water barrier and drainage wrap at terminations, openings, and penetrations. Show details of flexible flashing applications.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, certified, or licensed by the weather barrier system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

1.5 FIELD CONDITIONS

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

1.6 WARRANTY

- A. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives sealants, fillers and primers. Comply with limits specified in related Section.
- B. General: The air barrier assembly shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to adjacent waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- C. Air-Barrier Assembly Air Leakage: Less than 0.0008 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.004 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.
- D. Building Envelope shall be constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:
 - 1. Continuous, with all joints made airtight.
 - 2. Capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
 - 3. Durable or maintainable.
 - 4. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
 - a. Foundation and walls.
 - b. Walls and windows or doors.
 - c. Different wall construction and cladding assemblies.
 - d. Wall and roof.
 - e. Wall and roof over unconditioned space.
 - f. Walls, floor and roof across construction, control and expansion joints.
 - g. Walls, floors and roof to utility, pipe and duct penetrations.
 - 5. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.
- E. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

2.2 FLUID APPLIED, VAPOR PERMEABLE AIR AND WATER BARRIER.

- A. Basis of Design Product: PERM-A-BARRIER VPL 50RS UV Stable (20 mils) as manufactured by GCP Applied Technologies, 20 Moores Rd, Malvern, PA 19355, web: www.gcpat.com.
- B. Performance Criteria:

1. Membrane Air Permeance: ASTM E2178: Not to exceed 0.004 cfm/ft.² under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.02 L/s- m² @ 75 Pa)
 2. Assembly Air Permeance: Provide a continuous air barrier assembly that has an air leakage not to exceed 0.04 cfm/ft.² of surface area under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.2 L/s-m² of surface area at 75 Pa) when tested in accordance with ASTM E2357.
 3. Water Vapor Permeance: ASTM E96, Method B: Greater than 10 perms @ 20mil
 4. Pull Adhesion: ASTM D4541: minimum 30 psi or substrate failure to glass faced wall board, minimum 50 psi to concrete/CMU.
 5. Low temperature flexibility: ASTM D1970: Pass at minus 20 degrees Fahrenheit (at minus 29 degrees Celsius).
 6. Water resistance of in-place membrane: ASTM E331: Pass. No water penetration tested at 15 psf.
 7. Nail sealability: ASTM D1970: Pass
 8. UV Exposure Limit: Minimum 365 calendar days
 9. Inservice temperature capability of 300°F (149°C)
 10. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 11. Color: Black
- C. Subject to compliance with requirements, provide an equivalent product from one of the following manufacturers:
1. Prosoco Cat-5, as manufactured by Prosoco, Inc., 3741 Greenway Cir, Lawrence, KS 66046, web: <https://prosoco.com>
 2. GE Elemax 2600, as manufactured by Momentive Performance Materials (formerly GE Advanced Materials), 2750 Balltown Road, Niskayuna, NY 12309, web: <https://siliconeforbuilding.com>.

2.3 FOIL FACED SHEET MEMBRANE FLASHING

- A. Basis of Design Product: PERM-A-BARRIER Ultra (30 mils) as manufactured by GCP Applied Technologies, 20 Moores Rd, Malvern, PA 19355, web: www.gcpat.com.
- B. Description: Sheet material composed of 100% butyl rubber adhesive with aluminum facer for high tear, puncture and impact resistance.
- C. Performance Criteria:
1. Membrane Air Permeance: ASTM E2178: <0.004 cfm/ft.²
 2. Assembly Air Permeance: Provide a continuous air barrier assembly that has an air leakage not to exceed 0.004 cfm/ft.² of surface area under a pressure differential of 0.3 in. water (1.57 psf) (equal to 0.02 L/s-m² of surface area at 75 Pa) when tested in accordance with ASTM E2357.
 3. Water Vapor Permeance: ASTM E96, Method B: <0.01 perms
 4. Minimum Tensile Strength, Film: 5000 psi as per ASTM D882
 5. Minimum Elongation, To Failure: 200% as per ASTM D882
 6. Minimum Puncture Resistance: 70lbs as per ASTM E154
 7. Low temperature flexibility: ASTM D1970: Pass at minus 20 degrees Fahrenheit (at minus 29 degrees Celsius).
 8. Water resistance of in-place membrane: ASTM E331: Pass. No water penetration tested at 15 psf.
 9. Nail sealability: ASTM D1970: Pass
 10. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

11. Color: As indicated on Drawings.

2.4 FLEXIBLE FLASHING

- A. Air-barrier manufacturer's standard self-adhering membrane complying with ASTM D1970, interleaved with disposable plastic release liner until installed and included in the same warranty as the air and water barrier membrane.

2.5 ACCESSORY MATERIALS

- A. Requirement: Provide primers, fasteners, seam tapes, flashing, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by weather barrier manufacturer to produce a complete weather barrier assembly and that are compatible with primary weather barrier material and adjacent construction to which they may seal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 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 air-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.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.
- E. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

3.3 JOINT TREATMENT

- A. Gypsum Sheathing: Fill joints greater than 1/4 inch (6 mm) with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.
- B. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
 - 1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches (75 mm) along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.

3.4 TRANSITION STRIP INSTALLATION

- A. General: Install tapes, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install compatible strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
 - 3. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply elastomeric flashing sheet so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames with not less than 1 inch (25 mm) of full contact.
 - 1. Elastomeric Flashing Sheet: Apply adhesive to wall, frame, and flashing sheet. Install flashing sheet and termination bars, fastened at 6 inches (150 mm) o.c. Apply lap sealant over exposed edges and on cavity side of flashing sheet.
 - 2. Where opening flashing details are not shown, apply elastomeric flashing strips as indicated and in compliance with opening product (window, door, louver, etc) manufacturer's written recommendations.

- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- H. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, counterflashing strip.
- I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- J. 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 (150 mm) beyond repaired areas in strip direction.

3.5 INSTALLATION OF FLUID APPLIED, AIR AND WATER BARRIER

- A. Apply air and water barrier membrane to achieve a continuous air barrier according to air barrier manufacturer's written instructions.
- B. Apply air and water barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply a continuous unbroken air and water barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
 - 1. Vapor-Permeable Membrane Air Barrier: 20-mil (0.51-mm) thickness
- D. Do not cover air and water barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove air and water barrier that do not comply with requirements; repair substrates and reapply air barrier components.

3.6 FOIL FACED SHEET MEMBRANE FLASHING INSTALLATION

- A. Install foil faced sheet membrane flashing as per manufacturers written information and shop drawings.
- B. Pre-cut membrane to easily handled lengths.
- C. The entirety of the membrane must be pressed firmly into place with sufficient pressure using a hand roller during application to ensure continuous and intimate contact with the substrate.
- D. Overlap adjacent pieces 3 in. and roll overlap with a hand roller.

3.7 FIELD QUALITY CONTROL

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

- B. Inspections: Air and water barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air and water barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Continuous structural support of air and water barrier system has been provided.
 3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 4. Site conditions for application temperature and dryness of substrates have been maintained.
 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Surfaces have been primed, if applicable
 7. Laps in strips and transition membrane have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish-mouths.
 8. Termination sealant has been applied on cut edges.
 9. Strips and transition membrane have been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.
- C. Tests: Testing to be performed will be determined by Owner's testing agency from among the following tests:
1. Qualitative Testing: Air and water barrier assemblies will be tested for evidence of air leakage according to ASTM E1186.
- D. Remove and replace deficient air and water barrier components and retest as specified above.

3.8 CLEANING AND PROTECTION

- A. Protect air and water barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Protect air and water barrier from exposure to UV light and harmful weather exposure as required by manufacturer. Remove and replace main air and water barrier material exposed for more than 365 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 07 25 00

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SECTION 07 26 00
VAPOR RETARDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Reinforced-polyethylene vapor retarders.

1.3 RELATED REQUIREMENTS:

- A. Section 03 30 00 "Cast-in-Place Concrete" for coordination of vapor retarder installation during base preparation for slab on grade installations.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Reinforced-polyethylene vapor retarders.
 - 2. Penetration accessories and tape.
- B. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency. Submit independent third-party test data for all listed performance values to show compliance with this specification. All test data for review shall be as published and released for publication by the authors without restriction of distribution.
 - 1. Summary of test results as described in ASTM E1745.
 - a. Certify that all mandatory ASTM E1745 testing has been performed on a single production roll per ASTM E1745 Section 8.1. Test reports must specifically state that sampling and testing of materials are in strict accordance with the requirements of the standard.

1.6 QUALITY ASSURANCE

- A. Mockups: Vapor Retarder membrane including stake placement, pipe penetrations and securing to concrete surfaces to demonstrate standard of workmanship.
 - 1. Build panel approximately 100 -sq. ft. (9.3 sq. m).
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 SEQUENCING

- A. Begin installation only after substrate work is complete and penetrations are securely anchored.
- B. Coordinate with work as specified in Division 03 "Cast-in-Place Concrete" and "Concrete Reinforcing".

PART 2 - PRODUCTS

2.1 REINFORCED-POLYETHYLENE VAPOR RETARDERS

- A. Reinforced-Polyethylene Vapor Retarders: Sheet with outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 20 lb/1000 sq. ft. (9 kg/100 sq. m), with maximum permeance rating of 0.01 perm (5.7 ng/Pa x s x sq. m).
- B. Basis-of-Design Product: Stego Wrap 15 Mil thick Vapor Retarder by Stego Industries LLC. San Juan Capistrano, CA. 877.464-7834 or 949.493.5460, www.stegoindustries.com.
 - 1. Subject to compliance with requirements, provide the named product or a comparable product by one of the following manufactures:
 - a. ECOSHIELD-E15, 15-mil thick Sheet Membrane Vapor Retarder, by Epro Waterproofing Systems, www.eproserv.com .
 - b. W.R Meadows, PERMINATOR, 15-mil thick, www.meadows.com
 - c. REEF Industries, Inc., Griffolyn® Reinforced Vapor Protection, VAPORGUARD®, www.reefindustries.com.
- C. Properties:
 - 1. Water Vapor Retarder: Class A (Plastics) as per ASTM E1745.
 - 2. Permeance Rating: 0.01 perms, max. as per ACI 302.2R-06 recommendation & ASTM E1745 Section 7.1 (7.1.1-7.1.5).
 - 3. Permeance Testing: Comply with standard(s) ASTM F 1279 or ASTM E154, by ASTM E96, Method B
 - 4. Puncture Resistance: 2200 grams, min
 - 5. Tensile Strength: 45.0 lbf/in as per ASTM D882 or ASTM E154, sec.9
 - 6. Membrane Thickness: 15 Mil as per ASTM D1709 (method B)

2.2 ACCESSORIES

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Joint Tape: Manufacturer's recommended, double sided, adhesive tape with release paper on each face.
 - 1. Thickness: 6- mils minimum.
- C. Mastic Adhesive: Type recommended by manufacturer, non-sagging grade, compatible with sheet and substrate.
 - 1. Water Vapor Transmission Rate shall be 0.17 perms or lower per ASTM E96.
- D. Pipe Boots:
 - 1. Construct pipe boots from vapor Retarder material, pressure sensitive tape, and mastic per manufacturer's instructions.
- E. Vapor Retarder Stakes: Intended as option if floating form work is not used.
 - 1. Basis of Design: Polyvinyl Black VaporStake™, by Vaporstake, LLC, www.vaporstake.com.
 - 2. Physical Properties:
 - a. Solid Plastic construction: ASTM E1643-11 (sec. 8.4 & 8.6) and ACI 302.2R-06.
 - b. Use with Vapor Retarders: ASTM E1745-09
 - c. Recycled content: 100%
 - d. Size: Length for application and diameter per mfgr. for application
 - 3. Install in accordance with stake manufacturer's written recommendations.
 - 4. Manufacturers: Vaporstake, LLC, www.vaporstake.com.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions and proceed with Work when substrates are ready.
- B. Verify that substrate work is complete, clean, and dry and installed in accordance with contract documents before beginning installation of sheet products.
- C. Level and tamp or roll aggregate, sand or tamped earth base.

3.2 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.3 INSTALLATION OF BELOW GRADE VAPOR RETARDERS

- A. Under Slab-on-Grade: Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-98.
1. Unroll Vapor Retarder membrane with the longest dimension parallel with the direction of the concrete pour.
 2. Extend vapor barrier over footings and grade beams to a distance acceptable to the structural engineer or stop at impediments such as dowels and waterstops.
 3. Seal vapor barrier to footing/grade beam with double sided tape, termination bar, or both.
 4. Lay-out sheets to minimize quantity of joints.
 - a. Lap edge 6 -inches minimum and end joints 12 -inches minimum and continuously seal with joint tape.
 5. Apply tape to a clean and dry vapor retarder membrane.
 6. Terminate Retarder per manufacturer's recommendations along perimeter; at footers, vertical walls, and against penetrations.
 - a. Seal perimeter with continuous mastic bead along foundation walls.
 - b. Seal barrier joints with tape.
 7. No penetration of the Vapor Retarder membrane is allowed except for reinforcing steel and permanent utilities.
 - a. Seal all penetrations (including pipes) with field-assembled boots per manufacturer's instructions.
 - b. In the case that forms must be used, Vapor Stakes should be used to hold forms in place.
 - 1) Penetrate vapor Retarder with stake.
 - 2) Treat stake as pipe penetration.
 - 3) Leave stake permanently in concrete.
 - 4) Using a power saw, cut the stake off above the seal, but below the concrete's finished surface not higher than elevation of horizontal reinforcing.
 - 5) The lower portion of the vapor stake remains in place, permanently plugging the penetration.
 8. Refer to Division 03 "Cast-in-Place Concrete" for installation coordination requirements.
 9. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 -inches and taping all four sides with tape.
 - a. Do not use concrete adhesion tape to repair penetrations.
- B. Due to the possibility of differential settlement, adhere the vapor retarder at building perimeter and in a grid pattern every 4 -feet on-center with integrally bonded detail tape for concrete adhesion.

3.4 PROTECTION

- A. Protect vapor retarders from damage until concealed by permanent construction.
- B. Repair screeding stakes driven through retarder per manufacturer's recommendation.

- C. Install runway planks in construction traffic lanes until slabs are poured.

3.5 FIELD QUALITY CONTROL

- A. Conduct a visual inspection, in the presence of the Architect/Engineer, of the entire Retarder installation the day before placing concrete. Make all corrections prior to placing concrete.

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SECTION 07 26 33
MOISTURE MITIGATION CONTROL COATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes Moisture Mitigation Control Coating.
 - 1. Liquid applied, epoxy resin based moisture control system for interior substrates specified to receive moisture sensitive, adhesive applied, floor coverings.
 - 2. Cementitious leveling underlayment applied over moisture mitigation epoxy coating as required by specific flooring adhesive to be used at each finish flooring condition.

1.3 RELATED REQUIREMENTS

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Division 09 Sections specifying concrete floor surface preparation.
- C. Division 09 Sections specifying floor moisture and pH testing.
- D. Division 09 floor covering Sections, for installation requirements and to verify compatibility to the manufacturer's adhesives.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.
- C. International Concrete Repair Institute (ICRI):
 - 1. ICRI Technical Guideline No. 310.2R, Selecting and Specifying Concrete Surface Preparation for Coatings, Sealers, and Polymer Overlays.

1.5 DEFINITIONS

- A. Moisture Vapor Control System: A sequence of products applied on a concrete floor to isolate moisture and high pH in the concrete for adhesive applied finish floor coverings, complying with requirements of ASTM F3010.

- B. Moisture Vapor Control Coating: Barrier coating applied on concrete floor that acts as the primary barrier to moisture movement.
- C. Primer: One-component water-based liquid designed to bond to Moisture Vapor Control Coating and cementitious patching/leveling compounds.
- D. Underlayment: Trowelable or pourable patching/leveling compound to which the finish floor covering is adhered. Underlayment is installed on top of the Moisture Vapor Control Coating or primer.

1.6 ACTION SUBMITTALS

- A. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.
- B. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
 - 1. Include detailed installation requirements, spread rates, joint and crack treatment and final barrier surfaces for floor coverings.
 - 2. Pail Labels: Collect and submit each original pail label of Moisture Mitigation Control System Coating installed.
 - a. Copies are not acceptable.
- C. Shop Drawings: Floor Plans, indicating areas of installation, sequencing, and total area of installation in square feet.

1.7 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certification: Provide letterhead documentation of complete review of concrete mix designs, admixtures, sub-slab vapor retarder installation and curing methods with written acceptance prior to installation.
- B. Installer Proof of Qualification: Factory licensed, approved or certified applicator certificate signed by the manufacturer.
- C. Independent Laboratory Test Reports: For performance documentation of Moisture Vapor Control System.
 - 1. Water vapor transmission by ASTM E96 (water method) or ASTM D1653, indicating a maximum 0.1 perms net for coating on concrete.
 - 2. No loss in moisture-resistance properties for a period of ten years of exposure to continuous water contact and pH greater than 10 after final cure.
- D. Qualification Data: For Manufacturer and Installer.
- E. Sample Warranty: As specified.

1.8 CLOSEOUT SUBMITTALS:

- A. Submit under provisions of Section 01 77 00.

- B. Warranty: Submit executed warranty.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Company specializing in manufacturing water vapor reduction and alkalinity control reduction system products specified in this Section with minimum ten (10) years documented experience.
 - a. The moisture vapor and alkalinity control reduction system must be specifically formulated and marketed for water vapor reduction and alkalinity control without change of system design or formulation for a minimum of five (5) years.

B. Installer Qualifications:

1. Installer with not less than five (5) years of experience installing the specified coating systems.
2. Installer trained by the manufacturer or certified in accordance with manufacturer's specific warranty requirements.
3. Installer experienced in surface preparation and application of specified materials.

C. Pre-Installation Testing:

1. Document that floor and building conditions are within acceptable limits of temperature, relative humidity, and concrete condition before proceeding with substrate preparation and product application.
2. File a pre-installation checklist with the manufacturer and receive written confirmation of approval to proceed to support manufacturer's warranty.

D. Pre-Installation Conference: Conduct at Project site.

E. Mockup: Provide a mockup for evaluation of surface preparation techniques and moisture mitigation system application workmanship.

1. Mockup area of at least 200 square feet in location approved by Architect and Owner.
 - a. Include a 25 square feet area that illustrates the floor preparation without the coating applied.
2. Mockup Bond Tests: Perform tensile bond tests in triplicate on a 100 square foot minimum area on mockup, no sooner than 72 hours after installation is completed, according to ASTM D7234 through entire Moisture Mitigation Control System Coating into concrete substrate. Comply with the following:
 - a. No cohesive failure of leveling underlayment with at least 200 psi, or tensile failure in concrete substrate with no inter-layer or intra-layer failure of Moisture Mitigation Control System Coating.
 - b. If failure occurs, determine cause and method(s) to avoid further unacceptable work.
 - 1) Remove and re-apply mock-up area as required to produce acceptable work.
 - 2) Do not proceed with installation of moisture mitigation system until bond test results meet requirements above and are acceptable to Moisture Mitigation Control System Coating manufacturer.

MOISTURE MITIGATION CONTROL COATING

07 26 33 - 3

Fontana City Hall – Phase II

3) Repair all areas where testing was done.

3. Do not proceed with work until mockup workmanship and underlayment surface appearance are approved by manufacturer's representative and Architect.

- F. Products based on silicate chemistry, potassium, sodium, lithium, and similar formulations, water-based acrylics or water-based moisture mitigation systems are not acceptable and will be rejected.
- G. Manufacturer shall provide independent laboratory test reports documenting the Performance criteria for the product as specified.
- H. Installer shall coordinate with contractor regarding all treatments applied to concrete surfaces for compatibility with system, including but not limited to silicates and oils.
- I. Applicator shall be responsible for acceptance of concrete prior to installation of coating system.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to the job site in their original unopened containers, clearly labeled with the manufacturer's name and brand designation.
- B. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sun light.
 - 1. Do not store in areas with temperatures in excess of manufacturer's written instructions.
- C. Handle product in a manner that will prevent breakage of containers and damage products.
- D. Use products before manufacturer's expiration dates.

1.11 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits required by moisture mitigation system manufacturer.
- B. Do not apply Moisture Mitigation Control System Coating to concrete surfaces which have not been prepared to accept coating.
- C. Do not apply Moisture Mitigation Control System Coating to unprotected surfaces or when moisture is present on the surface of the concrete.
- D. Do not apply Moisture Mitigation Control System Coating when air or floor temperature is lower than 50 degrees F (10 degrees C) or expected to fall below this temperature within 24 hours from time of application.
- E. Install Moisture Mitigation Control System Coating only when concrete floor surface temperature is a least 5 degrees Fahrenheit above the dewpoint temperature of the air over the floor. Maintain and document coated floor surface temperature at least 5 degrees Fahrenheit above air dewpoint temperature for at least 24 hours after application.
- F. Allow continuous ventilation and air movement at all times during application and curing process of the moisture mitigation system.

MOISTURE MITIGATION CONTROL COATING

07 26 33 - 4

Fontana City Hall – Phase II

- G. Protect work to prevent damage that will affect performance and the finished underlayment surface.

1.12 WARRANTY

- A. Extended Warranty: Warranty provides, at Owner's option, repair or replacement of the Moisture Mitigation Control System Coating and flooring damaged due to failure of the Moisture Mitigation Control System Coating during the fifteen (15) year warranty period. Warranty definition of damage includes at least the following:
 - 1. Distress of flooring caused by moisture including but not limited to the following:
 - a. Adhesive deterioration resulting in loss of flooring bond to the floor.
 - b. Formation of bubbles, mole trails, lumps, bumps, seam separation, or other significant displacement that interferes with the intended use of the flooring.
 - 2. Distress of the Moisture Mitigation Control System Coating including but not limited to the following:
 - a. Deformation of approved patching/leveling compounds installed under the Moisture Mitigation Control System Coating.
 - b. Adhesive or cohesive failure of Moisture Mitigation Control System Coating components.
 - c. Distress of underlayment above the Moisture Mitigation Control System Coating such as delamination, disbanding, expansion, chemical reaction, or other deformation or displacement that interferes with the intended use of the flooring.
- B. Warranty includes the replacement of Moisture Mitigation Control System Coating, flooring system, patching compounds, installation accessories flooring materials and labor costs.
 - 1. Warranty does not exclude or become void due to cohesive substrate failure in the concrete surface due to normal concrete movement.
 - 2. Warranty does not exclude or become void due to existing substrate as installation of Moisture Mitigation Control System Coating indicates acceptance of site conditions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in Section 01 81 13.
- B. Moisture and Alkalinity: Remain tolerant to alkalinity of 14 pH in a 14 day bath test per ASTM D1308 and to 100 percent relative humidity per ASTM F2170.
 - 1. No loss in moisture-resistance properties for a period of fifteen (15) years of exposure to continuous water contact and pH greater than 8 after final cure of installed system.
- C. Water Vapor Transmission: Maximum 0.1 net perms (grains/hr/sq ft/per 1 inch Hg) water vapor transmission per independent testing in accordance with ASTM E 96, water method.

- D. Mold Resistance: Resistant to mold, mildew and biological growth when applied to prepared substrates.
- E. Flooring Compatibility: Coating to be compatible with all types of floor covering products.

2.2 MANUFACTURERS

- A. Basis of Design: VAP I 2000 Zero VOC family of products by KOSTER Waterproofing Systems, USA, www.kosterusa.com. One of the following at Contractor's option to suit conditions.
 - 1. VAP I 2000 Zero VOC, twelve hour cure time to final flooring.
 - 2. VAP I 2000 FS (Fast Set); four hour cure time to final flooring.
 - 3. VAP I 2000 UFS (Ultra-Fast Set); two hour cure time to final flooring.
- B. Subject to compliance with requirements, provide named product or an equivalent product by one of the following:
 - 1. AC Tech 2170® FC ZERO System by ALLIED Construction Technologies, Inc., www.actechperforms.com.
 - 2. MC™ RAPID by Ardex Engineered Cements, www.ardexamericas.com.
- C. Source Limitations: Provide materials approved by one Moisture Vapor Control System manufacturer including primers, coatings, and underlayment leveling/patching compounds for use above Moisture Vapor Control Coating.

2.3 SYSTEM DESCRIPTION

- A. It is the intent of this Section to require a complete stand-alone barrier system by one manufacturer with no requirements for additional components such as sand broadcast for adhesion of flooring systems.
- B. Moisture Vapor Control System containing 100 percent epoxy resin solids in a single coat system. Multi-coat systems are not acceptable.
- C. Comply with product requirements of ASTM F3010.
 - 1. Non-corrosive, low viscosity, high gloss, microbial resistant, moisture-alkaline resistant barrier coating to suppress, control and mechanically restrict water emission and pH level of concrete substrates for compliance with subsequent floor coverings or coating materials.
- D. Moisture Vapor Control Coating: Epoxy resins and other chemical compounds, specifically formulated chemicals and resins to provide the following properties.
 - 1. Solid Content: 100 percent.
 - 2. VOC, mixed: 0 g/L.
 - 3. Flash Point: 200 degrees F.
- E. Expansion Joint Treatment: By coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
 - 1. Basis of Design for KOSTER System: KOSTER Joint Sealant FS-H.

- F. Non-Moving Crack Treatment: By coating manufacturer or approved by coating manufacturer and type recommended to suit conditions indicated.
 - 1. Basis of Design for KOSTER System: KOSTER TA mixed with KOSTER VAP I 2000.
- G. Self-Leveling Primer: By coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
 - 1. Basis of Design for KOSTER System: KOSTER VAP I 06 Primer.
 - a. Applied over Moisture Vapor Control Coating prior to installation of underlayment.
- H. Self-Leveling Underlayment: By coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
 - 1. Basis of Design for KOSTER System: KOSTER SL Cementitious Underlayment.
 - a. Compressive Strength: 4,350 psi per ASTM C349 at 28 days.
 - b. Flexural Strength: 870 psi per ASTM C348 at 28 days.
 - c. Tensile Strength: Greater than 144 psi per ASTM D7234 at 28 days.
- I. Surface Treatment for Concrete Contaminated with Soluable Silicates: By Coating manufacturer or approved by coating manufacturer and type recommended to suit conditions indicated.
 - 1. Basis of Design for KOSTER System: KOSTER IB.
 - a. Apply to contaminated concrete prior to Vapor Emission Control System Sealer application

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates with Installer present for compliance with requirements for surface contamination, damage, and other conditions affecting performance of the Work
 - 1. Verify substrate conditions are acceptable for a warranted system.
 - 2. Verify new concrete floors have cured minimum 28 days.
 - 3. Verify removal of dirt, oils, films, and other materials detrimental to sealer application.
 - 4. Verify concrete cleaned by shot blasting or other mechanical abrasion is not excessively rough for sealing at specified Moisture Vapor Control Coating application rates.
 - 5. Verify items which penetrate concrete substrate to receive coating are securely installed and coating installation will not affect proper installation and warranty requirements.
- B. Examine substrate to determine if any repairs are required to restore substrate surface to be within tolerances required for floor finishes specified in other Sections, prior to completing Work of this Section.
 - 1. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of Moisture Vapor Control System with recommendations for methods and materials required to correct conditions before proceeding with work of this Section.
- C. Proceed with surface preparation only after unsatisfactory conditions have been corrected.

1. Proceeding with surface preparations indicates acceptance of surfaces and conditions of substrate.

3.2 PRE-INSTALLATION TESTING

- A. Concrete Slab Moisture and pH Testing: As specified in related Section 09 05 12.
 1. Owner to engage an Independent laboratory firm to perform testing of all concrete slabs (on grade and elevated) in accordance with ASTM F2170, no sooner than 45 days prior to the installation of the finished flooring, scheduled to receive adhered floor coverings.

3.3 PREPARATION

- A. Protection: Mask and protect walls, doors, equipment, adjacent work and finishes during installation process.
- B. Surface Preparation:
 1. Mechanically clean concrete substrate in accordance with ASTM D4259 to remove surface and penetrating contaminants and to produce a surface profile of CSP 3 or CSP 4 in accordance with ICRI Technical Guideline No. 310.2R.
 - a. Acceptable methods include shotblasting, scarifying or grinding. Grinding is only acceptable in locations unreachable by shotblast or scarification equipment.
 - b. Do not acid etch concrete surface.
 - c. Do not apply water to concrete surface.
 2. Acceptable substrate surfaces will be free of laitance, oil, grease, flooring adhesive, paint, and other surface contaminants affecting bond of Moisture Vapor Control System.
 3. If concrete floor develops areas of surface roughness greater than ICRI CSP-5 during preparation, apply patching/leveling compound in those areas and re-abrade to produce specified profile.
 - a. Excessively rough concrete cannot be adequately sealed at specified Moisture Vapor Control Coating application rates.
 - b. Confirm with Moisture Vapor Control System manufacturer for conditions where floor roughness can be repaired after coating has been installed.
 4. Concrete Fiber Reinforcement: If present after shot blasting, shall be burned off, scraped and vacuumed, leaving no fibers protruding from the concrete surface.
- C. When field quality control report indicates portions of substrate are unsatisfactory, repeat process until field quality control report indicates there are no unsatisfactory portions remaining.
- D. Surface Irregularities, Joints and Cracks: Use manufacturer's crack repair compound as follows.
 1. Fill bugholes, spalls, cracks, construction joints, sawcut control joints, surface irregularities, deteriorated joints and other surface damage exposed or created as a result of substrate cleaning operations flush with adjacent surfaces to provide sound substrate for specified floor finish.
 2. Follow manufacturer's recommendations for routing cracks with diamond abrasive wheel to not more than 1-1/8 inch to 1-1/4 inch depth.
 3. Vacuum clean to remove dust and residue.

MOISTURE MITIGATION CONTROL COATING

07 26 33 - 8

Fontana City Hall – Phase II

4. Mix and apply crack repair compound according to manufacturer's instructions.
 5. Scrape or lightly grind flush after curing if required by manufacturer to provide a level surface for Moisture Vapor Control Coating.
- E. Dry broom or vacuum clean concrete substrates in accordance with ASTM D4258 immediately before application of Moisture Vapor Control System to remove loose materials on substrate surface.

3.4 MIXING

- A. Use clean containers and mix thoroughly as per manufacturer's requirements to obtain a homogeneous mixture.
- B. Do not aerate the material when mixing.
- C. Mix ratios in accordance with manufacturer's written instructions.

3.5 INSTALLATION

- A. Apply Moisture Vapor Control Coating where relative humidity and alkalinity tests do not meet requirements listed in Section 09 05 12.
- B. Moisture Vapor Control Coating Application:
 1. Apply to form a continuous monolithic void-free application.
 2. Coverage rates are dependent on the surface texture and porosity of the substrate.
 3. Apply Moisture Vapor Control Coating at recommended rate per square foot to thickness required to meet the specified perm rating.
 4. Apply sufficient coating to achieve the manufacturer's recommended minimum film thickness using manufacturer's recommended squeegee or roller. Periodically check application rate and wet film thickness. Allow for manufacturer's recommended curing times.
 5. Treat pin holes and other coating surface deficiencies as directed by manufacturer.
- C. Joints: Expansion joints, isolation joints or other moving joints in the concrete substrate must not be filled or sealed with rigid materials. All moving joints must be preserved up through the Moisture Vapor Control System.
- D. Cementitious Underlayment Installation:
 1. Apply primer to Moisture Vapor Control Coating.
 2. Do not exceed manufacturer's recommended application rate and film thickness. Thicker primer can lead to cracking of underlayment.
 3. Allow for manufacturer's specified cure time.
 4. Do not exceed manufacturer's specified open time.
 5. Mix and pour the underlayment product on the floor and disperse with approved spreader, followed by smoothing material with approved smoother.
 6. Wear cleated shoes to avoid leaving marks.
 7. Do not exceed maximum application thickness specified by underlayment manufacturer. Provide a smooth, uninterrupted, level finish without bumps, clumps, depressions, or other defects that would reflect through applied resilient sports flooring.
 8. Floor finish shall be flat to within 1/8 inch in 10 feet, and as measured by ASTM E1155.

MOISTURE MITIGATION CONTROL COATING

07 26 33 - 9

Fontana City Hall – Phase II

- a. Provide F_F of 50 and F_L of 30.

3.6 DEFECTIVE WORK

- A. Inspect and repair defects.
 - 1. Inspect hardened underlayment for flatness.
 - 2. Lightly sand flat any bumps in the underlayment. Un-hydrated or partially hydrated clumps of underlayment cement shall be removed by carefully chiseling and patching with compatible trowel-applied patching compound recommended by underlayment manufacturer. Do not penetrate the Moisture Vapor Control Coating.
 - 3. Fill low spots with compatible trowel-applied patching compound recommended by underlayment manufacturer. Sand smooth to remove trowel marks.
- B. Allow surfaces to cure and re-apply additional coats as required to form a uniform control layer.
- C. Maintain environmental conditions required by coating manufacturer throughout the curing period.

3.7 FIELD QUALITY CONTROL

- A. Moisture Vapor Control System manufacturer and installer to guarantee installed system is compatible with all specified floor coverings and adhesives.
- B. Quality Control Testing and Observation: Owner's Testing Agency to perform the following:
 - 1. Visual inspection of completed substrate preparation to verify contamination is removed.
 - 2. Visual inspection of completed substrate preparation to verify surface profile matches ICRI profile required for specified coating or finish, using ICRI standard rubber mold for visual comparison.
 - 3. Prepare field quality control report. Clearly indicate the locations, extents, and conditions of areas where surface preparation does not conform to specified profile and cleanliness. Document observed conditions with digital photographs.
 - 4. Repeat inspections when additional surface preparation for unsatisfactory conditions indicated in the previous field quality control report.
 - 5. Verify that Moisture Vapor Control System film thickness meets manufacturer's recommended minimums.
 - 6. Verify that repairs of defective locations of the Moisture Vapor Control System are made according to the manufacturer's recommended requirements.

3.8 CLEANING AND PROTECTION

- A. Remove all debris resulting from Moisture Vapor Control System installation from project site.
- B. Protect prepared concrete substrates from contamination and damage due to traffic and topical water during required cure period until acceptance by floor covering installer.
- C. Recoat substrates that are contaminated or damaged by construction operations prior to installation of floor finishes specified in related Sections.
 - 1. Make all repairs and replacements necessary to the approval of the Architect and Moisture Vapor Control System manufacturer at no additional cost to the Owner.

END OF SECTION 07 26 33

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SECTION 07 42 13.23
METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal composite material (MCM) panels.
 - 2. Metal composite material (MCM) system.

1.3 DEFINITIONS

- A. MCM: Metal composite material; cladding material formed by joining two thin metal skins to polyethylene or fire-retardant core and bonded under precise temperature, pressure, and tension.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, MCM system Installer, MCM system manufacturer's representative, and installers whose work interfaces with or affects MCM panels, including installers of doors, windows, and louvers.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to MCM system installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect MCM system.
 - 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 7. Review temporary protection requirements for system assembly during and after installation.
 - 8. Review procedures for repair of panels damaged after installation.
 - 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel, system, and accessory.
 - 1. Metal composite material (MCM) panels.
 - 2. Metal composite material (MCM) system.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of MCM system; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, accessories, and special details.
 - 2. Accessories: Include details of flashing, trim, and anchorage, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
 - 3. Provide signed and sealed drawings, by a qualified design professional in Project jurisdiction, of MCM system showing compliance with performance requirements and design criteria identified for this Project.
- C. Samples for Initial Selection: For each type of MCM panel indicated, with factory-applied color finishes.
 - 1. Size: Manufacturers' standard size.
 - 2. Include Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of MCM panel required, with factory-applied color finishes.
 - 1. MCM Panel: One sample, 2 by 3 inches (50 by 75 mm).
 - 2. MCM System: 12 inches (305 mm) long by actual panel width, fabricated into panel systems indicated. Include fasteners, closures, and other MCM panel accessories. Panel sample need not be provided in the specified color.

1.6 INFORMATIONAL SUBMITTALS

- A. Test and Evaluation Reports:
 - 1. Product Test Reports: For each MCM panel, for tests performed by qualified testing agency.
 - a. MCM Panel Manufacturer's Material Test Reports: Certified test reports showing compliance with specific performance or third-party listing documenting compliance in accordance with the IBC.
 - b. Fabricator's MCM System Test Reports: Certified test reports showing system compliance with specific performance or third-party listing documenting compliance in accordance with the IBC.
 - 1) Dry or Wet Seal System: Tested to AAMA 501.1.
 - 2) DBVC System: Tested to AAMA 509.
 - 3) PER System: Tested to AAMA 508.
- B. Field Quality-Control Submittals:
 - 1. Field quality-control reports.

- C. Qualification Statements: For manufacturer.
- D. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For MCM panels.
- B. Warranty Documentation:
 - 1. Manufacturers' special warranties.
 - 2. Installer's special warranties.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 years' experience.
- B. Fabricator Qualifications: Approved by MCM panel manufacturer.
- C. Installer Qualifications: Fabricator of MCM system.
- D. Testing Agency Qualifications: An agency acceptable to authorities having jurisdiction.

1.9 MOCKUPS

- A. Build mockups to set quality standards for fabrication and installation.
 - 1. Build mockup as indicated on Drawings, including corner, supports, attachments, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on laboratory mockups.
 - 1. Build laboratory mockups at testing agency facility; use personnel, materials, and methods of construction that will be used at Project site.
 - 2. Notify Architect seven days in advance of dates and times when laboratory mockups will be tested.
- B. Preconstruction Testing: Performed by a qualified testing agency on manufacturer's standard assemblies.
 - 1. Water-Spray Test: Conduct water-spray test of mockup of MCM system, testing for water penetration in accordance with AAMA 501.2.

2. Seismic Performance: Conduct seismic test of mockup of MCM system, testing for seismic performance in accordance with AAMA 501.4.
3. PER System: Conduct all tests to determine wall performance and pressure equalization in accordance with AAMA 508.
4. DBVC System: Conduct all tests to determine wall performance and provide a V/W classification in accordance with AAMA 509.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, MCM panels, and other manufactured items so as not to be damaged or deformed. Package MCM panels for protection during transportation and handling.
- B. Unload, store, and erect MCM panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack MCM panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store MCM panels to ensure dryness, with positive slope for drainage of water. Do not store MCM panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on MCM panels during installation.

1.12 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of MCM panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.13 COORDINATION

- A. Coordinate MCM panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.14 WARRANTY

- A. Panel Integrity Warranty: Manufacturer agrees to repair or replace components of MCM panels that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Panel Finish Warranty: Manufacturer agrees to repair finish or replace MCM panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
- 2. Finish Warranty Period: 20 years from date of Substantial Completion.
- C. MCM System Warranty: System manufacturer's standard form in which manufacturer agrees to repair or replace components of MCM systems that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: No failure or deterioration of the system when laterally racked to 3/4 inch (19 mm) in both directions and repeated for three cycles in accordance with AAMA 501.4. System must pass the static water test as described in ASTM E331 following the seismic racking.
- B. Structural Performance: MCM systems to withstand the effects of the following loads, based on testing in accordance with ASTM E330/E330M:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
- C. Air Infiltration: Air leakage of not more than 0.003 cfm/sq. ft. when tested in accordance with ASTM E283/E283M at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- E. Water Penetration under Dynamic Pressure: No water penetration when tested in accordance with AAMA 501.1 at the following test pressure:
 - 1. Test Pressure: 15 psf (720 Pa).
- F. Provide DBVC system in accordance with AAMA 509.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: As indicated on Drawings.
- H. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

2.2 INSULATED WALL PANEL SYSTEM

- A. Basis of Design Product: Designwall 2000 panel, manufactured by Kingspan, web: www.kingspanpanels.us.
- B. Alternative Manufacturers: Subject to compliance with requirements, provide approved product from one of the following manufacturers:
 1. Pac-Clad, web: www.pac-clad.com
 2. CEI Materials, web: www.ceimaterials.com.
- C. Wall Panels: Provide panels as foamed-in-place manufacturing process.
 1. Insulation Core: QuadCore-B.
 - a. Density Nominal per ASTM D1622: 2.1-2.6 pcf
 - b. Shear Strength per ASTM C273: 15 psi
 - c. Compressive Strength per ASTM D1621: 24 psi
 - d. Tensile Strength: 24 psi
 2. Panel Thickness: As indicated on Drawings.
 3. Panel Size: As per manufacturers standard size.
 4. Thermal Performance: R-12.8 to R-25.6, as per panel thickness.
 5. Profile: As indicated on Drawings.
 6. Bond Strength: 22.5 in-lb/in. (100 N x mm/mm) when tested for bond integrity in accordance with ASTM D1623.
 7. Fire Performance: Flame-spread index less than and smoke-developed index less than 450, in accordance with ASTM E84 or UL 723.
- D. MCM Panel Materials:
 1. Steel-Faced Panels:
 - a. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - 1) Exterior Finish: As indicated on Drawings.
 - a) Color: As indicated on Drawings.

2.3 METAL COMPOSITE MATERIAL (MCM) SYSTEM

- A. Dry-Seal Barrier MCM System: Provide factory-formed and -assembled, MCM panels formed into profile for dry-seal barrier system installation. Include attachment assembly components and accessories required for weathertight system.
- B. System Panel Depth: As indicated on Drawings.

- C. Attachment Assembly Components: As indicated on Drawings, formed from material compatible with panel facing.
- D. Labeling: Comply with labeling requirement of applicable building code.

2.4 ACCESSORIES

- A. Metal Subframing and Furring: ASTM C955 cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 (Z275) hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of MCM system.
- B. System Accessories: Provide components required for a complete, weathertight wall system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of MCM panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as MCM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent MCM panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Use gasketed or approved coated fasteners between dissimilar metals.
 - 1. Steel Panels: As recommended by manufacturer
 - 2. Provide exposed fasteners with heads matching color of MCM panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in MCM panels and remain weathertight; and as recommended in writing by MCM system manufacturer.

2.5 FABRICATION

- A. Fabricate and finish MCM panels at the factory, by panel manufacturer's standard procedures and processes, as necessary to fulfill indicated panel performance requirements demonstrated by laboratory testing.
- B. Shop-fabricate MCM systems and accessories by fabricator's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with requirements of MCM panel manufacturer, of indicated system profiles, and with dimensional and structural requirements.
 - 1. Fabricate panels to dimensions indicated on Drawings based on an assumed design temperature of 70 deg F (21 deg C). Allow for ambient temperature range at time of fabrication.
 - 2. Formed MCM panel lines, breaks, and angles to be sharp and straight, with surfaces free from warp or buckle.

3. Fabricate panels with sharply cut edges and no displacement of face sheet or protrusion of core.
 4. Fabricated Panel Tolerances: Shop-fabricate panels to sizes and joint configurations indicated on Drawings.
 - a. Width: Plus or minus 0.079 inch (2 mm) at 70 deg F (21 deg C).
 - b. Length: Plus or minus 0.079 inch (2 mm) at 70 deg F (21 deg C).
 - c. Squareness: Plus or minus 0.079 inch (2 mm) at 70 deg F (21 deg C).
 5. Fabricate MCM panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
 6. Attach routed-and-turned panel flanges to with Manufacturer's standard fasteners.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's written instructions and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams.
 3. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Coil-Coated Metal Finish:
 1. PVDF Fluoropolymer: AAMA 2605, as indicated on Drawings, three coat fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat as indicated on Drawings. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- D. Custom finish as indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM system supports, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by MCM system manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by MCM system manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and assemblies penetrating MCM system to verify actual locations of penetrations relative to seam locations of MCM panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF MCM SYSTEM

- A. General: Install MCM system in accordance with system manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor MCM system securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving MCM system.
 - 2. Flash and seal MCM system at perimeter of all openings. Fasten with self-tapping screws.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as MCM system work proceeds.
 - 6. Align bottoms of MCM panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 7. Provide weathertight escutcheons for all items penetrating system.
 - 8. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by MCM system manufacturer.
 - 9. Attach MCM panels to supports at locations, spacings, and with fasteners recommended by manufacturer to meet listed performance requirements.
- B. Attachment Assembly, General: Install attachment assembly required to support MCM panels and to provide a complete weathertight wall system, including tracks, drainage channels, anchor channels, perimeter extrusions.
 - 1. Install subframing, furring, and other panel support members and anchorages in accordance with ASTM C955.
 - 2. Install support system at locations, at spacings, and with fasteners recommended by MCM system manufacturer to meet listed performance requirements.

- C. Dry-Seal MCM System: Attach MCM panels by interlocking panel as per manufacturers recommendation.
 - 1. Seal horizontal and vertical joints between adjacent MCM panels with manufacturer's standard gaskets.
- D. Install panels to allow individual panels to "free float" and be installed and removed without disturbing adjacent panels.
- E. Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install accessory components required for a complete MCM system assembly including trim, copings, corners, seam covers, flashings, [sealants] [gaskets], fillers, closure strips, and similar items. Provide types indicated by MCM system manufacturer.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
 - 1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install trim to fit substrates and to result in waterproof performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 ft. (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

3.3 INSTALLATION TOLERANCES

- A. Shim and align MCM panels within installed tolerance of 1/4 inch in 20 ft. (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Water-Spray Test: After installation, test area of assembly indicated on Drawings for water penetration in accordance with AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed MCM system installation, including accessories.
- D. MCM system will be considered defective if it does not pass test and inspections.
- E. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- F. Prepare test and inspection reports.

3.5 CLEANING

- A. Remove temporary protective coverings and strippable films as MCM panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, clean finished surfaces as recommended by MCM panel manufacturer. Maintain in a clean condition during construction.
- B. After installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

3.6 PROTECTION

- A. Replace MCM panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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SECTION 07 42 43
COMPOSITE WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior, panelized fiber cement cladding system and accessories to complete a drained and back-ventilated rainscreen.

1.3 RELATED SECTIONS

- A. Section 05 12 00 "Structural Steel Framing"
- B. Section 06 10 53 "Miscellaneous Rough Carpentry"
- C. Section 07 21 00 "Thermal Insulation"
- D. Section 07 2500 "Weather Barriers"
- E. Section 07 62 00 "Sheet Metal Flashing and Trim"
- F. Section 07 92 00 "Joint Sealants"

1.4 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 509-14 – Voluntary Test and Classification Method of Drained and Back Ventilated Rain Screen Wall Cladding Systems.
- B. National Fire Protection Association (NFPA):
 - 1. NFPA 285 - Fire Test Method for Exterior Wall Assemblies Containing Combustible Material.

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTAL

- A. Product Data: Submit manufacturer's product description, storage and handling requirements, and installation instructions.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, accessories, and special details.
 - 2. Accessories: Include details of flashing, trim, and anchorage, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
- C. Samples for Initial Selection: For each type of panel indicated, with factory-applied color finishes.
 - 1. Size: Manufacturers' standard size.
 - 2. Include Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of panel required, with factory-applied color finishes.
 - 1. Panel: One, panel width by 12 inches.

1.7 INFORMATIONAL SUBMITTAL

- A. Product Test Reports and Code Compliance: Documents demonstrating product compliance with local building code, such as test reports or Evaluation Reports from qualified, independent testing agencies.
- B. Field Quality-Control Submittals: Field quality control reports
- C. Qualification Statements: For manufacturer and installer.
- D. Samples: Submit samples of each product type proposed for use.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data
- B. Warranty Documentation:
 - 1. Manufacturers' special warranties.
 - 2. Installer's special warranties.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. All fiber cement panels specified in this section must be supplied by a manufacturer with a minimum of 10 years of experience in fabricating and supplying fiber cement cladding systems.
 - 2. Provide technical and design support as needed regarding installation requirements and warranty compliance provisions.

- B. Installer Qualifications: All products listed in this section are to be installed by a single installer trained by manufacturer or representative.

1.10 MOCKUPS

- A. Build mockups to set quality standards for fabrication and installation and for preconstruction testing.
 - 1. Build mockup as indicated on Drawings, including supports, attachments, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Panels must be stored flat and dry before installation. Do not stack pallets more than two high.
- B. If panels are exposed to water or water vapor prior to installation, allow to completely dry before installing. Failure to do so may void warranty.
- C. Panels shall be carried on edge. Improper handling may cause cracking or panel damage.
- D. Direct contact between the panels and the ground should be avoided at all times. It is necessary to keep panels clean during installation process.

1.12 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of panels to be performed in accordance with manufacturers' written instructions and warranty requirements.

1.13 COORDINATION

- A. Coordinate panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.14 WARRANTY

- A. Panel Integrity Warranty: Manufacturer agrees to repair or replace components of panels that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration and other materials beyond normal weathering.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

- B. Panel Finish Warranty: Manufacturer agrees to repair finish or replace panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading.
 - b. Cracking, checking, peeling, or failure of paint.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Fiber Cement Cladding: Comply with ASTM C1186, Type A, Grade II requirements:
- B. Mean Coefficient of Linear Thermal Expansion (ASTM E228): Max 1.0×10^{-5} in./in. F.
- C. Surface Burning (ASTM E84): Flame Spread: 0, Smoke Developed: 0.
- D. Air Infiltration: Air leakage of not more than 0.003 cfm/sq. ft. when tested in accordance with ASTM E283/E283M
- E. Water Penetration under Static Pressure: No water penetration when tested in accordance with ASTM E331
- F. Water Penetration under Dynamic Pressure: No water penetration when tested in accordance with AAMA 501.1.
- G. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.
- H. Drained and Back Ventilated Rainscreen (AAMA 509-14): System classifications: W1, V1.

2.2 CCOMPOSITE WALL PANELS

- A. Acceptable Manufacturer: Nichiha Corporation, web: www.nichiha.com.
- B. Basis of Design Product: Nichiha Illumination series, as manufactured by Nichiha Corporation.
 - 1. Profile Color: As indicated on Drawings.
 - 2. Profile: As indicated on Drawings.
 - 3. Accessory:
 - a. Manufactured corners 3-1/2" returns.
 - b. Aluminum trim: Corner key, open outside corner, H-mold, J-mold, compression joint, inside corner.
 - c. Dimensions – As indicated on Drawings.
 - d. Panel thickness: As per manufacturers standard thickness.

- e. Finish: As indicated on Drawings.

2.3 MATERIALS

- A. Fiber cement panels manufactured from a pressed, stamped, and autoclaved mix of Portland cement, fly ash, silica, recycled rejects, and wood fiber bundles.

2.4 INSTALLATION COMPONENTS

- A. Ultimate Clip System: As indicated on Drawings.
- B. Aluminum Trim: Paint primed trim as specified in finish schedule.
- C. Flashing System: As indicated on Drawings.
- D. Fasteners: Corrosion resistant fasteners, such as hot-dipped galvanized screws appropriate to local building codes and practices. See manufacturer's instructions for appropriate fasteners for construction method used.
- E. Flashing: Flash all areas specified in manufacturer's instructions. Flashing must be galvanized, anodized, or PVC coated.
- F. Sealant: Sealant shall comply with ASTM C920, Class 35 as per Section 07 92 00.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
 - 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by system manufacturer.
 - 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by system manufacturer.
 - 3. Verify that air or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install panels or components that appear to be wet, damaged or defective.

3.2 TOLERANCE

- A. Wall surface plane must be plumb and level within +/- ¼ inch in 20 feet in any direction.
 - 1. One layer of Nichiha 5mm (3/16") Spacer may be used as shim.

3.3 INSTALLATION

- A. General: Install products in accordance with the latest installation guidelines of the manufacturer and all applicable building codes and other laws, rules, regulations and ordinances.
- B. Panel Cutting: Cut panels as per manufacturers written information and tools.
 - 1. Cut fiber cement panels outside or in a well-ventilated area.

3.4 CLEANING AND PROTECTION

- A. Clean and protect the panels as per manufacturers written information.

END OF SECTION 07 42 43

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Adhered thermoplastic polyolefin (TPO) roofing system. including flashings and other components as follows:
 - a. Substrate Preparation.
 - b. Vapor retarder.
 - c. Roof insulation.
 - d. Roof cover boards.
 - e. Roof membrane.
 - f. Roof membrane flashings.
 - g. Adhesives.
 - h. Walkway pads.
 - i. Sealants.

B. Related Requirements

- 1. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- 2. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
- 3. Section 07 62 00 "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counter-flashings.
- 4. Section 07 71 00 "Roof Specialties".
- 5. Section 07 72 00 "Roof Accessories".
- 6. Section 07 92 00 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
- 7. Division 22 "Plumbing" for storm drainage piping specialties for roof drains.

1.3 DEFINITIONS

- A. Roofing Terminology: See ASTM D079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.4 REFERENCES

- A. Codes and Construction Industry 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.

1. Comply with the latest editions of the standards referenced in this section, except where more stringent standards are specified in this section, shown on the Drawings, or required by the manufacturer.
 2. References are to current editions of documents unless earlier editions are specifically referenced by the governing code or are otherwise indicated.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

1.5 DEFINITIONS

- A. TPO: Thermoplastic polyolefin.
- B. Roofing Terminology: See ASTM D1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.
- C. Total System Warranty: Warranty of the entire roof system including items specified in all project specification sections in connection with the roofing system.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated. Demonstrate compliance with specified attributes.
1. Solar Reflectance Index for Roof Materials: Provide Product Test Reports indicating that roof materials comply with Solar Reflectance Index requirement and demonstrate Cool Roof Rating Council (CRRRC) listing.
- B. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer and bearing his seal and signature, detailing, fabrication and assembly of roofing system. Include plans, elevations, sections, details, and attachments to other work. Shop drawings shall be project specific beyond standard details published by the manufacturer and show integration to adjacent systems.
1. Base flashings and membrane terminations.
 2. Tapered insulation, including slopes.
 3. Roof plan showing orientation of membrane roofing.
 4. Insulation and roof membrane fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples for Verification: For the following products:
1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
 2. Roof insulation.
 3. Walkway pads or rolls.
 4. Metal termination bars.
 5. Battens.
- D. Qualification Data: For qualified Design Engineer, Installer and manufacturer.

- E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of compliance with performance requirements.
- F. Installer's Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
- G. The roof membrane manufacturer shall provide documented proof of 5 projects performing for the duration of the specified warranty located in similar climates to the project being specified.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- I. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES.
- J. Field quality-control reports.
- K. Maintenance Data: For roofing system to include in maintenance manuals.
- L. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project. Manufacturer shall have a minimum 10 years' experience with similar projects.
 - 1. Membrane to have no formulation changes in the last twenty (20) years as certified by the manufacturer.
- B. Installer Qualifications: A qualified installer that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty. The Contractor shall have at least five (5) years of experience as an applicator with the submitted manufacturer as certified by the manufacturer.
 - 1. Installer must be capable of extending the Manufacturer's Labor and Materials guarantee.
 - 2. Installer must be capable of extending the Manufacturer's No Dollar Limit guarantee.
 - 3. Upon completion of the installation and the delivery to manufacturer of a certification that all work has been done in strict accordance with the contract specifications and the manufacturer's requirements, an inspection shall be made by a Technical Representative of manufacturer to review the installed roof system.
 - 4. All work pertaining to the installation of the membrane and flashings shall only be completed by personnel trained and authorized by the manufacturer in those procedures.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

07 54 23 - 3

Fontana City Hall – Phase II

cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

D. Regulatory Requirements:

1. Foam Plastic Insulation: Comply with requirements of Section 2603 in the California Building Code (CBC).
2. Thermal- and Sound-Insulating Materials, Radiant Barriers, and Vapor Retarders: Comply with requirements of California Building Code (CBC) Section 719.
3. Insulating Material Standards: Comply with the California Referenced Standards Code, California Code of Regulations, Title 24, Part 12 / Chapter 12-13 Standards for Insulating Material.

E. Source Limitations: Obtain components including roof insulation fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.

F. Do not deviate from the Project Specification or the approved shop drawings without prior written approval by the Architect, the Owner's Representative and the manufacturer.

G. Exterior Fire-Test Exposure: ASTM E108, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

H. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

I. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

J. Preinstallation Roofing Conference: Conduct joint conference at Project site after approval of a complete submittal for both roofing and vegetated roof assemblies.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, installer of vegetated roofing assemblies, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

07 54 23 - 4

Fontana City Hall – Phase II

1.9 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 - 2. All adhesives shall be stored at temperatures between 40 degrees F and 80 degrees F.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- E. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.
- F. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
- G. All materials which are determined to be damaged by the Architect or the manufacturer are to be removed from the job site and replaced at no cost to the Owner.

1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
 - 1. Membrane materials may be installed under certain adverse weather conditions but only after consultation with the manufacturer, as installation time and system integrity may be affected.
 - 2. Do not install if wind is gusting more than 15 miles per hour or interferes with proper installation.
 - 3. Do not apply roofing membrane when ambient temperature is outside manufacturer's recommended outside limits.
 - 4. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
 - 5. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- B. Coordinate the work with installation of associated counterflashings installed by other sections.

- C. Only as much of the new roofing as can be made weather-tight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.
- D. Schedule and execute work without exposing the interior building areas to inclement weather or its effects. Protect existing building and its contents against all risks.
- E. Ensure all surfaces receiving new insulation, membrane or flashings are dry at time of application. Provide equipment necessary to dry surfaces prior to application otherwise.
- F. Secure new and temporary construction, including equipment and accessories to preclude wind blow-off and subsequent roof or equipment damage.
- G. Install uninterrupted waterstops at the end of each day's work and remove completely before resuming next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Replace contaminated membrane at no cost to the Owner.
- H. Prevent membranes from contacting incompatible materials, including but not limited to asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials, as described by the manufacturer requirements for membrane compatibility, precautions and recommendations.
- I. Sequence work to avoid use of new completed work as walking surface or equipment movement and storage. Provide protection and barriers necessary to segregate the work area and to prevent damage to completed work. Provide a substantial protection layer consisting of plywood over felt or plywood over insulation board on roof areas subject to construction traffic.
- J. Remove all dirt, debris and dust from surfaces by vacuuming, sweeping, blowing with compressed air or similar methods. Maintain in clean condition before and during application.
- K. Follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.
- L. Remove all new roofing waste material from the site immediately and transport to a legal dumping area authorized to receive such material.
- M. Take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.
- N. Flammable adhesives and deck primers shall not be stored or used in the vicinity of open flames, sparks and excessive heat.
- O. Consult the manufacturer's technical department for precautionary steps when rooftop contamination occurs or is anticipated.
- P. Verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Report any such blockages in writing (letter copy to the manufacturer) to the Architect for corrective action prior to installation of the roof system.
- Q. Immediately stop work if any unusual or concealed condition is discovered and immediately notify Architect of such condition in writing for correction. (Letter copy to the manufacturer).
- R. Clean site, including interior and exterior building areas affected by construction, to the Owner's satisfaction.

- S. Repair landscaped areas damaged by construction activities at no cost to the Owner.
- T. Do not install adhered membrane if any of the following conditions occur. Consult the manufacturer's technical department for precautionary steps:
 - 1. The roof assembly permits interior air to pressurize the membrane underside.
 - 2. The wall/deck intersection permits air entry into the wall flashing area.
- U. Take precautions and coordinate the operation of vents and air intakes when using adhesives to prevent adhesive odors entering the building. Keep lids on unused cans at all times.
- V. Wear all required protective wear for job conditions when using solvents or adhesives.

1.11 WARRANTIES

- A. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - 1. Total System Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, metal edges, copings and other components of membrane roofing system. The Warranty shall be non-prorated provide for No Dollar Limit (NDL), and shall not exclude ponding water and no time limited shall be assigned for any such ponding water during the warranty period.
 - 2. Wind Speed: 55 MPH, Manufacturer's standard.
 - 3. Warranty Period: 20 years from date of Substantial Completion.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, vapor retarders, and walkway products, for the following warranty period:
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
 - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D3746 or ASTM D4272.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.

- C. Edge Securement: Comply with CBC 1504.5 "Edge Securement for Low-Slope Roofs". Provide products designed and tested for wind resistance in accordance with ANSI/SPRI ES-1, as required by the California Building Code, Chapter 15.
- D. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7 for wind speeds up to 120 MPH as adjusted for building height and exposure class.
 - 1. Fire/Windstorm Classification: FM 1-90, Class A.
 - a. Roof system is designed to achieve 90-psf of uplift testing.
- E. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E1980, based on testing identical products by a qualified testing agency.
- F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Drainage: Provide a roof system with positive drainage where all standing water dissipates within 48 hours after precipitation ends.

2.2 TPO MEMBRANE ROOFING

- A. Source Limitations: Obtain components including roof insulation, fasteners, metal edges and copings for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer in writing and included in their warranty.
- B. Basis of Design Product: JM TPO – 60 mils, meets the requirement of ASTM D6878 as manufactured by Johns Manville, web: www.jm.com
- C. Acceptable Alternate Products: One of the following, as accepted by the Architect in writing;
 - 1. Everguard TPO, www.gaf.com.
 - 2. Firestone UltraGuard TPO Roof, www.firestonebpc.com.
 - 3. Carlisle SynTec SureWeld TPO: www.carlisle-syntec.com
- A. Fabric-Reinforced TPO Sheet: ASTM D6878, internally reinforced, uniform, flexible, fleece-backed TPO sheet.
 - 1. Thickness: 60 mils, Not Nominal.
 - 2. Membrane thickness over the reinforcing scrim (top-ply thickness) shall be nominal .024-mil or thicker.
 - 3. White Color: Initial SRI (solar reflectance index) not less than 99 in accordance with ASTM E1980.

2.3 AUXILIARY MEMBRANE ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.

1. Liquid-type auxiliary materials, adhesives and sealants shall comply with the limits for VOC content specified in related Section.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as TPO sheet membrane.
1. Prefabricated outside and inside flashing corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are heat-welded to membrane or base flashings.
 2. Prefabricated injection molded vent pipe flashing, 60 mils thickness.
- C. Slip Sheet: Manufacturer's standard, of thickness required for application.
- D. Bonding Adhesive: Manufacturer's standard, water based.
1. All products shall be furnished by the membrane manufacturer and specifically formulated for the intended purpose.
 2. TPO Bonding Adhesive: A high strength solvent-based contact adhesive that allows bonding of TPO membrane to various porous and non-porous substrates.
 3. Water Cut-Off Mastic: Used as mastic to prevent moisture migration at drains, compression terminations and beneath conventional metal edging (at a coverage rate of approximately 10' per tube or 100' per gallon).
 4. Universal Single-Ply Sealant: A 100% solids, solvent free, one-part, polyether sealant that provides a weather tight seal to a variety of building substrates and meeting the requirements of Section 07 92 00. Can be used as a termination bar sealant or for use in counter flashing, coping, and scupper details.
 5. Low VOC contact primer for enhancing the bond of Bonding Adhesive.
 6. Insulation Adhesive: 2-part urethane adhesive used to adhere insulation to insulation and insulation to a vapor barrier
- E. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors. Sure-Seal Termination Bar: 1 inch (13 mm) wide, .098 inch (2.5mm) thick extruded aluminum bar pre-punched 6 inches (152 mm) on center with sealant ledge to support Lap Sealant.
1. Termination Stop: An extruded aluminum, low profile bar used to attach to the roof deck or to walls/curbs at termination, square penetrations and at incline changes of the substrate. 1 in. wide, flat aluminum bar 1/8 in. thick that has predrilled holes every 6 in. o.c.
 2. Termination Disc: A 20-gauge, 2 in. diameter SAE 1010 steel plate with an AZ 55 Galvalume coating to meet FM 4470 criteria for corrosion resistance used to attach to the roof deck at round penetrations.
- F. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch (25 mm wide by 1.3 mm) thick, prepunched.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening membrane to substrates indicated to resist imposed loads as specified, and acceptable to membrane roofing system manufacturer.
- H. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, and other accessories.

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

07 54 23 - 9

Fontana City Hall – Phase II

- I. Clad Metal: TPO-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles.
 - 1. Sheet Metal: 24-gauge, G90 galvanized sheet metal with 20 mil (0.5 mm) unsupported TPO membrane laminated on one side.
- J. Sealant: Roof Manufacturer's Multi-Purpose Sealant (for termination details), complying with requirements for sealants specified in Section 07 92 00.

2.4 EDGINGS AND TERMINATIONS

- A. ES-1 Certified Metal Edging to be used at all drip edge and coping cap locations. The roofing contractor is to include these items in their bid as all coping metal and drip edge metal are to be included in the warranty.
 - 1. Edgings fabricated by local ES-1 certified fabricator may be provided where acceptable to roof membrane manufacturer for inclusion in warranty.
- B. ES-1 certified metal edging in 10'-0" lengths made from .040 Aluminum with a prefinished Kynar finish. Comes with inside and outside miter pieces along with end cap, sump and end termination pieces. Products by membrane manufacturer or as approved by membrane manufacturer in writing and included in the Roof Total System Warranty.
- C. Refer to Division 07.

2.5 PARAPET SHEATHING

- A. Parapet Sheathing: Roofing Manufacturers approved, fire-tested fiberglass-faced gypsum sheathing.
 - 1. Basis of Desing Product: 5/8" Densglass sheathing as manufactured by Georgia-Pacific, web: www.buildgp.com
- B. Fasteners:
 - 1. Parapet Sheathing: Corrosion resistant drive screws, ASTM C1002 for attachment to metal framing.

2.6 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or provided by and included within the roof membrane manufacturer's system warranty, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated or as required to meet requirements of minimum thermal resistance and drainage slope.
- B. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated, except maintain minimum ¼ inch in 12 inches slope at all slopes, including valleys.
- C. Non-Halogenated Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, glass fiber reinforced cellulose facer bonded to core.

1. Acceptable Manufacturers:
 - a. GAF
 - b. DuPont
 - c. Carlisle Syntec Systems.
 - d. Substitutions: As per Division 01.

2.7 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Bead Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

2.8 COVER BOARDS

- A. Provide one of the following products manufactured by or as recommended by roof membrane manufacturer and included in the full roof assembly warranty.
 1. Installed over rigid roof insulation with staggered joints, adhered or mechanically attached as scheduled.
- B. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate, Type X, 5/8 inch thick or thickness required to achieve indicated fire classification.
 1. Products: Provide products manufactured by or as recommended by roof membrane manufacturer and included in the full roof assembly warranty:
 2. Georgia-Pacific Corporation; Dens Deck, Prime with EONIC Technology.

2.9 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 0.150 inch (3.81 mm) thick and acceptable to roofing system manufacturer.
- B. Basis of Design Product: JM TPO walkpad, as manufactured by Johns Manville, web: www.jm.com.
 1. Material: Non-reinforced TPO.
 2. Color: Grey
 3. Size: As per manufacturer's standard size.

2.10 MISCELLANEOUS ACCESSORIES

- A. Aluminum Tape: 2 -inch (50 mm) wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at joints.
- B. Sealing Tape Strip: Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as a preventive measure against air and windblown moisture entry.
- C. Multi-Purpose Tape: A high performance sealant tape with used with metal flashings as a preventive measure against air and windblown moisture entry.
- D. Welder: Self-propelled hot-air welding machine used to seal long lengths of the membrane seams. Types and capacities recommended by roofing manufacturer to suit conditions indicated and as required to provide required results.
- E. TPO Membrane Cleaner: Used to prepare membrane that has been exposed to the elements for approximately 7 days prior to heat welding or to remove general construction dirt at an approximate coverage rate of 400 square feet per gallon (one surface).

2.11 MISCELLANEOUS FASTENERS AND ANCHORS

- A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm) and shall be approved for such use by the fastener manufacturer.
- B. Wood Nailers & Blocks: Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Project Drawings. Thickness of nailers must match the insulation thickness to achieve a smooth transition. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated) and be #2 quality or better lumber. Creosote or asphalt-treated wood is not acceptable. Wood nailers shall conform to Factory Mutual Loss Prevention Data Sheet 1-49. All wood shall have a maximum moisture content of 19 percent by weight on a dry-weight basis.

2.12 FOIL FACED SHEET MEMBRANE FLASHING (AIR/WEATHER BARRIER TIE-IN)

- A. Refer to Section 07 25 00 "Weather Barrier" for the product details and installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.

2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of wood and steel roof decks complies with pertinent requirements in Structural Drawings and Specifications.
4. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
5. Verify, that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.

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

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components, so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 -inches (150 mm) in each direction.
 1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 -inch (6 mm) with insulation.
 1. Cut and fit insulation within 1/4 -inch (6 mm) of nailers, projections, and penetrations.

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

07 54 23 - 13

Fontana City Hall – Phase II

- G. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation position while walking it in place.
- H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 -inches (150 mm) in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten cover boards according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.4 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing and install according to adhering membrane roofing system manufacturer's written instructions.
- B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer and allow to partially dry before installing roofing. Do not apply to splice area of roofing.
- E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
- G. Seam Welding: The roofing contractor is to test weld samples made from scraps pieces of TPO a minimum of twice a day. Test welds to be conducted before starting in the morning and after lunch. Any drastic change in weather requires an additional test weld be performed. Signed and dated test welds to be provided to the building owner's representative. At all splice intersections, roll the seam with a silicone roller to ensure a continuous hot air welded seam.
- H. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity once the hot air welds have thoroughly cooled (approximately 30 minutes).
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
 - 4. Overlay all splice intersections with Sure-Weld T-Joint Cover. Weld coverstrips at all feltback seams that do not have a factory selvage edge.

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

07 54 23 - 14

Fontana City Hall – Phase II

5. Complete all seams by end of day.
 6. T-Joints (three-way overlaps): When welding a three-way overlap, the top edge of the second sheet shall be shaved down to create a smooth transition for the top membrane layer to conform to for welding. Chamfer the edge of the membrane.
- I. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
 1. Solidly coat drain bowl flange with sealant. Install a 36 inch square piece of PVC flashing over the drain. Fasten clamping ring in a solid bed of sealant on top of the PVC and trim the PVC within 1 -inch (25 mm) of inside edge of clamping ring. Lap outer edge of flashing sheet onto deck sheet a min. of 6 -inch and heat weld.
 - J. Install membrane roofing and auxiliary materials to tie into existing roofing to maintain weathertightness of transition.
 - K. Install Termination Stop around all square penetrations including equipment curbs, and Termination Disc around all round penetrations including drains, pipes, standoffs, and any other membrane terminations within the field.
 1. Fasten in accordance with Manufacturer's requirements at a minimum of 4 -inch o.c.
 - L. Install Termination Bars and termination reinforcement at membrane perimeters at parapet walls.
 1. Fasten in accordance with Manufacturer's requirements at a minimum of 12 -inch o.c.
 2. Provide Sarnacord at the perimeter side of the securement strips.
 - M. Install Mechanical fasteners as recommended by roof manufacturer at spacing(s) and pattern(s) as determined by roof manufacturer to resist imposed wind uplift loads
 - N. Install Termination Bar and reinforcements according to the Roof Manufacturer Detail Drawings with approved fasteners into the structural deck at the base of parapets, walls and curbs. Termination Bar "peel stops" as required by Roof Manufacturer to meet wind uplift requirements at the base of all tapered edge strips and at transitions, peaks, and valleys according to Roof Manufacturer details.
 1. Perimeter area is defined as the outer boundary of the roof. If the roof is broken into different levels, each roof area shall be treated as an individual roof with its outer boundary being treated as a perimeter. Typically, internal expansion joints and firewalls are not considered to be full perimeters. Refer to Factory Mutual's Data Sheet 1-28 for more information.
 2. The ridge area is defined as the high point in the roof area formed by two intersecting planes. When the sum of the slopes is a minimum of 4 inches in 12 inches (30 degrees), each side of the ridge shall be treated as a perimeter area.

3.5 SECUREMENT AROUND ROOFTOP PENETRATIONS

- A. At the base of walls, drains, curbs, vent pipes, or any other roof penetrations, Termination Bar "peel stops" shall be installed according to perimeter rate of attachment. Fasteners shall be installed according to the manufacturer's instructions. Fasteners shall be installed using the fastener manufacturer's recommended torque-sensitive fastening tools with depth locators. Fasteners shall clamp the roof membrane tightly to the substrate. Weld reinforcing cord between the termination bars and the penetrations.

- B. Membrane flashings shall extend a minimum of 2-1/2 inches past the Termination Bar and be hot-air welded to the field membrane. Weld reinforcing cord between the perimeter Termination Bar and the parapet wall of eave flashing.
- C. Hot-air weld overlaps according to manufacturer's recommendations. Seam test cuts shall be taken at least 3 times per day.

3.6 BASE FLASHING INSTALLATION

- A. Flashing of parapets, curbs, expansion joints and other parts of the roof must be performed using Sure-Weld reinforced membrane or prefabricated accessories. Sure-Weld non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners, when the use of pre-molded or prefabricated accessories is not feasible.
- B. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- C. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice or seam area of membrane roofing.
- D. Apply bonding adhesive to substrate in smooth, even coats with no gaps, globs or similar inconsistencies. Do not apply to seam area of flashing.
- E. Flash penetrations and field-formed inside and outside corners with manufacturers prefabricated components or reinforced sheet flashing.
- F. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- G. Flashing membranes shall be adhered to substrates. Interior and exterior corners and miters shall be cut and hot-air welded into place.
- H. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars in accordance with membrane manufacturer's recommended details.
- I. Flashing membranes shall be mechanically fastened along the top edge through manufacturer's provided stainless steel discs or termination bars fastened at a maximum of 12 -inch o.c., or through pre-drilled metal strips.
- J. Install securement strip fastened 12 -inch o.c. with acceptable fasteners into the structural deck, at the base of parapets, walls and curbs according to membrane manufacturer's recommended details. Hot-air weld cord onto the waterproofing membrane on the penetration side of the securement strip.
- K. Flashings shall extend a minimum of 8 in. above the membrane surface unless previously accepted by the membrane manufacturer, the Owner, and the architect/engineer.
- L. All flashings that exceed 30 -inch in height shall receive additional securement. Consult manufacturer for securement methods.
- M. Flashings shall be installed concurrently with the membrane in order to maintain a watertight condition of work in progress.

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

07 54 23 - 16

Fontana City Hall – Phase II

3.7 WALKWAY INSTALLATION

- A. Install walkways at all traffic concentration points (such as roof hatches, access doors, rooftop ladders, etc.) and all locations as identified on the Contract Drawings. Provide continuous walking surfaces connecting roof access points with all locations on the roof requiring access. If walkways are not shown on the roof plans, propose walkway layout for Architect's approval at no additional compensation.
- B. Hot-air weld walkway pads to the membrane in accordance with the manufacturer's current application guidelines.
- C. Walkways are not to be installed over membrane seams.

3.8 DAILY SEALS

- A. On phased roofing, when the completion of flashings and terminations is not achieved by the end of the work day, a daily seal must be performed to temporarily close the membrane to prevent water infiltration.
- B. Complete an acceptable membrane seal in accordance with the manufacturer's requirements.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Leak Detection Flood Testing:
 - 1. Owner will engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.
 - 2. Flood Testing: Flood test each deck drain and sump for leaks, according to recommendations in ASTM D5957. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Flood drain sump to an average depth of 2-1/2 -inches (65 mm,) with a minimum depth of 1 -inch (25 mm) and a maximum depth of 4 -inches (100 mm). Maintain 2 -inches (50 mm) of clearance from top of sheet flashings.
 - b. Flood each area for 48 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
 - 4. Verify proper operation of all roof drains, including unblocking of drain piping if required.
- C. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- D. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- E. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.10 PROTECTING AND CLEANING

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

3.11 SCHEDULE

- A. Concrete Deck Substrate Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in the Design Criteria article of this section.
 - 1. Membrane Attachment: Adhered using Solvent Based Contact Adhesive.
 - 2. Tapered Insulation, minimum 1-1/2 inch thickness and 5/8" gypsum sheathing Cover Board: Fully Adhered with adhered with fast low rise foam adhesive.
 - 3. Vapor Barrier is to be installed directly over the Concrete deck with Primer.
 - 4. ES-1 Certified metal edging for all drip edge and coping conditions.
- B. Metal Deck Substrate Roof System: Provide a waterproof roof system, capable of withstanding uplift forces as specified in the Design Criteria article of this section.
 - 1. Membrane Attachment: Adhered using Solvent Based Contact Adhesive.
 - 2. Tapered Insulation minimum 1-1/2 inch thickness and 5/8" gypsum sheathing Cover Board: Mechanically Fastened.
 - 3. Vapor Barrier is to be installed directly over the metal deck.
 - 4. ES-1 Certified metal edging for all drip edge and coping conditions.

3.12 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: <Insert name of Owner>.
 - 2. Address: <Insert address>.
 - 3. Building Name/Type: <Insert information>.
 - 4. Address: <Insert address>.
 - 5. Area of Work: <Insert information>.
 - 6. Acceptance Date: <Insert date>.
 - 7. Warranty Period: <Insert time>.
 - 8. Expiration Date: <Insert date>.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

07 54 23 - 18

Fontana City Hall – Phase II

- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Fire;
 - c. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - d. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - e. Vapor condensation on bottom of roofing; and
 - f. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

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

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

3.13 PROTECTION LAYER INSTALLATION

- A. Install protection layers over completed membrane assemblies as soon as possible. Coordinate this work with owner and manufacturer's representative to allow inspection and acceptance of membrane and water tests before installation of protection layers.

END OF SECTION 07 54 23

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Custom flashing and trim fabrications, made from the following:
 - 1. Sheet metal materials.
 - 2. Underlayment.
 - 3. Miscellaneous materials.
- B. Related Requirements:
 - 1. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Section 07 71 00 "Roof Specialties" for manufactured copings, roof-edge specialties, roof-edge drainage systems, reglets, and counterflashings.
 - 3. Section 07 72 00 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.2 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 - 3. Review requirements for insurance and certificates if applicable.
 - 4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.4 ACTION SUBMITTALS

- A. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.
- B. Product Data: For each type of product.
 - 1. Include manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

2. Metal material characteristics and installation recommendations.
3. Submit color chart prior to material ordering and/or fabrication so that equivalent colors to those specific can be approved
4. Provide approval letters from metal manufacturer for use of their metal within this particular roofing system type.

C. Shop Drawings: For sheet metal flashing and trim.

1. Plans, elevations, sections, and attachment details.
2. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches (1:10).
3. Fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
4. Identification of material, thickness, weight, and finish for each item and location in Project.
5. Details for forming, including profiles, shapes, seams, and dimensions.
6. Details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
7. Details of termination points and assemblies.
8. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
9. Details of roof-penetration flashing.
10. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
11. Details of special conditions.
12. Details of connections to adjoining work.

D. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long by actual width.

E. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of exposed finish.

F. Samples for Verification: Actual sample of finished products for each type of exposed finish for sheet metal and other metal accessories.

1. Sheet Metal Flashing and Trim: Manufacturers' standard size. Include finished seam with required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Certificates: For each type of coping and roof edge flashing that is ANSI/SPRI/FM 4435/ES-1 tested.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Research Reports: For copings and roof edge flashing, from an agency acceptable to authority having jurisdiction showing compliance with ANSI/SPRI/FM 4435/ES-1.
- D. Qualification Statements: For fabricator.
- E. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Entity that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Engage an experience Installer who has completed sheet metal flashing and trim work similar in material, design, and extent to that indicated for this Project and with a minimum 5 year fabrication and installation record of successful in-service performance.
- C. For roof edge flashings and copings that are ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved, shop is to be listed as able to fabricate required details as tested and approved.

1.8 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge, including fascia, approximately 10 ft. (3.0 m) long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.
- B. Stack performed and pre-finished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 - 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 - 2. Protect stored sheet metal flashing and trim from contact with water.
- D. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 PROJECT CONDITIONS

- A. Coordinate Work of this Section with interfacing and adjoining Work for proper sequencing of each installation. Ensure best possible weather resistance, durability of Work, and protection of materials and finishes.

1.11 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. SPRI Wind Design Standard: Manufacture and install roof edge flashings and copings tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METAL MATERIALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with minimum ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with minimum ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - 1. Nominal Thickness: As indicated on Drawings.
 - 2. Surface: Smooth, flat.
- C. Aluminum Sheet: Coil-coated sheet, ASTM B209/B209M, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - 1. Thickness: As per Drawings.
 - 2. Surface: Smooth, flat.
 - 3. Exposed Coil-Coated Finish:
 - a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4. Color: As selected by Architect from manufacturer's full range.
 - 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).
- D. Stainless Steel Sheet: ASTM A240/A240M, Type 316, dead soft, fully annealed.
 - 1. Nominal Thickness: 0.0188 inch (0.477 mm).
 - 2. Surface: Smooth, flat.
 - 3. Exterior Finish: ASTM A480/A480M No. 4.
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

2.3 UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils (0.76 mm) thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 240 deg F (116 deg C); ASTM D1970/D1970M.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (minus 29 deg C) or lower; ASTM D1970/D1970M.
- B. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

- C. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Zinc-Coated (Galvanized) or Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel in accordance with ASTM A153/A153M or ASTM F2329/F2329M.
 - 3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - 4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
- C. Solder:
 - 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.
- H. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

- I. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive and non-galvanic; size and thickness required for performance.

2.5 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
 - 1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 - 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
 - 1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 ft. (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.
- F. Seams:
 - 1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- G. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Types specified in Section 07 7100.
 - 1. Joint Style: Butt, with wide, concealed backup plate].
 - 2. Fabricate from the following materials:
 - a. Aluminum-Zinc Alloy-Coated Steel:
- B. Roof and Roof to Wall Transition Expansion-Joint Cover: Fabricate from the following materials:
 - 1. Stainless Steel: 0.025 inch (0.64 mm) thick.
 - 2. Galvanized Steel: 0.034 inch (0.86 mm) thick.
- C. Roof / Parapet / Curb to Wall Saddle Flashings: Fabricate from the following materials:
 - 1. Stainless Steel: 0.025 inch (0.64 mm) thick.
 - 2. Galvanized Steel: 0.034 inch (0.86 mm) thick.
- D. Base Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 2. Galvanized Steel: 0.028 inch (0.71 mm) thick.
- E. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 2. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- F. Flashing Receivers: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch (0.40 mm) thick.
- G. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch (0.48 mm) thick.
- H. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch (0.40 mm) thick.
- I. Splash Pans: Fabricate from the following materials:
 - 1. Stainless Steel: 0.0187 inch (0.5 mm) thick.

2.7 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:

1. Stainless Steel: 0.016 inch (0.40 mm) thick.
- B. Opening Flashings in Frame Construction: Provide at all openings in exterior walls. Fabricate head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
 1. Stainless Steel: 0.016 inch (0.40 mm) thick.
 2. Aluminum: 0.020 inch (0.51 mm) thick; where required to match finish of adjacent opening frames.
 3. Galvanized Steel: 0.022 inch (0.55 mm) thick.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following material:
 1. Stainless Steel: 0.025 inch (0.64 mm) thick.
 2. Galvanized Steel: 0.0276 inch (0.7 mm) thick.
- B. Overhead-Piping Safety Pans: Fabricate from the following material:
 1. Stainless Steel: 0.025 inch (0.64 mm) thick.
 2. Galvanized Steel: 0.040 inch (1.02 mm) thick.
- C. Flashing not otherwise specified: Fabricate from the following materials in minimum thickness or weight indicated and greater as required to comply with cited standards.:
 1. Stainless Steel: 0.025 inch (0.64 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrates, and other conditions affecting performance of the Work.
 1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over substrate to prevent air infiltration or water penetration.
- B. Verify membrane termination and base flashings are in place, sealed, and secure.
- C. Beginning of installation means acceptance of existing conditions.
- D. Field measure site conditions prior to fabricating work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet Underlayment:
 - 1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
 - 2. Prime substrate if recommended by underlayment manufacturer.
 - 3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
 - 4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
 - 5. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller.
 - 6. Roll laps and edges with roller.
 - 7. Cover underlayment within 14 days.
- B. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim.
 - 1. Install in shingle fashion to shed water.
 - 2. Lap joints not less than 2 inches (50 mm).
- C. Install slip sheet, wrinkle free, as per manufacturer's instruction or as indicated in Drawings, before installing sheet metal flashing and trim.
 - 1. Install in shingle fashion to shed water.
 - 2. Lapp joints not less than 4 inches (100 mm).

3.3 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
- B. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install continuous cleats with fasteners spaced not more than 12 inches (300 mm) o.c.
 - 3. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- C. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet of red-rosin paper.
- D. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- E. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
1. Wood Blocking or Sheathing: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws
- F. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- G. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section specifying Joint Sealants.
- H. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not use torches for soldering.
 2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- I. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- 3.4 MISCELLANEOUS FLASHING INSTALLATION
- A. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

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

3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to produce complete roof-drainage system and to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of interlocking folded seam or blind rivets and sealant unless otherwise indicated.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant compatible with roof membrane and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard and drawing details. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in related section specifying exterior wall cladding.
- C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings as detailed on drawings and to extend 4 inches (100 mm) Insert dimension beyond wall openings.

3.7 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- F. Provide final protection and maintain conditions that ensure sheet metal flashing and trim Work during construction is without damage or deterioration other than natural weathering at the time of Substantial Completion.

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SECTION 07 71 00
ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Manufactured units for the following applications:
 - 1. Copings.
 - 2. Roof-edge specialties.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for installing embedded reglets.
 - 2. Section 04 22 00 "Concrete Unit Masonry" for installing embedded reglets and for masonry through-wall flashing with receiver for counterflashing.
 - 3. Section 05 50 00 "Metal Fabrications" for downspout guards and downspout boots.
 - 4. Section 06 10 00 "Rough Carpentry" for wood nailers, curbs, and blocking.
 - 5. Section 07 25 00 "Weather Barriers" for air barrier and compatibility with and transitions to underlayment for roof specialties.
 - 6. Section 07 54 23 "Thermoplastic Polyolefin (TPO) Roofing"
 - 7. Section 07 62 00 "Sheet Metal Flashing and Trim" for custom- and site-fabricated, sheet metal flashing and trim.
 - 8. Section 07 72 00 "Roof Accessories" for manufactured roof curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
 - 9. Section 07 92 00 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.
 - 10. Section 09 96 00 "High Performance Coating" for field painting of roof specialties.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
 - 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof specialty.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof specialties.
 - 1. Plans, expansion-joint locations, keyed details, and attachments to other work. Distinguish between factory pre-manufactured- and field-assembled installation.
 - 2. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
 - 3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
 - 4. Details of termination points and assemblies, including fixed points.
 - 5. Details of special conditions.
- C. Samples: For each type of roof specialty and for each color and texture specified.
- D. Samples for Verification:
 - 1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
 - 2. Include copings, and roof-edge specialties, made from 12-inch (300-mm) lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of roof specialty copings and roof-edge flashings that is ANSI/SPRI/FM 4435/ES-1 tested and FM Approvals approved.
- B. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.
- C. Research Reports: For copings and roof-edge flashings, from ICC-ES showing compliance with ANSI/SPRI/FM 4435/ES-1.
- D. Qualification Statements: For manufacturer.
- E. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roof specialties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer offering products that are FM Approvals listed for specified class and ANSI/SPRI/FM 4435/ES-1 tested to specified design pressure.

1.8 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge as indicated on Drawings.
 - 2. Build mockup of typical roof edge as part of "Integrated Exterior Mockup" specified in Section 01 40 00 "Quality Requirements."
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.10 FIELD CONDITIONS

- A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.11 COORDINATION

- A. Coordinate roof specialties with roofing system, exterior wall system, air barrier, flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, weathertight, secure, and noncorrosive installation.
 - 1. Performance Coordination: Coordinate with the Work of roofing and exterior wall Sections to ensure that roof specialties provided under the Work of this Section meet or exceed specified roofing and exterior wall design performance requirements.
- B. Confirm and coordinate compatibility of materials and comply with warranty requirements of roofing system manufacturer.
- C. Coordinate roof specialties layout and seams with sizes and locations of joints and seams in adjacent materials.

1.12 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 07 54 23 "Thermoplastic Polyolefin (TPO) Roofing"
- B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finishes or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain roof specialties from single manufacturer providing roofing-system warranty specified in Section 07 54 23 "Thermoplastic Polyolefin (TPO) Roofing"

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. FM Approvals' Listing: Manufacture and install copings and roof-edge specialties that are listed in FM Approvals' "Approval Guide" and approved for windstorm classification, Class 1-75. Identify materials with FM Approvals' markings.
- C. SPRI Wind Design Standard: Manufacture and install copings roof-edge specialties tested in accordance with ANSI/SPRI/FM 4435/ES-1 and capable of resisting the following design pressures:
 1. Design Pressure: As indicated on Drawings.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.3 COPINGS

- A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 ft. (3.6 m), concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps.
 1. Extruded-Aluminum Coping Caps: Extruded aluminum, thickness as required to meet performance requirements.
 - a. Finish: Three-coat fluoropolymer.

- b. Color: As selected by Architect from manufacturer's full range.

2.4 ROOF-EDGE SPECIALTIES

- A. Basis-of-Design Products: Provide products meeting specified requirements and approved in writing by the membrane roof manufacturer specified in related section, and included in the roof membrane assembly warranty, in custom profiles to match shapes indicated.
 - 1. The design is based on products manufactured by OMG® Roofing Products, Agawam, MA; tel: (800) 633-3800; web: www.omgroofing.com. Provide custom profiles to match shapes indicated.
 - 2. Subject to compliance with requirements, provide named products or equivalent products by one of the following manufacturers:
 - a. ATAS International, Inc.
 - b. Drexel Metal.
 - c. Presto-Lock by Johns Manville.
- B. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous metal receiver with integral drip-edge cleat to engage fascia cover and secure roof membrane, compatible with roof membrane type specified in related section.. Provide matching corner units.
 - 1. Corners: Factory mitered and continuously welded and sealed watertight, minimum 12 inch legs.
 - 2. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
 - 3. Receiver: Manufacturer's standard material and thickness, compatible with cover.
 - 4. Special Fabrications: As indicated on Drawings.
 - 5. Material: One of the following as recommended by manufacturer for conditions indicated.
 - a. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with minimum ASTM A653/A653M, G90 (Z275) coating designation, 24 gage.
 - 6. Finish and Texture:
 - a. Surface: Smooth, flat finish.
 - b. Finish: Factory Finished.
 - c. Color: As selected by Architect from manufacturer's full range.

2.5 SHEET METAL MATERIALS

- A. Aluminum Sheet: ASTM B209/B209M, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
 - 1. Mill Finish: As manufactured.
 - 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil (0.005 mm).
 - 3. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - 4. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A755/A755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 2605. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight in color coat.

5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.6 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Fasteners: Roof specialty manufacturer's recommended fasteners, designed to meet performance requirements, suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 1. Fasteners for Metallic-Coated Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel in accordance with ASTM A153/A153M or ASTM F2329/F2329M.
 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
 4. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
- C. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- D. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- E. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.
- F. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- G. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install roof specialties in accordance with manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - 1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - 3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 - 4. Torch cutting of roof specialties is not permitted.
 - 5. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer's written installation instructions.
 - 1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 - 1. Space movement joints at a maximum of 12 ft. (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
 - 2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
- D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended in writing by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal concealed joints with butyl sealant as required by roof specialty manufacturer.

- F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).
- G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 INSTALLATION OF COPINGS

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.4 INSTALLATION OF ROOF-EDGE SPECIALTIES

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.5 CLEANING AND PROTECTION

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing in accordance with ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting in accordance with Section 09 91 13 "Exterior Painting."
- C. Clean and neutralize flux materials. Clean off excess solder and sealants.
- D. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- E. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 71 00

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof curbs.
 - 2. Roof hatches.
 - 3. Pipe and duct supports.

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Section 05 50 00 "Metal Fabrications" for metal vertical ladders, and stairs for access to roof hatches.
- C. Section 07 62 00 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, miscellaneous sheet metal trim and accessories.
- D. Section 07 71 00 "Roof Specialties" for counterflashing.

1.4 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.5 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories.
 - 1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.7 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
 - 1. Size and location of roof accessories specified in this Section.
 - 2. Method of attaching roof accessories to roof or building structure.
 - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
 - 4. Required clearances.
- B. Sample Warranties: For manufacturer's special warranties.

1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.9 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories to withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, and integrally formed deck-mounting flange at perimeter bottom.
 - 1. Basis of Design Manufacturer: Thybar Corporation, Addison, IL; tel: (800) 666-2872; web: www.thybar.com.
 - 2. Acceptable Manufacturer: Alternate Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. RPS; web: www.rps.com
 - b. Custom Curbs, Inc., www.customcurbsinc.com
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Supported Load Capacity: Coordinate load capacity with information on Shop Drawings of equipment to be supported.
- D. Steel: Zinc-coated (galvanized) steel sheet, 0.0747 inch (14 gauge) thick.
 - 1. Finish: Factory prime coating.
- E. Construction:
 - 1. Curb Profile: Manufacturer's standard compatible with roofing system.
 - 2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
 - 3. Fabricate curbs to minimum height of 12 inches (305 mm) above roofing surface unless otherwise indicated.
 - 4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
 - 5. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
 - 6. Liner: Same material as curb, of manufacturer's standard thickness and finish.
 - 7. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.

8. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from 3/4-inch- (19-mm-) thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
9. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.3 ROOF HATCHES

- A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, and integrally formed deck-mounting flange at perimeter bottom.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. The Bilco Company (203-934-6363)
 - b. Milcor, Inc., a brand of Commercial Products Group of Hart & Cooley, Inc. (800-624-8642)
 - c. Nystrom Building Products, Inc. (800-547-2635)
- B. Type and Size:
 1. Single-leaf lid, reference Drawings for sizes.
- C. Loads: Minimum 40-lbf/sq. ft. (1.9-kPa) external live load and 20-lbf/sq. ft. (0.95-kPa) internal uplift load.
- D. Hatch Material, Steel: Zinc-coated (galvanized) steel sheet.
 1. Thickness: Manufacturer's standard thickness for hatch size indicated,
 2. Finish: Baked enamel or powder coat.
 3. Color: As selected by Architect from manufacturer's full range.
- E. Construction:
 1. Insulation: 2-inch- (50-mm-) thick, polyisocyanurate board.
 - a. R-Value: 12.0 according to ASTM C1363.
 2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
 3. Fabricate curbs to minimum height of 12 inches (305 mm) above finished roofing surface unless otherwise indicated.
- F. Hardware: Spring operators, hold-open arm, galvanized steel spring latch with turn handles, galvanized steel butt- or pintle-type hinge system, and padlock hasps inside and outside.
 1. Lifting Mechanisms: Compression or torsion spring operator with shock absorbers that automatically opens upon release of latch; capable of lifting covers despite 10 psf (475 kPa) load.
- G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation;

attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Height: 42 inches (1060 mm) above finished roof deck.
2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches (31 mm) in diameter or galvanized-steel tube, 1-5/8 inches (41 mm) in diameter.
3. Flat Bar: Galvanized steel, 2 inches (50 mm) high by 3/8 inch (9 mm) thick.
4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches (533 mm) in diameter.
5. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
6. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
7. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
8. Fabricate joints exposed to weather to be watertight.
9. Fasteners: Manufacturer's standard, finished to match railing system.
10. Finish: Manufacturer's standard.

a. Color: High visibility safety yellow.

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
2. Height: 42 inches (1060 mm) above finished roof deck.
3. Material: Steel tube.
4. Finish: Manufacturer's standard baked enamel or powder coat.

a. Color: High visibility safety yellow.

2.4 PIPE AND DUCT SUPPORTS

A. Basis of Design: KeyCurb™ Rooftop Strut Series and Strut Extension Series manufactured by JL Industries, or equal.

1. Substitutions: Section 01 25 00.

B. Curb Construction:

1. Base Unit: Molded recycled rubber.
 - a. Size: 6 inches wide x 10 inches long x 4.88 inches high.
 - b. Weight: 5 lbs.
 - c. Color: Black.
2. Slotted Frame Channel: 7/8-inch by 1-5/8 inches 14-gauge galvanized steel (ASTM A 653).
 - a. Pipe or conduit clamps by others are used to secure items to channel.
3. Extension Series models include base unit with 2 adjustable carbon steel threaded rods and fastening hardware for slotted channel attachment.

- a. Cadmium plated threaded rods, clamps, nuts, bolts and washers.

C. Support Devices:

- 1. Model RKCSN1-8 Strut Series: 1 KeyCurb base with 8-inch galvanized slotted channel bolted to top of base.
- 2. Model RKCSN1-12 Strut Series: 1 KeyCurb base with 12-inch galvanized slotted channel bolted to top of base.
- 3. Model RKCSN1-16 Strut Series: 1 KeyCurb base with 16-inch galvanized slotted channel bolted to top of base.
- 4. Model RKCSE1-8 Strut Extension Series: 1 KeyCurb base with 2 adjustable carbon steel threaded rods supporting 8-inch-long galvanized slotted channel.

- a. Overall Height at Full Extension: 13 inches.

- 5. Model RKCSE1-12 Strut Extension Series: 1 KeyCurb base with 2 adjustable carbon steel threaded rods supporting 12-inch-long galvanized slotted channel.

- a. Overall Height at Full Extension: 13 inches.

- 6. Model RKCSE1-16 Strut Extension Series: 1 KeyCurb base with 2 adjustable carbon steel threaded rods supporting 16-inch-long galvanized slotted channel.

- a. Overall Height at Full Extension: 13 inches.

2.5 METAL MATERIALS

- A. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, AZ50 (AZM150) coated.
- B. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.
- C. Steel Tube: ASTM A500/A500M, round tube.
- D. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.
- E. Steel Pipe: ASTM A53/A53M, galvanized.

2.6 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- C. Underlayment:
 - 1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - 2. Polyethylene Sheet: 6-mil- (0.15-mm-) thick polyethylene sheet complying with ASTM D4397.
 - 3. Slip Sheet: Building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum, rosin sized.

4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
- D. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
- E. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- F. Elastomeric Sealant: ASTM C920, elastomeric **[polyurethane]** **[silicone]** polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- G. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Install roof accessories according to manufacturer's written instructions.
 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.

2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Roof-Hatch Installation:
1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 2. Attach safety railing system to roof-hatch curb.
 3. Attach ladder-assist post according to manufacturer's written instructions.
- E. Pipe Support Installation: Comply with MSS SP-58 and MSS SP-89. Install supports and attachments as required to properly support piping. Arrange for grouping of parallel runs of horizontal piping, and support together.
1. Pipes of Various Sizes: Space supports for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
- F. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 91 13 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

SECTION 07 81 00
APPLIED FIRE 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. Section Includes:
 - 1. Sprayed fire-resistive materials.

1.3 RELATED REQUIREMENTS

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Section 05 12 00 "Structural Steel Framing" for surface conditions required for structural steel receiving sprayed fire-resistive materials.
- C. Section 05 31 00 "Steel Decking."
- D. Section 07 21 00 "Thermal Insulation" for fire-safing insulation.
- E. Section 07 84 13 "Penetration Firestopping" for fire-resistance-rated firestopping systems.
- F. Section 09 29 00 "Gypsum Board" for gypsum-board-based fire protection.

1.4 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.
- B. Concealed Sprayed Fire-Resistive Materials: Applied to surfaces that are concealed from view behind other construction when the Work is completed.
- C. Exposed Sprayed Fire-Resistive Materials: Fire-resistive materials applied to surfaces that are exposed to view when the Work is completed and that are in machine rooms.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

2. Review and finalize construction schedule and verify sequencing and coordination requirements.
3. Review weather predictions, ambient conditions, and proposed temporary protections for SFRM during and after installation.
4. Review surface conditions and preparations.
5. Review field quality-control testing procedures.

1.6 ACTION SUBMITTALS

- A. Provide complete submittals at the same time as submittals for work in related Sections to permit review of complete and integrated systems and assemblies.
- B. Product Data: For the following:
 1. Sprayed fire-resistive material.
 2. Bonding agent.
 3. Metal lath.
 4. Reinforcing fabric.
 5. Reinforcing mesh.
 6. Sealer.
 7. Topcoat.
- C. Shop Drawings: Framing plans or schedules, or both, indicating the following:
 1. Extent of fire protection for each construction and fire-resistance rating.
 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 3. Minimum sprayed fire-resistive material thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
 4. Treatment of sprayed fire-resistive material after application.
- D. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of fire protection material.
- C. Evaluation Reports: For fire protection material, from ICC-ES or other model code organization acceptable to authorities having jurisdiction.
- D. Preconstruction Test Reports: For fire protection.
- E. Field quality-control reports.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fire protection material manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups of fire protection material.
 - 1. Field Mockup: Assemblies as indicated on the Drawings or as selected by Architect.
 - 2. Provide test specimens and assemblies representative of proposed materials and construction.
- B. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
 - 1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 2. Density: Test for density according to ASTM E605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 3. Verify that manufacturer, through its own laboratory testing or field experience, attests that the primers or coatings are compatible with fire protection material.
 - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, obtain applied-fire protection material manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fire protection material when ambient or substrate temperature is outside manufacturer's absolute limits unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fire protection material, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection material dries thoroughly.
- C. Sequence and coordinate application of sprayed fire-resistive materials with other related work specified in other Sections to comply with the following requirements:
 - 1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
 - 2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
 - 3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
 - 4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
 - 5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
 - 6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.

7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace sprayed fire-resistive materials that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
 1. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of sprayed fire-resistive materials from substrates.
 2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
- B. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fire protection material, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
 1. Fiber-based fire resistive materials are not acceptable.
- B. Source Limitations: Obtain fire protection material for each fire-resistance design from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- E. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- F. Fire-resistance of structural members shall comply with current CBC, Section 714 requirements.
- G. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in Section 01 61 16.
- H. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS - CEMENTITIOUS

- A. Standard Durability SFRM (Interior Locations, Concealed Conditions): Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.
1. Products:
 - a. GCP Applied Technologies; Monokote MK-6 Series.
 2. Alternate Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. Carbolite Company.
 - b. Isolatek International.
 3. Bond Strength: Minimum 200-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.
 4. Density: Not less than 15 lb/cu. ft. and as specified in the approved fire-resistance design, according to ASTM E 605.
 5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.
 6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 0.
 - b. Smoke-Developed Index: 0.
 7. Compressive Strength: Minimum 10 lbf/sq. in. according to ASTM E761.
 8. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
 9. Deflection: No cracking, spalling, or delamination according to ASTM E759.
 10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760.
 11. Air Erosion: Maximum weight loss of 0.0 g/sq. ft. in 24 hours according to ASTM E859.
 12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21.
 13. Finish: Spray-textured finish.
- B. Intermediate Durability SFRM (Interior Locations, Exposed to View Only or for Buildings Between 75 and 420 Feet Tall): Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.
1. Products:
 - a. GCP Applied Technologies; Monokote MK-10HB.
 2. Alternate Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. Carbolite Company.
 - b. Isolatek International.

3. Bond Strength: Minimum 600-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E736.
 4. Density: Not less than 15 lb/cu. ft. and as specified in the approved fire-resistance design, according to ASTM E605.
 5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.
 6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 0.
 - b. Smoke-Developed Index: 0.
 7. Compressive Strength: Minimum 30 lbf/sq. in. according to ASTM E761.
 8. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
 9. Deflection: No cracking, spalling, or delamination according to ASTM E759.
 10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760.
 11. Air Erosion: Maximum weight loss of 0.0 g/sq. ft. in 24 hours according to ASTM E859.
 12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21.
 13. Finish: Spray-textured finish.
- C. Medium Durability SFRM (Interior Locations, Exposed Conditions to Abrasion): Manufacturer's standard, factory-mixed, Portland cement based dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.
1. Products:
 - a. GCP Applied Technologies; Monokote Z-106/HY
 2. Alternate Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. Carbolite Company.
 - b. Isolatek International.
 3. Bond Strength: Minimum 2,000-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E736.
 4. Density: Not less than 22 lb/cu. ft. and as specified in the approved fire-resistance design, according to ASTM E605.
 5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.
 6. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: **0**.
 - b. Smoke-Developed Index: **0**.
 7. Compressive Strength: Minimum 100 lbf/sq. in. according to ASTM E761.
 8. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
 9. Deflection: No cracking, spalling, or delamination according to ASTM E759.

10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
 11. Air Erosion: Maximum weight loss of 0.0 g/sq. ft. in 24 hours according to ASTM E859.
 12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21
 13. Finish: Skip-troweled finish .
- D. High Durability SFRM (Interior and Exterior Locations, Exposed Conditions Subject to Impact): Manufacturer's standard, factory-mixed, Portland cement based dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.
1. Products:
 - a. GCP Applied Technologies; Monokote Z-146
 2. Alternate Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. Carbolite Company.
 - b. Isolatek International.
 3. Bond Strength: Minimum 10,000-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.
 4. Density: Not less than 40 lb/cu. ft. and as specified in the approved fire-resistance design, according to ASTM E 605.
 5. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.
 6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 0.
 - b. Smoke-Developed Index: 0.
 7. Compressive Strength: Minimum 500 lbf/sq. in. according to ASTM E761.
 8. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
 9. Deflection: No cracking, spalling, or delamination according to ASTM E759.
 10. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.
 11. Air Erosion: Maximum weight loss of 0.0 g/sq. ft. in 24 hours according to ASTM E859.
 12. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21
 13. Finish: Skip-troweled finish .

2.3 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with fire protection material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fire protection material manufacturer and complying with one or both of the following requirements:

1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fire protection material and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E736.
- C. Bonding Agent: Product approved by fire protection material manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fire protection material manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fire protection material.
- E. Topcoat: Suitable for application over sprayed fire-resistive material; of type recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.
1. Cement-Based Topcoat: Factory-mixed, cementitious hard-coat formulation for trowel or spray application over SFRM.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.
1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection material with substrates under conditions of normal use or fire exposure.
 2. Verify that objects penetrating fire protection material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 3. Verify that substrates receiving fire protection material are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection material application.
- B. Verify that concrete work on steel deck is complete before beginning fire protection material work.
- C. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning fire protection material work.
- D. Conduct tests according to fire protection material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
- E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fire protection material materials during application.
- B. Clean substrates of substances that could impair bond of fire protection material.
- C. Prime substrates included in fire-resistance design and where recommended in writing by fire protection material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection material.
- D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection material. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

- A. Construct fire protection material assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection material work.
- B. Comply with fire protection material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire protection material; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fire protection material with other construction to minimize need to cut or remove fire protection material.
 - 1. Do not begin applying fire protection material until clips, hangers, supports, sleeves, and other items penetrating fire protection material are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fire protection material until application of fire protection material is completed.
- D. Metal Decks:
 - 1. Do not apply fire protection material to underside of metal deck substrates until concrete topping, if any, is completed.
 - 2. Do not apply fire protection material to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fire protection material.
- E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fire protection material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fire protection material manufacturer.
- F. Spray apply fire protection material to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fire protection material manufacturer.
- G. Extend fire protection material in full thickness over entire area of each substrate to be protected.

- H. Install body of fire protection material in a single course unless otherwise recommended in writing by fire protection material manufacturer.
- I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fire protection material that differs in color from that of encapsulant over which it is applied.
- J. Where sealers are used, apply products that are tinted to differentiate them from fire protection material over which they are applied.
- K. Provide a uniform finish complying with description indicated for each type of fire protection material material and matching finish approved for required mockups.
- L. Cure fire protection material according to fire protection material manufacturer's written instructions.
- M. Do not install enclosing or concealing construction until after fire protection material has been applied, inspected, and tested and corrections have been made to deficient applications.
- N. Finishes: Where indicated, apply fire protection material to produce the following finishes:
 - 1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
 - 2. Spray-Textured Finish: Finish left as spray applied with no further treatment.
 - 3. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.
 - 4. Skip-Troweled Finish: Even leveled surface produced by troweling spray-applied finish to smooth out the texture and neaten edges.
 - 5. Skip-Troweled Finish with Corner Beads: Even, leveled surface produced by troweling spray-applied finish to smooth out the texture, eliminate surface markings, and square off edges.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Sample and verify the thickness and density of the fireproofing in accordance with provisions of ASTM E605, "Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members," the "Inspection Procedure for Field Applied Sprayed Fire Protection Materials, as published by the AWCI, Tech Manual 12-A. Provide results of the above test to all parties at the completion of each floor.
 - 2. Test and inspect as required by the CBC.
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection material for the next area until test results for previously completed applications of fire protection material show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Fire protection material will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fire protection material that does not pass tests and inspections, and retest.

2. Apply additional fire protection material, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.

D. Prepare test and inspection reports.

3.5 CLEANING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.6 PROTECTION

- A. Protect fire protection, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.7 REPAIRS

- A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.
- B. Repair fire protection damaged by other work before concealing it with other construction.
- C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

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SECTION 07 81 23
INTUMESCENT FIRE 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. Section includes thin-film intumescent fire-resistive materials (IFRM).

1.3 RELATED REQUIREMENTS

- A. Pertinent Sections specifying Sustainable Design Requirements.
- B. Section 05 12 00 "Structural Steel" for structural steel receiving intumescent fireproofing materials.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

1.5 DEFINITIONS

- A. IFRM: Intumescent sprayed fire-resistive materials.
- B. Concealed Sprayed Fire-Resistive Materials: Applied to surfaces that are concealed from view behind other construction when the Work is completed.
- C. Exposed Sprayed Fire-Resistive Materials: Applied to surfaces that are visible to the eye or exposed to the weather or interior when the Work is completed.

1.6 ACTION SUBMITTALS

- A. Provide complete submittals at the same time as submittals for work in related Sections to permit review of complete and integrated systems and assemblies.
- B. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.

- C. Shop Drawings: Framing plans or schedules, or both, indicating the following:
 - 1. Extent of fireproofing for each construction and fire-resistance rating.
 - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
 - 4. Treatment of fireproofing after application.
- D. Samples: For each exposed product and for each color and texture specified to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Size: minimum 12-inches square on steel demonstrating internal and external corners, as applicable to the Work.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of fireproofing.
- C. Evaluation Reports: Manufacturer provided reports indicating compliance with ASTM E119 / UL263 per applicable codes.
- D. Preconstruction Test Reports: For fireproofing.
- E. Field quality-control reports.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
- A. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.
- B. Pre-Installation Conference: Conduct conference at Project site.
 - 1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.
- C. Field Inspection: An independent testing laboratory/company shall be selected by the Owner to test random samples as applied, to verify thickness of thin-film intumescent fire-resistive coating in accordance with AWCI Technical Manual 12-B. Inspection shall be carried out immediately following final thickness of intumescent fireproofing and just before application of manufacturer approved topcoat.
- D. Field Samples: An architectural, smooth finish is required. Prior to beginning the application process, samples are to be provided or a mock-up prepared following all specified procedures for approval by Architect. Final acceptance of the sample installation shall be by Owner or Owner representative. All subsequent contract work shall conform to the surface quality of the sample installation.

1.9 MOCKUP

- A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of each type of fire protection and different substrate as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is outside manufacturer's absolute limits unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
 - 1. When the temperature at the job site is less than 50 degrees F (10 degrees C), a minimum substrate and ambient temperature of 50 degrees F (10 degrees C) shall be maintained prior to, during, and a minimum of 72 hours after application. If necessary for job schedule, the General Contractor shall provide enclosures and heat to maintain proper temperatures and humidity levels in the application areas.
 - 2. Relative humidity shall not exceed 85% throughout the total period of application and drying for the intumescent fire resistive material, and must not exceed 85% throughout the application and drying for the protective decorative topcoat.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.
 - 1. In enclosed areas, ventilation shall not be less than 4 complete air exchanges per hour until the material is dry.

1.11 COORDINATION

- A. Do not apply thin-film intumescent fire-resistive coating until concrete toppings and/or roofing applications have been installed.
- B. The installation of piping, ducts, conduit or other suspended equipment shall not commence until the application of the thin-film fire resistive material is complete in that area.
- C. Steel surfaces with less than 3 feet (1 m) clear working access may necessitate the application of materials to inaccessible surfaces prior to erection of the finished steel members, either at the point of fabrication or on-site.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace sprayed fire-resistive materials that fail in materials or

workmanship within specified warranty period. Failures include, but are not limited to, the following:

1. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of sprayed fire-resistive materials from substrates.
2. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.

B. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in related section.
- B. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
 1. Apply intumescent fire protection materials at the required thickness to provide the UL fire resistive ratings.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E119 or ANSI/UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Provide products containing no detectable asbestos.
- E. Source Limitations: Obtain from single source from single manufacturer.

2.2 INTUMESCENT FIRE-RESISTIVE COATINGS –SOLVENT BASED

- A. Thin-Film Fire-Resistive Intumescent Coating: Factory-mixed solvent-based formulation for interior applications.
- B. Basis-of-Design (Interior Condition): Thermo-Sorb® VOC manufactured by Carboline, 2150 Schuetz Rd, St. Louis, MO 63146, (314) 644-1000, www.carboline.com.
 1. Alternative Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. Isolatek International
 - b. PPG
 - c. The Sherwin-William Company.
 2. Physical and Performance Properties:

- a. Bond Strength: 200 psi (1931 k Pa) per ASTM D4541.
 - b. Durometer Hardness: 63 per ASTM D2240, Shore D.
 - c. Impact Resistance: 0.16 ft.lb/inch per ASTM D2794.
 - d. Surface Burning Characteristics: ASTM E84, Class A.
 - e. Compressive Strength: ASTM D695 1,187 psi or ASTM E736 757psi.
 - 3. Exposed Finish: Level 3-4 Architectural Finish as approved by Architect.
 - 4. Protective Decorative Finish Topcoat: Carbothane 133MC or Carbocrylic 3359DTMC as manufactured by Carboline.
 - 5. Color: As indicated on Drawings.
- C. Basis-of-Design (Interior Condition): Thermo-Lag E100/E100S, epoxy fireproofing as manufactured by Carboline, 2150 Schuetz Rd, St. Louis, MO 63146, (314) 644-1000, www.carboline.com.
- 1. Physical and Performance Properties:
 - a. Bond Strength: 300 psi per ASTM D4541.
 - b. Durometer Hardness: >40 per ASTM D2240, Shore D.
 - c. Impact Resistance: 0.75 ft.lb/inch per ASTM D2794.
 - d. Surface Burning Characteristics: Class A, per ASTM E84.
 - e. Compressive Strength: >2330 psi as per ASTM D695
 - f. Flexural Strength: >1220 psi as per ASTM D790
 - 2. Exposed Finish: Level 3-4 Architectural Finish as approved by Architect.
 - 3. Protective Decorative Finish Topcoat: Carbothane 133MC polyurethane finish as manufactured by Carboline.
 - 4. Protective Sealer: Carbomastic 94TL epoxy sealer, applied at 5-7 mils DFT

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
 - 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.
 - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign

- substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
2. Verify that objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 3. Verify that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
- B. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
- B. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- C. Clean substrates of substances that could impair bond of fireproofing.
- D. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.

3.3 APPLICATION

- A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for application procedures, and types of equipment used to convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Apply thin-film IFRM coating as follows:
1. Base Coats: Spray apply successive base coat(s). Allow to dry and cure between coats. Before applying finish topcoat, determine required dry film thickness according to manufacturer's written recommendations.
 2. Remove drippings and excessive roughness, and sanded smooth to provide level of finish selected.
 3. Topcoat: Spray application with surface lightly rolled before drying to smooth out surface irregularities and to seal in surface fibers.

- D. Final dry-film thickness must be measured with a dry-film thickness gauge. Refer to AWCI Technical Manual 12-B for required dry-film thickness measurement method.
- E. Do not apply topcoat until it has been determined that the required dry-film thickness of intumescent fireproofing product has been achieved, and single-component intumescent product has achieved the required hardness.
- F. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - 1. Test and inspect as required by the CBC, and as indicated on Schedule of Special Inspections.
 - 2. Engage a qualified independent testing laboratory for applied intumescent thickness testing in accordance with AWCI Technical Manual 12-B.
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Fireproofing will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
 - 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.
- C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.
- D. Repair fireproofing damaged by other work before concealing it with other construction.
 - 1. Repair fireproofing by reapplying it using same method as original installation.

END OF SECTION 07 81 23

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SECTION 07 84 13
PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Refer to Drawings for specific penetration assemblies.

1.4 PREINSTALLATION MEETINGS

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

1.5 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
 - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system

manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines. Obtain approval of authorities having jurisdiction prior to submittal.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Listed System Designs: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.8 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.10 PROJECT CONDITIONS

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

1.11 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain joint firestop systems for each type of joint opening indicated from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.
 - 1) UL in its online directory "Product iQ."
 - 2) Intertek Group in its "Directory of Building Products."
 - 3) FM Approvals in its "Approval Guide."

2.3 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems are to be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products manufactured by one of the following:
 - a. Hilti, Inc., www.hilti.com .
 - b. 3M Fire Protection Products, <http://3M.com/firestop> .
 - c. STI, Specified Technologies Inc., www.stifirestop.com .

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:
 - a. Those within the cavity of a wall.
 - b. Floor, tub, or shower drains within a concealed space.
 - c. 4-inch (200-mm) or smaller metal conduit penetrating directly into metal-enclosed electrical switchgear.
3. W-Rating: Provide penetration firestopping systems with a Class 1 W-rating in accordance with UL 1479.

- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.4 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric strips for use around combustible penetrants.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Compressible, removable, and reusable intumescent pillows encased in fire-retardant polyester or glass-fiber cloth. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

- K. Fire-Rated Cable Sleeve Kits: Complete kits designed for new or existing cable penetrations through walls to accept standard accessories.
- L. Thermal Wrap: Flexible protective wrap tested and listed for up to 2-hour fire ratings in accordance with ASTM E814/UL 1479 for membrane penetrations or ASTM E1725/UL 1724 for thermal barrier and circuit integrity protection.
- M. Fire-Rated Cable Pathways: Single or gangable device modules composed of a steel raceway with integral intumescent material and requiring no additional action in the form of plugs, twisting closure, putty, pillows, sealant, or otherwise to achieve fire and air-leakage ratings.
- N. Retrofit Device for Cable Bundles: Factory-made, intumescent, collar-like device for firestopping existing over-filled cable sleeves and capable of being installed around projecting sleeves and cable bundles.
- O. Wall-Opening Protective Materials: Intumescent, non-curing putty pads or self-adhesive inserts for protection of electrical switch and receptacle boxes.
- P. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use around rectangular steel HVAC ducts without fire dampers.
- Q. Firestop Plugs: Flexible, re-enterable, intumescent, foam-rubber plug for use in blank round openings and cable sleeves.
- R. Fire-Rated Cable Grommet: Molded two-piece grommet made of plenum-grade polymer and foam inner core for sealing small cable penetrations in gypsum walls up to 1/2 inch (13 mm) diameter.
- S. Closet Flange Gasket: Molded, single-component, flexible, intumescent gasket for use beneath a water closet (toilet) flange in floor applications.
- T. Endothermic Wrap: Flexible, insulating, fire-resistant, endothermic wrap for protecting membrane penetrations of utility boxes, critical electrical circuits, communications lines, and fuel lines.

2.5 MIXING

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION OF PENETRATION FIRESTOPPING SYSTEMS

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

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

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

END OF SECTION 07 84 13

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SECTION 07 84 43
JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Joints in or between fire-resistance-rated constructions.
 - 2. Joints in smoke barriers.
- B. Related Requirements:
 - 1. Section 07 84 13 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each joint firestopping system. Include location, description of joint type, illustration of firestopping system, and design designation of qualified testing agency.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements" or been trained and certified by firestopping manufacturer.

1.8 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Tremco, Inc.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed..

- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Tremco, Inc.
 - 2. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems. Comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

- B. Install forming / damming / backing materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Inspection: The Project Inspector will inspect all joint firestopping.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection has been completed and installation approved by the Project Inspector.

3.5 CLEANING AND PROTECTION

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

END OF SECTION 07 84 43

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Nonstaining silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mildew-resistant joint sealants.
- B. Related Requirements:
 - 1. Section 07 84 13 "Penetration Firestopping".
 - 2. Section 08 80 00 "Glazing".
 - 3. Section 09 51 13 "Acoustical Panel Ceilings".

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- D. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, and curing time.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.8 FIELD CONDITIONS

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

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
- C. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- D. Sealants shall comply with the testing and product requirements of San Diego Air Pollution Control District Rule 67.0 "Architectural Coatings" and Rule 67.21 "Adhesive Material Application Operations".
- E. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food; provide products that comply with 21 CFR 177.2600.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corporation.
 - c. Tremco Incorporated.
 - d. Or Approved Equal.

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BASF / Sonneborn Corporation.
 - b. Sika Corporation.
 - c. Tremco Incorporated.
 - d. Or Equal.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corp.
 - c. Tremco Incorporated.
 - d. Or Equal.

2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
 - 4. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings according to Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

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

3.5 PROTECTION

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

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces

- 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in dimension stone cladding.
 - e. Joints in glass unit masonry assemblies.
 - f. Joints in exterior insulation and finish systems.
 - g. Joints between metal panels.
 - h. Joints between different materials listed above.
 - i. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - j. Control and expansion joints in ceilings and other overhead surfaces.
 - k. Other joints as indicated on Drawings.
- 2. Joint Sealant: Silicone, nonstaining, Type S, Grade NS, Class 50, Use NT.
- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Interior joints in horizontal traffic surfaces

- 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in stone flooring.
 - c. Control and expansion joints in brick flooring.
 - d. Control and expansion joints in tile flooring.
 - e. Other joints as indicated on Drawings.
- 2. Joint Sealant: Urethane, Type S, Grade NS, Class 25, Use T, NT.
- 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces

- 1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated on Drawings.
- 2. Joint Sealant: Silicone, mildew resistant, acid curing, Type S, Grade NS, Class 25, Use NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces
 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of unit masonry concrete walls and partitions.
 - d. Joints on underside of plant-precast structural concrete beams and.
 - e. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, Type S, Grade NS, Class 25, Use NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 92 00

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Interior standard steel doors and frames.
 - 2. Exterior standard steel doors and frames.
- B. Related Requirements:
 - 1. Section 01 81 13 "Sustainable Design Requirements."
 - 2. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.
- B. Shop Drawings: Include the following:
1. Elevations of each door type.
 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 7. Details of anchorages, joints, field splices, and connections.
 8. Details of accessories.
 9. Details of moldings, removable stops, and glazing.
- C. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.
- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.
 2. Egress Door Inspector: Submit documentation of compliance with NFPA 101, Section 7.2.1.15.4.
 3. Submit copy of DHI Fire and Egress Door Assembly Inspector (FDAI) certificate.
- B. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly, fire-rated borrowed-lite assembly, and thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.
- C. Field quality control reports.

1.8 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.9 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies is to meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

- B. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies is to meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

- 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with project requirements, provide products from one of the following manufacturers:
 - 1. Steelcraft, Allegion; web: us.allegion.com .
 - 2. ASSA ABLOY: Ceco, Curries, or Fleming; web: www.assaabloydss.com .
 - 3. Windsor Republic Doors; web: www.republicdoor.com.
 - 4. Door Components, Inc.; web: www.doorcomponents.com .

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

- A. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

- a. Type: As indicated in the Door and Frame Schedule on Drawings.
- b. Thickness: 1-3/4 inches (44.5 mm).
- c. Face: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- d. Edge Construction: Model 2, Seamless.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Core: Manufacturer's standard.
- g. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.

2. Frames:

- a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
- b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
- c. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule on Drawings.

1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches (44.5 mm).
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
- d. Edge Construction: Model 2, Seamless.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- h. Core: Manufacturer's standard
- i. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.

2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A60 (ZF180) coating.
- b. Construction: Full profile welded.

HOLLOW METAL DOORS AND FRAMES

08 11 13 - 4

Fontana City Hall – Phase II

3. Exposed Finish: Prime.

2.5 HOLLOW-METAL PANELS

- A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches (610 mm) of frame height above 7 feet (2.1 m).
 3. Postinstalled Expansion Anchor: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.7 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

HOLLOW METAL DOORS AND FRAMES

08 11 13 - 5

Fontana City Hall – Phase II

- G. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

2.8 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch (19 mm) beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
1. Sidelite Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding, or by rigid mechanical anchors.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

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

2.10 LOUVERS

- A. Provide integral louvers for doors, where indicated, which comply with SDI 111, with blades or baffles formed of 0.020-inch- (0.5-mm-) thick, cold-rolled steel sheet set into 0.032-inch- (0.8-mm-) thick steel frame.
 1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
- B. Form corners of moldings with hairline joints. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 .
 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
 3. Floor Anchors: Secure with post installed expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.
 4. Solidly pack mineral-fiber insulation inside frames.
 5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.

HOLLOW METAL DOORS AND FRAMES

08 11 13 - 7

Fontana City Hall – Phase II

6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 1. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.
 2. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
- D. Glazing: Comply with installation requirements in Division 08 glazing sections and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
 2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.

2. Egress Door Inspections: Inspect each door equipped with panic hardware, each door equipped with fire exit hardware, each door located in an exit enclosure, each electrically controlled egress door, and each door equipped with special locking arrangements in accordance with NFPA 101, Section 7.2.1.15.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.5 REPAIR

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

END OF SECTION 08 11 13

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SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Five-ply flush wood veneer-faced doors for transparent finish.
 - 2. Factory finishing flush wood doors.
- B. Related Requirements:
 - 1. Section 01 81 13 "Sustainable Design Requirements."
 - 2. Section 08 71 00 "Door Hardware"
 - 3. Section 08 80 00 "Glazing"

1.3 PREINSTALLATION MEETINGS

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

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
 - 2. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies
- D. North American Architectural Woodwork Standards - 3.1 (NAAWS), 2017 edition, published jointly by:
 - 1. Woodwork Institute, <http://woodworkinstitute.com>.
- E. Underwriters' Laboratories Inc. (UL):
 - 1. UL 10B - Standard for Fire Tests of Door Assemblies.

F. Window and Door Manufacturers Association (WDMA):

1. WDMA I.S.1A – Industry Standard for Architectural Wood Flush Doors.

1.5 ACTION SUBMITTALS

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

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

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

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Requirements for veneer matching.
9. Doors to be factory finished and application requirements.

C. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Plastic laminate, 6 inches (150 mm) square, for each color, texture, and pattern selected.
3. Polymer edging, in manufacturer's standard colors.
4. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.

B. Field quality-control reports.

C. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Special warranties.
- B. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.8 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies complies with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:
 - 1. DHI's Fire Door Assembly Inspector (FDAI) certification.

1.9 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

- A. Environmental Limitations:
 - 1. Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during remainder of construction period.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
 - 2. Warranty also includes installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.

2.3 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with ANSI/WDMA I.S. 1A.

2.4 SOLID-CORE FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Doors, Solid-Core Five-Ply Veneer-Faced:
 - 1. Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. Masonite Architectural.
 - b. Oregon Doors.
 - c. VT Industries.
 - 2. Performance Grade: ANSI/WDMA I.S. 1A Heavy Duty, unless otherwise indicated.
 - 3. ANSI/WDMA I.S. 1A Grade: Premium.
 - 4. Faces: Single-ply wood veneer not less than 1/50 inch (0.508 mm) thick.
 - a. Cut: Plain sliced (flat sliced).
 - b. Match between Veneer Leaves: Book match.
 - c. Assembly of Veneer Leaves on Door Faces: Running match.
 - d. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - 5. Exposed Vertical and Top Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A. [Same species as faces - Architectural Woodwork Standards edge Type A] [Applied wood-veneer edges of same species as faces and covering edges of faces - Architectural Woodwork Standards edge Type B] [Applied wood edges of same species as faces and covering edges of crossbands - Architectural Woodwork Standards edge Type D].
 - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
 - b. Fire-Rated Pairs of Doors:

- 1) Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: 550 lbf (2440 N) or 475 lbf (2110 N) in accordance with WDMA T.M. 10.
6. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
7. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
 1. Locate hardware to comply with DHI-WDHS-3.
 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
 5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."

2.6 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 2. Finish faces, all four edges, edges of cutouts, and mortises.
 3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.

C. Transparent Finish:

1. ANSI/WDMA I.S. 1A Grade: Premium.
2. ANSI/WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
3. Staining: Match Architect's sample.
4. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware."
- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Install frames level, plumb, true, and straight.
1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3.2 mm in 2400 mm).
 2. Anchor frames to anchors or blocking built in or directly attached to substrates.
 - a. Secure with countersunk, concealed fasteners and blind nailing.
 - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
 - 1) For factory-finished items, use filler matching finish of items being installed.
 3. Install fire-rated doors and frames in accordance with NFPA 80.
- D. Job-Fitted Doors:
1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
 - a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
 2. Machine doors for hardware.
 3. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 4. Clearances:
 - a. Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors.

- b. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated on Drawings.
 - c. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
- 5. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- E. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- F. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 - 1. Fire-Rated Door Inspections: Inspect each fire-rated door in accordance with NFPA 80, Section 5.2.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

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SECTION 08 18 16.13
SLIDING ALUMINUM-FRAMED GLASS DOOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Sliding aluminum-framed glass doors.
 - 2. Door Hardware.
 - 3. Glazing accessories.

1.3 RELATED REQUIREMENTS:

- A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 08 80 00 "Glazing."
- C. Division 08 Section "Door Hardware" for hardware not specified in this Section.
- D. Division 08 "Glazed Aluminum Curtain Walls" for coordinating finish with aluminum fenestration units on the building exterior.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. California Energy Commission:
 - 1. Building Energy Efficiency Standards for Residential and Nonresidential Buildings.
- D. California Energy Code:
 - 1. Appendix NA7 - Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes.
- E. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

F. American Architectural Manufacturers Association (AAMA):

1. AAMA 501.1 - Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure.
2. AAMA 501.4 - Recommended Static Test Method for Evaluating Curtain Wall and Storefront Systems Subjected to Seismic and Wind Induced Interstory Drifts.
3. AAMA 501.5 - Test Method for Thermal Cycling of Exterior Walls.
4. AAMA 501.6 – Recommended Dynamic Test Method for Determining the Seismic Drift Causing Glass Fallout from A Wall System.
5. AAMA 501.7 - Recommended Static Test Method for Evaluating Windows, Window Wall, Curtain Wall and Storefront Systems Subjected to Vertical Inter-Story Movements.
6. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems.
7. AAMA 701/702 - Voluntary Specification for Pile Weatherstripping and replaceable fenestration weatherseals.
8. AAMA 906 -Voluntary Specification for Sliding Door and Lift and Slide Roller Assemblies.
9. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
10. AAMA/NWWDA 101/I.S.2 - Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors.

G. National Fenestration Rating Council (NFRC):

1. ANSI/NFRC 100 - Procedure for Determining Fenestration Product U-Factors.
2. NFRC 500 – Procedure for Determining Fenestration Product Condensation Resistance Values.

H. The Society for Protective Coatings (SSPC):

1. SSPC-PS Guide No. 12.00 – Guide to Zinc-Rich Coating Systems.

I. Structural Engineering Institute of the American Society of Civil Engineers (SEI / ASCE):

1. ASCE / SEI 7 - Minimum Design Loads For Buildings and Other Structures.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review, discuss, and coordinate the interrelationship of sliding aluminum-framed glass doors with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.6 ACTION SUBMITTALS

- A. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

SLIDING ALUMINUM-FRAMED GLASS DOOR

08 18 16.13 - 2

Fontana City Hall – Phase II

- B. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
1. Construction details.
 2. Material descriptions.
 3. Fabrication methods.
 4. Dimensions of individual components and profiles.
 5. Hardware, finishes, and operating instructions.
- C. Shop Drawings: For sliding glass doors. Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and the following:
1. Prepared by or under the supervision of a qualified professional engineer, and bearing his seal and signature, detailing fabrication and assembly of metal-clad wood window assemblies requiring delegated design to meet specified criteria.
 2. Include details of provisions for assembly expansion and contraction.
 3. Include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
 4. Provide installation instructions and isometric details.
 5. Include full-size isometric details of each vertical-to-horizontal intersection of window assemblies, showing the following:
 - a. Anchorage.
 - b. Expansion provisions.
 - c. Glazing.
- D. Samples for Initial Selection: For each type of sliding glass door indicated.
1. Include similar Samples of hardware and accessories involving color selection.
- E. Samples for Verification: For sliding glass doors and components required, prepared on Samples of size indicated below:
1. Main Framing Member: 12-inch (300-mm) long section with weather stripping, glazing bead and factory-applied color finish.
 2. Provide 12 X 12 inch door corner of frame with factory applied color finish, weather stripping, glass and glazing bead.
 3. Hardware: Full-size units with factory-applied finish.
- F. Product Schedule: Use same designations indicated on Drawings.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each class, grade, and size of sliding glass door.
- B. Qualification Data: For qualified Installer and manufacturer.
- C. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS:

- A. Maintenance Data: For finishes, weather stripping, operable panels, and operating hardware to include in maintenance manuals.
- B. Warranty: Sample of each special warranty.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating sliding glass doors that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to sliding door manufacturer for installation of units required for this Project.
 - 1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility including preparation of data for sliding glass doors, including Shop Drawings and Delegated-Design Submittal, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- C. Source Limitations: Obtain each type of sliding glass doors from single source from single manufacturer.
- D. NFRC Compliance: Completed site-built assembly shall conform to NFRC 100 requirements and be tested and labeled in accordance with that standard.
- E. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of sliding glass doors. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- F. Certificate of Acceptance: Refer to California Energy Code Section 110.6.
 - 1. Submit Certificate of Acceptance certifying that the fenestration product meets the required acceptance requirements, completed, signed and submitted to the enforcement agency, with copies to Owner and Architect.
 - 2. NFRC 100 Label Certificate: Submit proof of testing of site-built assembly and compliance with NFRC 100. Manufacturer certificates or factory tests are not acceptable for this requirement.
 - 3. Provide AAMA-certified, sliding glass doors with an attached label.
- G. Safety Glass: Materials complying with testing requirements.
 - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction.

- H. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

1.10 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of sliding glass door openings by field measurements before fabrication.
- B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal-clad wood window assemblies without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions

1.11 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - 2. Warranty Period:
 - a. Sliding Aluminum-Framed Glass Doors: Five years from date of Substantial Completion.
 - b. Glass Units: 10 years from date of Substantial Completion.
 - c. Aluminum Finish: 10 years from date of Substantial Completion.
- B. Installer's Warranty: Installer warranties shall not add to or modify conditions of the Manufacturer's standard form and shall not require Owner to register with Installer, perform maintenance other than that recommended by Manufacturer, or pay additional fees of any kind to receive warranty service. Installer warranties may require Owner to pay reasonable costs for work not ultimately attributable to product or installation failure.
 - 1. Labor and Materials for Installation; Period 2 years.

1.12 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

1.13 DELIVERY, STORAGE, AND HANDLING

- A. Deliver access doors in cartons or crates to prevent damage during transit and job storage.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with the most stringent limited specified in pertinent section and tested and determined compliant per the referenced standards for each material type.
- B. General: Provide sliding glass doors capable of complying with performance requirements indicated, based on testing manufacturer's sliding doors that are representative of those specified, and that are of minimum test size indicated below:
 - 1. Provide sliding glass doors capable of complying with requirements indicated, based on testing manufacturer's patio doors that are representative of those specified and that are of test size required by AAMA/NWWDA 101 I.S.2.
- C. Acoustical Performance: Provide sliding glass doors with an STC rating of 34 when tested according to and determined by ASTM E1425 and ASTM E1332, respectively.
- D. Life-Cycle Testing: Tested according to and complying with AAMA/WDMA/CSA 101/I.S.2.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 ALUMINUM SLIDING DOORS

- A. Basis of Design Product: DORMA ESA 400B Bi Parting full breakout with two operable sidelites as manufactured by Dormakaba, web: www.dormakaba.us.
- B. Automatic DoorThermal/Non-thermal sliding doors.
- C. Materials:
 - 1. Windows and doors fabricated from aluminum extrusions of 6063-T5 alloy and temper with a minimum wall thickness of 0.090" for the door frame sill member and a minimum of 0.072" for all other members including frame, panel and optional horizontal muntins. The aluminum shall be free of defects which impair strength and appearance.
 - 2. Door construct shall be by means of interlocking corner shear block cross bolted.
 - 3. The sliding door system shall include two interlocks securing the leading stile of the sidelite and the butt stile of the sliding door together.
 - 4. Vertical Stiles shall be:
 - a. Medium stile: 4-1/2 inch
 - 5. Bottom Rails shall be standard size: 10 inch nominally.
 - 6. Weather stripping shall meet AAMA 701-11 Class A, slide in type, replaceable nylon retained by the aluminum extrusions to reduce energy loss. The following types of weather-stripping are required: nylon pile weather stripping on the door bottoms; dual pile weather-stripping at sliding door lead edges; weather-stripping between the carrier and header on

SLIDING ALUMINUM-FRAMED GLASS DOOR

08 18 16.13 - 6

Fontana City Hall – Phase II

the sliding doors; dual pile weather-stripping at the interlock rails between the sliding door and sidelites; dual pile weather-weather-stripping between the sidelites doors and the door jambs.

- D. Configuration: Refer to Drawings for configuration for each opening.

2.3 ACCESSORY MATERIALS

- A. Component parts and accessories shall be of aluminum alloy, stainless steel or non-metallic materials which will neither deteriorate nor promote corrosion.
 - 1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- B. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for sliding glass doors, complying with ASTM B 456 or ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- C. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when door is closed.
 - 1. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA/CSA 101/I.S.2.
- D. Horizontal members shall have two contact points incorporating silicone treated woven pile with mylar center fins. All vertical members shall have four contact points of silicone treated woven pile with mylar center fins. All shall be held in integral extruded slots and secured to prevent movement or loss while operating sash. Comply with AAMA 701.
 - 1. Weather Seals: Provide weather stripping to comply with AAMA 702.
- E. Sealant: For sealants required within fabricated sliding doors, provide door manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

2.4 GLAZING

- A. Glass and Glazing System: Comply with Division 8 Section "Glazing" for safety glass, and glazing requirements applicable to glazed sliding glass doors.

2.5 DOOR OPERATORS

- A. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of delrin-covered, ball-bearing-center wheels operating on a continuous roller track. Support doors from carrier assembly by adjustable cantilever and pivot assembly.
 - 1. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.

- B. Operator and Controller: a system with an electro-mechanical operator and microprocessor controller. Components consist of a DC permanent magnet motor, self-lubricating drive system and a wear-free digital rotary encoder all linked to a fully integrated digital microprocessor controller
1. Features:
 - a. Power opening and closing.
 - b. Drive System: belt
 - c. Adjustable opening and closing speeds.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Obstruction recycle.
 - f. Intergraded access control capabilities.
 2. Door Switches: Interior side mounted program switches consisting of:
 - a. Main Switch-Auto-Close-Open, operates door in fully automatic mode, turns door off, or keeps it fully open.
 - b. Exit Only Switch: on/off, only exit side activation device will initiate door opening.
 - c. Partial Opening Switch: on/off Energy saving opening mode limits the width opening.
 - d. Switch: Keyed
 3. Controller shall provide a means to verify presence sensor functionality and the connection between the controller and sensor(s) as required by the ANSI 156.10 standard. This closed loop monitoring system, upon detection of fault in the sensor or wiring shall cause automatic operation to cease.

2.6 ACTIVATION AND SAFETY

- A. Provide controls in accordance with ANSI/BHMA standard for condition of exposure and for long-term, maintenance-free operation under normal traffic load. Only safety systems (sensors) that have been tested and approved should be used in conjunction with manufacturer systems and products.
- B. Combination Motion/Presence Sensors: Self-contained units; consisting of both motion and presence sensors in a single housing; adjustable to provide detection field sizes and functions required by ANSI/BHMA A156.10.
1. Motion Sensor: K-band-frequency, doppler effect radar.
 - a. Provide capability for switching between bidirectional and unidirectional detection.
 - b. For one-way-traffic entrances, sensor on egress side shall not be active when doors are fully closed.
 2. Presence Sensor(s): Active infrared sensor shall provide two over lapping zones that provide presence detection in the threshold while the door is in the open position
- C. Activation Device:
1. Access control activator: as selected by architect.

2.7 ELECTRICAL

- A. Electrical 120 VAC, 60 Hz, 5 Amp service.
- B. Battery Back-up: Concealed in the door header case and capable of full operation including sensor capabilities for 200 cycles.

2.8 HARDWARE

- A. General: Provide Manufacturer's hardware, fabricated from a corrosion-resistant material compatible with aluminum complying with AAMA 907 and designed to smoothly operate, tightly close, and securely lock sliding glass doors. Do not use aluminum in frictional contact with other metals. Where exposed, provide extruded, cast, or wrought aluminum or nonmagnetic stainless steel.
 - 1. Hardware Finish: Manufacturer's standard as selected by Architect.
- B. Roller Assemblies: Provide movable panels with adjustable-height roller assemblies, complying with AAMA 906, consisting of self-lubricating, dual tandem stainless-steel ball-bearing rollers; with two roller assemblies per panel.
- C. Roller Track: Manufacturer's standard, Stainless Steel, designed to seat securely in the sill.
- D. Door Pulls: Provide manufacturer's standard pulls in finishes as selected by Architect.
- E. Automatic Locking for Sliding Door: Electrically controlled device mounted in header that automatically locks door against sliding when in closed position. Use battery back up to insure enhanced level of security.
- F. Weather-stripping and Glazing Gaskets:
 - 1. All glazing gasket is to be marine type vinyl, specifically designed for a tight seal between the glass and the sash extrusion.
- G. Threshold and Sill Cap/Track: Designed to comply with performance requirements indicated; with manufacturer's standard finish.
 - 1. Provide extruded-aluminum ADA-compliant ramped threshold and low profile track of thickness, dimensions, and profile indicated;

2.9 FABRICATION

- A. Fabricate sliding glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
- B. Weather Stripping: Provide operable panels with a double row of sliding weather stripping in horizontal rails and single- or double-row weather stripping in meeting or jamb stiles. Provide compression-type weather stripping at the perimeter of each movable panel where sliding-type weather stripping is not appropriate.
 - 1. Provide weather stripping locked into extruded grooves in door panels or frames.

- C. Factory-Glazed Fabrication: Glaze sliding glass doors in the factory where practical and possible for applications indicated. Comply with with AAMA/WDMA/CSA 101/I.S.2.
- D. Glazing Stops: Provide snap-on glazing stops coordinated with Division 8 Section "Glazing" and with glazing system indicated. Provide glazing stops to match panel frames.

2.10 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.11 ALUMINUM FINISHES

- A. High-Performance Organic Finish (Three-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coatings; Organic Coating: manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - 1. Match Finishes specified in Section 08 41 13 for Aluminum Framed Entrance and Storefronts and Section 08 44 13 for Glazed Aluminum Curtain Walls .

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and Manufacturer's written instructions for installing doors, hardware, accessories, and other components.

- B. Install sliding glass doors level, plumb, square, true to line, without distortion, warp or rack of frames and panels, or impeding thermal movement, anchored securely in place to structural support, and in proper relation to other adjacent construction.
- C. Install sliding glass doors and components to drain condensation, water penetrating joints, and moisture migrating within doors to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E2112, Section 5.12 "Dissimilar Materials."

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Test and inspect installed sliding aluminum-framed glass doors as follows:
 - 1. Testing Methodology: Test sliding aluminum-framed glass doors for air-leakage and water-penetration resistance in accordance with AAMA 502.
 - 2. Air-Leakage Resistance Testing:
 - a. Test Pressure: Pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 - 3. Water-Penetration Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 - 4. Testing Extent: Three sliding aluminum-framed glass doors of each type as selected by Architect and a qualified independent testing and inspecting agency. Conduct tests after perimeter sealants have cured.
 - 5. Test Reports: Prepared in accordance with AAMA 502.
- C. Sliding aluminum-framed glass door will be considered defective if it does not pass tests and inspections.

3.4 ADJUSTING

- A. Lubricate hardware and moving parts.
- B. Adjust operating panels to provide a tight fit at contact points and gaskets for smooth operation without binding.
- C. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.

3.5 CLEANING AND PROTECTION

- A. Clean aluminum surfaces immediately after installing doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, and clean surfaces.
- B. Clean glass immediately after installing doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect door surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances contact sliding door surfaces, remove contaminants immediately according to manufacturer's written instructions.
- E. Refinish or replace doors with damaged finishes.
- F. Replace damaged components.

END OF SECTION 08 18 16.13

SECTION 08 3113
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames.
 - 2. Fire-rated access doors and frames.

1.3 RELATED REQUIREMENTS:

- A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 01 81 13 "Sustainable Design Requirements."
- C. Section 07 72 00 "Roof Accessories" for roof hatches.
- D. Section 07 92 00 "Joint Sealants"
- E. Division 23 Sections for heating and air-conditioning duct access doors.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.
- C. California Code of Regulations, Title 24, Part 3, California Electrical Code.
- D. California Code of Regulations, Title 24, Part 4, California Mechanical Code (CMC), Uniform Mechanical Code with California Amendments.
- E. California Code of Regulations, Title 24, Part 5, California Plumbing Code (CPC), Uniform Plumbing Code with California Amendments.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For each product specified, provide the following information:
 - 1. Show standard and project specific details including attachment size, spacing and type, trim and termination at adjacent surfaces.
 - 2. Show door elevations.
 - 3. Indicate location of each unit on reflected ceiling plan drawings.
- C. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches (150 by 150 mm) in size.
- D. Product Schedule: For access doors and frames. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing and inspecting agency.
 - 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.

1.7 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

1.8 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies meets the qualifications set forth in NFPA 80 and Section 5.2.3.1.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Concealed Flanges:

1. Basis of Design: Bauco Plus II™ Access Door as manufactured by BAUCO Access Panel Solutions, Inc. (APS), 834 Devonshire Road, Victoria, BC V9A 4T4, Canada, (877) 592-0033, <https://bauco.com>.
2. Subject to compliance with requirements, provided named product or an equivalent product by one of the following manufacturers:
 - a. Acudor Products Inc.
 - b. Milcor Inc.
 - c. Elmdor Access Doors.
3. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
4. Locations: Walls and ceilings.
5. Door Size: As indicated on Drawings.
6. Extruded Aluminum for Door: 2.8 mm thick, alloy 6063-T6.
7. Frame Material: Same material and thickness as door.
8. Latch and Lock: Concealed touch latch, unless otherwise indicated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Basis of Design Product: Style FDW Access Panel as manufactured by J.L. Industries, an ACTIVAR, Inc. company; 9702 Newton Av S., Bloomington, MN 55431, +1 (800) 554-6077, <https://activarcpg.com>.
2. Subject to compliance with requirements, provided named product or an equivalent product by one of the following manufacturers:
 - a. Acudor Products Inc.
 - b. Milcor Inc.
 - c. Elmdor Access Doors.
3. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
4. Optional Features: Gasketing.
5. Locations: Wall and ceiling.
6. Door Size: As indicated on Drawings.
7. Fire-Resistance Rating: Not less than that of adjacent construction.
8. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch (1.02 mm), 20 gage, factory primed.
9. Frame Material: Same material and finish as door, nominal 0.064 inch (1.61 mm) thick, 16 gage,
10. Latch and Lock: Universal turn ring and key lock "U" unless indicated otherwise.

2.4 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063.
- E. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- F. Frame Anchors: Same material as door face.
- G. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- D. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
 - 2. Keys: Furnish two keys per lock and key all locks alike.
- E. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
2. Factory Finished: Apply manufacturer's standard baked-enamel or powder-coat finish immediately after cleaning and pretreating, with minimum dry-film thickness of 1 mil (0.025 mm) for topcoat.
 - a. Color: As selected by Architect from Manufacturer's full range of colors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 1. Fire-Rated Door Inspections: Inspect each fire-rated access door in accordance with NFPA 80, Section 5.2.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated access door indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 08 31 13

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SECTION 08 34 73.16
WOOD SOUND CONTROL DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Side-hinged, wood sound control door assemblies.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data:

1. Include information indicating compliance with assembly performance requirements, construction details, material descriptions, and finishes.

B. Shop Drawings:

1. Elevations of each type and style of door; details of doors, frames, anchorages, wall-opening conditions, sound control seals, door bottoms, and thresholds; and locations of reinforcements and preparations for hardware.

- C. Samples for Initial Selection:** For units with factory-applied finishes, manufacturer's standard finish sheets, showing full range of available finishes.

- D. Samples for Verification:** For each type of exposed finish not less than 3 by 5 inches (76 by 127 mm).

1. Doors and Frames: Samples approximately 12 by 12 inches (305 by 305 mm).

- a. Doors: Include section of vertical-edge, top, and bottom construction; automatic door bottom or gasket; core construction; glazing; and hinge and other applied hardware reinforcement.
- b. Frames: Include profile, corner joint, anchors, and seals.

- E. Product Schedule:** For wood sound control door assemblies. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports:** For each sound control door assembly, for tests performed by a qualified testing agency.

- B. Field Quality-Control Reports: For sound control door assemblies.
- C. Qualification Statements: For manufacturer and Installer.
- D. Sample Warranties: For sound control door assemblies.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sound control door assemblies.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating sound control door assemblies that meet or exceed assembly performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory in accordance with NIST's National Voluntary Laboratory Accreditation Program.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage.
 - 1. Welded Frames: Deliver with two temporary shipping spreader bars each, tack welded across bottom of frames.
- B. Upon delivery, remove cardboard and wrappings from doors and frames to promote air circulation.
- C. Do not use nonvented plastic or canvas to cover doors and frames to prevent entrapping moisture.
- D. Store doors and frames vertically under cover at Project site, spaced with blocking that provides a minimum 1/4-inch (6-mm) space between each stacked unit to permit air circulation between components.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install sound control door assemblies until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of sound control door assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Failure of product materials and workmanship.
 - b. Failures of assemblies to have NIC ratings within 5 dB of laboratory STC ratings specified when tested in accordance with ASTM E336, with results calculated in accordance with ASTM E413.
 - c. Faulty operation of sound seals.
 - d. Deterioration of wood doors, hollow-metal frames, finishes, and other materials beyond normal use or weathering.
 - e. Wood doors that are warped (bow, cup, or twist) more than 1/4 inch (6 mm) in a 42-by-84-inch (1068-by-2134-mm) section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76-mm) span.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain sound control door assemblies from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Acoustic Performance: Provide sound control door assemblies with minimum STC ratings indicated on Drawings for the entire assembly, calculated in accordance with ASTM E413 when tested in an operable condition in accordance with ASTM E90.

2.3 SIDE-HINGED, WOOD SOUND CONTROL DOOR ASSEMBLIES

- A. Assemblies: Complete with wood doors, hollow-metal frame, sound seals, and specified hardware and accessories.
1. Manufacturer's Nameplate: Affix permanent nameplate to assembly indicating manufacturer's name and STC rating.
- B. Wood Doors: Flush design, complying with requirements in WDMA I.S. 1A.
1. Thickness: As indicated in door schedule.
 2. Core: Manufacturer's standard sound control core as required to comply with assembly performance requirements.
 3. WDMA I.S. 1A Performance Grade: Heavy Duty.
 4. WDMA I.S. 1A Quality Grade: Premium.
 5. Stiles and Rails: Hardwood.
 6. Wood Veneer Faces for Transparent Finish:

- a. Species: Select white maple.
 - b. Cut: Quarter sliced.
 - c. Match between Veneer Leaves: Slip match.
 - d. Assembly of Veneer Leaves on Door Faces: Balance match.
 - e. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
 - f. Vertical Edges: Match face veneer.
 - g. Top and Bottom Edges: Factory sealed.
 - h. Factory Finish: Manufacturer's standard transparent finish.
- 1) Stain: In color matching Architect's sample.
7. Faces for Paint Finish: High-density surface complying with requirements for WDMA I.S. 1A Quality Grade indicated.
- a. Vertical Edges: Match faces.
 - b. Top and Bottom Edges: Factory sealed.
 - c. Factory Finish: As per finish schedule..
8. High-Pressure Decorative Laminate Faces: ISO 4586-3 in color and pattern selected by Architect from manufacturer's standard range.
- a. Vertical Edges: Match door faces.
 - b. Top and Bottom Edges: Factory sealed.
9. Glazing Stops: Metallic-coated steel sheet, formed blade stops with mitred corners; prepared for countersunk tamper-resistant flat- or oval-head machine screws.
- C. Hollow-Metal Frames: NAAMM-HMMA 820, continuously welded frames with corners mitered and reinforced.
1. Interior Frames: Provide back bend, gypsum board returns.
- a. Commercial-Quality Steel Sheet: Coldrolled, in thickness required to support door and comply with assembly performance requirements but not less than 0.075-inch (1.90-mm) nominal thickness.
2. Hardware Reinforcement: Comply with requirements in BHMA A156.115 for preparing frames for hardware.
3. Grout Guards: Metallic-coated steel sheet, not less than 0.026 inch (0.66 mm) thick.
4. Materials:
- a. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
5. Prime Finish: Apply manufacturer's standard rust-inhibitive primer immediately after cleaning and pretreating metal.
- a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with requirements in SDI A250.10 for acceptance criteria; recommended in writing by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
6. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with requirements in SDI A250.3 for performance and acceptance criteria.

WOOD SOUND CONTROL DOOR ASSEMBLIES

08 34 73.16 - 4

Fontana City Hall – Phase II

- a. Color and Gloss: As indicated on finish schedule..
- D. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls in accordance with ASTM A153/A153M, Class B.
 - 1. Jamb Anchors: Anchors of minimum size and type required by wall construction and assembly performance requirements.
 - 2. Floor Anchors: Metallic-coated steel in thickness matching frame but not less than 0.079-inch (2.01-mm) nominal-thickness.
 - a. Monolithic Concrete Slabs: Provide clip-type anchors, with two holes to receive fasteners.
 - b. Separate Topping Concrete Slabs: Provide adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.
 - 3. Ceiling Struts: Not less than 3/8-inch-thick by 2-inch- (9.5-mm-thick by 51-mm-) wide uncoated steel unless otherwise indicated on Drawings.
- E. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized in accordance with ASTM A153/A153M or ASTM F2329/F2329M.
- F. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

2.4 HARDWARE

- A. Sound Control Door Hardware: Manufacturer's standard sound control system required to comply with assembly performance requirements.
 - 1. Head and Jamb Seals: Provide one of the following:
 - a. Neoprene Compression Seals: One-piece units consisting of closed-cell sponge neoprene seal held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
 - b. Silicone Compression Seals: One-piece units consisting of silicone compression bulb and stabilizer flange; attached to door frame adhesively.
 - c. Magnetic Seals: One-piece units consisting of closed-cell sponge neoprene seal and resiliently mounted magnet held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
 - 2. Automatic Door Bottoms: Neoprene or silicone gasket, held in place by metal housing, that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.
 - a. Mounting: Mortised or semi-mortised into bottom of door as required to comply with assembly performance requirements.
 - 3. Door Bottoms: Neoprene or silicone gasket held in place by metal housing; mortised into bottom edge of door.
 - 4. Cam-Lift Hinges: Manufacturer's standard full-mortise type as required to support weight of door.
 - 5. Thresholds: Flat, smooth, unfluted type recommended in writing by manufacturer; fabricated from aluminum.

- a. Finish: Clear anodic finish.
 - b. Color: As selected by Architect from full range of industry colors and color densities.
- B. Astragals for Double Doors: As per hardware schedule or manufacturer's standard metal acoustic astragals with integral acoustic seals.
- C. Other Hardware: Comply with requirements in Section 08 71 00 "Door Hardware."

2.5 SOUND CONTROL ACCESSORIES

- A. Glass and Glazing: Manufacturer's glazing system complying with assembly performance requirements.
 - 1. Glass: ASTM C1036, Type 1, q3, safety glass complying with testing requirements in 16 CFR 1201 for category based on lite size.
- B. Grout: ASTM C476, with a slump of not more than 4 inches (102 mm) as measured in accordance with ASTM C143/C143M.
- C. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.6 FABRICATION

- A. Wood Doors: Factory fit doors to frames with uniform clearances and bevels in accordance with WDMA I.S. 1A unless otherwise indicated. Comply with final door hardware schedules and hardware templates.
 - 1. Glazed Lites: Factory install glazed lites in accordance with requirements of tested assembly and to comply with assembly performance requirements.
 - 2. Locate door hardware as indicated on Drawings.
 - a. Coordinate measurements of hardware mortises in hollow-metal frames to verify dimensions and alignment before factory machining.
- B. Hollow-Metal Frames: Fabricate to tolerances indicated in NAAMM-HMMA 865 and to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
 - 1. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners or provide plug buttons to conceal fasteners.
 - 4. Floor Anchors: Weld anchors to bottom of jambs and fixed mullions with at least four spot welds per anchor.

5. Masonry Jamb Anchors: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and provide minimum quantity as follows:
 - a. Two anchors per jamb up to 60 inches (1524 mm) in height.
 - b. Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
 - c. Four anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
 - d. Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm), or fraction thereof, more than 96 inches (2438 mm) in height.
6. Stud-Wall Jamb Anchors: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and provide minimum quantity as follows:
 - a. Three anchors per jamb up to 60 inches (1524 mm) in height.
 - b. Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
 - c. Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
 - d. Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm), or fraction thereof, more than 96 inches (2438 mm) in height.
 - e. Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.
7. Grout Guards for Welded Frames: Weld guards to frame at back of hardware cutouts, sound control seal preparations, and as required to close off other interior of openings in frames to be grouted.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Hollow-Metal Frames: Remove temporary shipping spreader bars installed at factory. Restore exposed finishes by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

3.3 INSTALLATION OF SIDE-HINGED, WOOD SOUND CONTROL DOOR ASSEMBLIES

- A. General: Install sound control door assemblies plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
- B. Hollow-Metal Frames: Set accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. Check squareness, twist, and plumbness of frames as walls are

WOOD SOUND CONTROL DOOR ASSEMBLIES

08 34 73.16 - 7

Fontana City Hall – Phase II

constructed. Shim as necessary to comply with installation tolerances. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

1. Frames Fabricated in Sections: Field splice by welding face joint continuously; grind, fill, and dress; make splice smooth, flush, and invisible on exposed faces.
 2. Corrosion-Resistant Coating: Apply corrosion-resistant coating to backs of frames to be filled with grout containing antifreezing agents.
 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 4. Metal-Stud Partitions: Fully fill frames with mineral-fiber insulation.
 5. In-Place Gypsum Board Partitions: Secure jambs with countersunk anchors, and fill and make smooth, flush, and invisible on exposed faces.
 6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above unless frame is anchored to structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
- C. Wood Doors: Fit doors accurately in frames in accordance with manufacturer's written instructions and to comply with assembly performance requirements.
- D. Sound Control Seals: Where seals have been factory prefit and preinstalled and subsequently removed for shipping, reinstall seals and adjust in accordance with manufacturer's written instructions.
- E. Cam-Lift Hinges: Install in accordance with manufacturer's written instructions.
- F. Thresholds: Set thresholds in full bed of sealant complying with requirements in Section 07 92 00 "Joint Sealants."
- G. Astragals for Double Doors: Install in accordance with manufacturer's written instructions.
- H. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (229 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.
- I. Installation Tolerances:
1. Opening Width: Plus 1/16 inch (1.6 mm) or minus 1/32 inch (0.8 mm), measured from rabbet to rabbet at top, middle, and bottom of frame.
 2. Opening Height: Plus 1/16 inch (1.6 mm) or minus 1/32 inch (0.8 mm), measured from head rabbet to top of floor or bottom of frame minus jamb extensions at each jamb and across head.
 3. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 4. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 5. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines and perpendicular to plane of wall.

6. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Acoustical Testing: To verify assemblies comply with acoustical performance requirements.
 1. Testing Extent: Every sound control door assembly.
 2. Testing Method: ASTM E336, with NIC rating calculated in accordance with ASTM E413.
 3. Acceptable Results: NIC rating within 5 dB of laboratory STC rating.
- C. Repair or remove and replace installations where testing and inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Inspection Report: Prepared and submitted in writing to Architect and Contractor within 24 hours after testing.

3.5 ADJUSTING AND CLEANING

- A. Hollow-Metal Frames:
 1. Metallic-Coated Surface Touchup: Immediately after installation, clean abraded areas of doors and frames and repair with galvanizing repair paint in accordance with manufacturer's written instructions.
 2. Prime-Coat Touchup: Immediately after installation, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible, rust-inhibitive, air-drying primer.
 3. Factory-Applied Paint Touchup: Immediately after installation, repair damaged areas of factory-applied paint and touchup in accordance with manufacturer's written instructions.
- B. Wood Doors: Immediately after installation, repair damaged areas of factory-applied finishes and touchup in accordance with manufacturer's written instructions.
- C. Remove and replace defective work, including defective or damaged sound seals and doors and frames that are warped, bowed, or otherwise defective.
 1. Adjust seals to provide contact required to comply with assembly performance requirements.
- D. Check and adjust seals, door bottoms, and other hardware items immediately before final inspection.

END OF SECTION 08 34 73.16

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SECTION 08 34 81
ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire protective smoke containment curtain assemblies.
- B. Products Supplied But Not Installed Under This Section:
 - 1. Group Control Panel unit.
 - 2. Emergency Up Buttons
- C. Work by Others shall be completed prior to installation of Smoke Containment System.
- D. Related Requirements:
 - 1. Section 09 91 23 "Interior Painting" for field painting system components.
 - 2. Division 26 – Electrical for the following:
 - a. Smoke Detector with normally open auxiliary contact and emergency power supply.
 - b. 120v AC Power and connection to Control Station.
 - c. Pull box, conduit, and wire for Control Circuit.
 - d. Pull box, conduit, and wire for Alarm Circuit.
 - e. Pull box, conduit, and wire for Housing Control Circuit.
 - f. Pull box, conduit, and wire for Rewind and Battery Charge Indicator.
 - g. J-Boxes and Access Panels as required.

1.3 REFERENCES

- A. ICC Evaluation Service ES AC77 – Acceptance Criteria for Smoke-Containment Systems Used With Fire-Resistive Elevator Hoistway Doors and Frames.
- B. ICC Evaluation Service report ESR-1136
- C. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing
- D. NFPA Codes and Standards:
 - 1. 70 – National Electrical Code.
 - 2. 105 – Recommended Practice for the Installation of Smoke-Control Door Assemblies.
 - 3. 72-2002 and 2007 – National Fire Alarm Code

E. UL Standards:

1. 268 – Smoke Detectors for Fire Protective Signaling Systems.
2. 508 – Industrial Control Equipment.
3. 864 – Control Units for Fire Protective Signaling Systems.
4. 1784 – Air Leakage Tests for Door Assemblies.

1.4 DEFINITIONS

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

1.5 COORDINATION

- A. Coordinate fire protective smoke containment curtain assemblies with power, signal, fire-alarm, and smoke-detection systems specified in Division 26 and Division 28.
- B. Coordinate fire suppression sprinkler system connection in compliance with requirements of Division 21.
- C. Coordinate fire protective smoke containment curtain assemblies with ceilings for operational clearances and maintenance access requirements.
- D. Coordinate fire protective smoke containment curtain assemblies with walls for support requirements, rating continuity above ceilings, and recessed wall switches.
- E. Coordinate requirements for metal supports required for fire protective smoke containment curtain assemblies.
- F. Coordinate anchorage installation for elevator door smoke containment system. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.6 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
1. Schedule and convene a pre-installation meeting prior to commencement of field operations with representatives of the following in attendance: Owner, Architect, General Contractor, smoke containment system sub-contractor, painting sub-contractor, and electrical sub-contractor.
 2. Review substrate conditions, requirements of related work, installation instructions, storage and handling procedures, and protection measures.
 3. Keep minutes of meeting including responsibilities of various parties and deviations from specifications and installation instructions.

1.7 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, product descriptions, fire-resistance ratings, and finishes.

B. Shop Drawings: Include the following:

1. Shop drawings shall be submitted electronically using the Project BIM model.
2. Include plans, elevations, sections, and attachment details.
3. Include details of fire-protective curtain assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location of each field connection.
4. Detail fabrication and assembly of fire-protective curtain assemblies.
5. Show locations of controls, motors, switches, detectors or replaceable fusible links, and other accessories.
6. Include diagrams for power, signal, and control wiring.
7. Differentiate between manufacturer-installed and field-installed wiring.
8. Verify rough and clear openings and the dimensions of other construction by field measurements before fabrication and indicate measurements on shop drawings.

C. Permits and Manuals:

1. Furnish certificates, operating permits, maintenance manuals with operating and maintenance instructions, emergency information, and similar information to Owner as required.
2. Instruct Owner's personnel in proper operation and required semi-annual maintenance.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, testing agency, and factory-authorized service representative.
- B. Evaluation Reports: For curtain assemblies, from ICC-ES or other qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's special warranty.

1.9 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-protective curtain assemblies to include in emergency, operation, and maintenance manuals.
- B. Field quality-control reports for required testing.

1.10 QUALITY ASSURANCE

- A. Overall Standards: Manufacturer shall maintain a quality control program in accordance with ICC-ES Acceptance Criteria 77.
- B. Qualifications:
 1. Manufacturer Qualifications: Minimum seven years of experience in producing smoke containment systems of the type specified.

2. Installer Qualifications: Factory trained by manufacturer.

C. Certifications:

1. Manufacturer's ICC Evaluation Service report ESR-1136.
2. California Department of Forestry and Fire Protection and Office of the State Fire Marshal Listing.
3. Testing Laboratory Label.
4. UL Listing.

D. Testing Agency Qualifications: An independent testing and inspecting agency acceptable to authorities having jurisdiction and with the experience and capability to conduct the testing indicated without delaying the Work.

E. Fire-Rated Door Assemblies: Provide elevator door smoke containment assembly identical to assembly used with elevator door and frame assemblies tested as a tight-fitting smoke and draft control assembly per CBC and that are labeled and listed for fire ratings indicated by UL, FM, ITS/Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

F. Listing and Labeling: Provide electrical components specified in this Section that are listed and labeled.

1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store elevator door smoke containment assembly in Manufacturer's original packaging and in accordance with Manufacturer's instructions.

1.12 FIELD CONDITIONS

A. Field Measurements: Field-verify and coordinate dimensions and indicate measurements on Shop Drawings.

1.13 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of curtain assemblies that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

1.14 MAINTENANCE

A. Maintenance and Testing:

1. Perform minimum semi-annual maintenance and testing on each smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by local authority having jurisdiction.

ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

08 34 81 - 4

Fontana City Hall – Phase II

2. Provide test documentation.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Elevator door smoke containment assembly designed to be placed over a fire-resistive elevator door to provide a tight-fitting, smoke, and draft control assembly complying with CBC.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Limits for Adhesives, Sealants, Fillers, Primers, Paints, and Coatings:
 1. Comply with limits specified in "California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. Air Leakage: Not to exceed 3 cfm (0.001416 m³/s) per sf of door opening at 0.1 in (25 Pa) water pressure differential at ambient temperature and 400 degrees F (204 degrees C) tested per CBC.
- C. Fire Rating: UL-10D One hour fire rated and labeled.
- D. Maximum Size: The maximum LISTED width is 4'-0" (1200) mm inside doorframe. The maximum mounting height is 9'-0" (2700) mm.
- E. Maximum Temperature Necessitating Replacement: The smoke containment system must be replaced after exposure to temperatures exceeding 200 degrees F (93 degrees C).
- F. Expansion: Maximum 4-1/2 inches when tested under both positive and negative pressure and at both ambient temperature of 72 deg F and elevated temperature of 400 deg F at 0.3 in. wg (74.6 Pa) differential pressure.
- G. Opening Force: Maximum 5 lbf per ft. to disengage the curtain when applied perpendicular to the plane of the film at the boundary.
- H. Operation-Cycle Requirements: No evidence of material fatigue or impairment of function in smoke containment components or operator after testing for 100 cycles according to ICBO ES AC 77.
- I. Product Recognition
 1. Each smoke-containment system shall be identified as follows:
 - a. The Manufacturer's name.
 - b. Maximum leakage rating at the specified pressure and temperature conditions.
 - c. Label of the approved quality control agency.
 - d. ICC Evaluation Service Report ESR-1136.

2.3 ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

- A. Basis-of-Design Product: Model DSI-600 Fire Rated Elevator Smoke Containment System as manufactured by DSI Smoke and Fire Curtains, web: www.doorsysinc.com.

ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

08 34 81 - 5

Fontana City Hall – Phase II

- B. Other Acceptable Manufacturers: Subject to compliance with requirements provide product from one of the following manufacturers:
 - 1. Cornellcookson.
 - 2. McKeon
 - 3. Smoke Guard Corporation.
- C. Source Limitations: Obtain elevator door smoke containment assembly through one source from a single manufacturer.

2.4 COMPONENTS

- A. Head Box: The curtain head box shall be manufactured from 18 gage galvanized steel. The enclosure shall be rated at the same temperature as the curtain fabric.
 - 1. Removable cover plates shall be incorporated to allow access to the curtain rollers.
 - 2. Standard head box sizes shall be 7 ½" x 7 ½" for single rollers (maximum width of 16 feet).
- B. Side Guide Rails: 2" deep x 4" wide, primed steel finish.
- C. Bottom Bar: A weighted bottom bar shall be provided to prevent deflection and ensure correct operation under gravity.
- D. Roller: The roller shall be constructed from an octagonal tube which incorporate a 24v D.C. motor and gearbox and a sealed heavy duty ball bearing assembly.
- E. A motor control circuit housed in a steel enclosure shall be mounted onto the motor end of the head box.
- F. Provide each motorized curtain with back Electromagnetic force-controlled speed of descent of no less than 6 inches per second and no more than 24 inches per second.
- G. Curtain Fabric: The fabric curtain shall be manufactured from VG455 woven glass fiber cloth and shall be UL listed for at least one hour fire rating. Curtain includes a grab strap for egress per ICC ES requirements

2.5 OPERATION

- A. The smoke and fire curtain shall deploy upon a signal from the fire alarm system in an emergency situation.
- B. The system must be proven to "fail safe" to the operational position on total loss of primary and auxiliary power. The system must contain a housed battery system at the Group Control Panels.
- C. Under normal operating conditions the curtains would be held in the retracted position via the motors operating at low voltage. The manufacture must be able to confirm that the motor windings are suitable for this type of operation.
- D. Upon activation of the fire alarm the control panel shall remove the supply voltage and the curtain shall descend under the power of gravity in a controlled manner. A dynamic braking system housed in the motor control circuit shall control the speed of the descent of the curtain. The descent shall be electronically synchronized on overlapping curtains with a bottom bar.

- E. To retract the curtain the control panel shall supply 24v to the motor control circuits and motors shall drive the curtains to the upper position. As the bottom bar or stopping bar hits the curtain head box a current limiting circuit shall step back the voltage and current and hold the bottom bar in the retracted position.
- F. Limit switches are not to be used to control the upper position of the curtain.
- G. An optional braking system is available at the manufacture stage to allow a two stage descent during gravity deployment. Should the main power fail to the group control panel, the supply is automatically switched to the integral standby battery. The curtain remains in the retracted position for 1 hour (fully retracted loaded system). The curtain shall remain fully operational until the battery low voltage cut off facility reads a voltage of 21v; the curtains shall then safely descend under the power of gravity to the operational position.
- H. Group Control Panel: Provide Group Control Panel (GCP) capable of controlling up to 5 no. 24v motor assemblies. During normal operation, the GCP shall provide a 24v AC supply to the curtain motor holding them in the retracted position. Should smoke be detected, the fire alarm contact in the GCP shall be opened by the fire alarm control system, the GCP shall remove the 24v supply to the curtain motors and the curtains shall descend under the power of gravity in a controlled manner.
 - 1. Open on fire- configured to be gravity fail safe
- I. Test Facility- key switch required
- J. All push to exit buttons must contain internal battery back-up power supply for fail safe operation for ICC ES requirements.
- K. Weight of bottom to be 1.5 pounds per linear foot for curtain to lift with less than 15lbs of force for secondary means of egress for compliance with ICC ES requirements.

2.6 FABRICATION

- A. Fabricate elevator door smoke containment system work to be free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Shop Assembly: Preassemble elevator door smoke containment units in 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.
- C. Coordinate dimensions and attachment methods of smoke containment units with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned, unless otherwise indicated.
- D. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.
- E. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install elevator door smoke containment units.

- F. Label curtain with the words "NOT AN EXIT" in minimum 4-inch-high, bold black block letters. Position the wording so it shall be located at approximately mid-height of the elevator door when the curtain is fully deployed.

2.7 FINISHES

- A. Stainless-Steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 1. Directional Satin Finish: No. 4.
 - 2. Dull Satin Finish: No. 6.
 - 3. Mirrorlike Reflective, Nondirectional Polish: No. 8.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify related work performed under other sections is complete and in accordance with Shop Drawings.
- B. Verify wall surfaces and elevator door frames are acceptable for installation of smoke containment system components.
- C. Verify existing field painted elevator door frames to be used for screen adherence have been repainted in accordance with smoke containment system manufacturer's instructions or they have the original factory paint.
- D. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates.
- E. Proceed with installation only after unsatisfactory conditions have been corrected to meet the Manufacturer's recommendations and Construction Documents.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's written instructions for a complete, rated system by factory trained Installers.
- B. General: Install elevator door smoke containment units and operating equipment complete with necessary hardware, auxiliary rails if required, anchors, inserts, hangers, and supports according to Shop Drawings, manufacturer's written instructions, and as specified.
 - 1. Install smoke containment units to comply with applicable requirements of NFPA 105.
- C. Mount housing unit as indicated on the approved Shop Drawings, level and plumb.
- D. Make required electrical connections.

- E. Seal joints between materials and substrates in accordance with smoke containment unit manufacturer's instructions, as necessary to provide required smoke control, and in accordance with requirements of Division 7 Section "Joint Sealants."

3.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and to furnish reports to Architect.
- B. Inspections:
 - 1. Fire-Rated Door Inspections: Inspect each fire-rated floor door in accordance with NFPA 80, Section 5.2.
- C. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- D. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- E. Prepare and submit separate inspection report for each fire-rated floor door indicating compliance with each item listed in NFPA 80 and NFPA 101.

3.4 DEMONSTRATION

- A. Demonstrate required testing and maintenance procedures to Owner's Representative.
- B. Engage a factory-authorized service representative to perform training session for Owner's maintenance personnel as specified below:
 - 1. Schedule training with Owner with at least 7 days' advance notice.
 - 2. Train Owner's maintenance personnel on procedures and schedules related to troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices, including semi-annual maintenance required by authorities having jurisdiction.
 - 3. Review data in the maintenance manuals. Refer to Division 1 Section "Closeout Procedures" and "Operation and Maintenance Data."
- C. Maintenance and Testing:
 - 1. Perform minimum semi-annual maintenance and testing on each elevator door smoke containment system as required by the manufacturer's warranty, code agency evaluation reports, and as required by local authority having jurisdiction.
 - 2. Retain permanent record of tests.

3.5 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

END OF SECTION 08 34 81

SECTION 08 35 13
FOLDING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal bi-folding doors.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for folding doors.

B. Shop Drawings:

1. Include plans, elevations, sections, and installation details.
2. Include clearances required for operation, storage pockets and pocket doors, and accessory items.

C. Samples for Initial Selection: For each type of exposed finish.

1. Include Samples of hardware and accessories involving color and finish selection.

D. Samples for Verification: For each type of exposed finish.

1. Include Samples of hardware and accessories to verify color and finish selection.

E. Product Schedule: For folding doors. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For folding doors to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of folding doors.

1.7 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 METAL BI-FOLDING DOORS

- A. Basis of Design Product: Concept 99 bi-folding door as manufactured by MobilFlex Inc., web: www.mobilflex.com.
- B. Curtain Construction: The curtain is constructed of modules 1/16" (1,6mm) thick arranged in a checkerboard design of 3" (76mm) c/c. The modules are linked together by hidden aluminum and steel rods of 5/16" (8mm) diameter.
 - 1. Panel Height: As indicated on Drawings.
 - 2. Panel Finish: As indicated on Drawings.
- C. Track:
 - 1. Curtain shall be hung from an overhead track 1-5/16" (33mm) wide by 1-9/16" (40mm) high. Track shall be tempered aluminum alloy 6063-T5.
- D. Stacking:
 - 1. Stacking shall not exceed a depth of 1.15" per foot of closure width plus 3" for each post (lead, end or intermediate). (95mm/lin. m + 76mm per post). Full egress doors add 7" (178mm).
- E. Locking
 - 1. Lead post shall be equipped with a hook bolt lock with MobilFlex cylinders each side.
 - 2. Trailing post shall be self-locking at the top and bottom inside the storage pocket.
 - 3. Free floating intermediate posts shall be located at all curves and at recommended intervals of 10 feet (3m) or 5 feet (1,5m) for counter top units. Intermediate posts shall be equipped with self-adjusting spring loaded drop bolts activated from the inside only. Drop bolts shall engage dustproof stainless steel receptacles.
- F. Hardware: Manufacturer's standard felt pads, screws, and pulls in standard finish. Hinges, pivots, and manufacturer's standard wheels factory installed and as follows:
 - 1. Hinges: Three self-aligning hinges per pair of doors.
 - 2. Guides and Pivots: Not less than 9/16-inch- (14-mm-) diameter, adjustable screw-type, weight-bearing, zinc-plated pivot rod held in place by nylon rod clamp assemblies; with

not less than 1/4-inch- (6.4-mm-) diameter, spring-loaded, self-aligning, zinc-plated steel guide rods and top pivot rods held in place by nylon sleeves.

- G. Pocket Door: Swinging door that closes to conceal the storage pocket.
 - 1. Solid-core pocket doors with reverse-action spring hinge; 90-degree minimum swing.
 - 2. Face Finish: Match adjacent finishes.
 - 3. Magnetic Catch: Holding force of no more than 30 lbf (133 N).
 - 4. Maximum Opening Force: 50 lbf (222 N).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. For folding doors supported by or anchored to permanent construction, advise installers of specific requirements for placement of anchorage devices. Furnish installers of other work with templates and drawings indicating locations of anchorage devices and similar items.

3.3 INSTALLATION

- A. General: Install bi-folding doors complying with manufacturer's written installation instructions. Install track in one piece.
- B. Standard Floor Clearances: 1/4 to 3/4 inch (6.4 to 19 mm) maximum (above floor finish).

3.4 ADJUSTING

- A. Adjust units to ensure smooth, quiet operation without warping or binding. Adjust hardware to function smoothly. Confirm that latches engage accurately and securely without forcing or binding.
- B. Pocket Doors: Adjust to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION 08 35 13

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SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Exterior and interior storefront framing.
- 2. Storefront framing for window walls.
- 3. Exterior and interior manual-swing entrance doors

B. Related Requirements:

- 1. Section 07 42 13.19 "Metal Composite Material Wall Panels".
- 2. Section 07 92 00 "Joint Sealants".
- 3. Section 08 71 00 "Door Hardware".
- 4. Section 08 80 00 "Glazing".

1.3 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

- 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
- 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 41 13 - 1

Fontana City Hall – Phase II

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch lengths of full-size components and showing details of the following:
 1. Joinery, including concealed welds.
 2. Anchorage.
 3. Expansion provisions.
 4. Glazing.
 5. Flashing and drainage.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and field-testing agency.
- B. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Source quality-control reports.
- D. 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 joint sealant manufacturer's written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- E. Sample Warranties: For special warranties.
- F. Manufacturer Seismic Qualification Certificate: Submit certification that aluminum-framed entrances and storefronts shall withstand seismic forces defined according to ASCE/SEI 7.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 41 13 - 2

Fontana City Hall – Phase II

- C. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code – Aluminum."
- D. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, sway, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- B. Structural Loads: As indicated on drawings and below.
- C. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4-inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4-inch, whichever is less.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 41 13 - 3

Fontana City Hall – Phase II

2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8-inch, whichever is smaller.
- D. Structural: Test according to ASTM E330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Dead Loads: Provide entrance and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
 2. Provide a minimum 1/16-inch clearance between members and operable windows and doors.
- F. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
- G. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of CBC or the ASCE 7, Minimum Design Loads for Buildings and Other Structures, 6.4.2, "Analytical Procedure," whichever are more stringent.
- H. Air Infiltration: Test according to ASTM E283 for infiltration as follows:
1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
 2. Entrance Doors:
 - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
 - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
- I. Water Penetration under Static Pressure: Test according to ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. Water leakage is defined as follows:
 - a. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 41 13 - 4

Fontana City Hall – Phase II

- J. Noise Reduction: Test according to ASTM E90, with ratings determined by ASTM E1332, as follows.
- K. Windborne-Debris Impact Resistance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E1886 and testing information in ASTM E1996 for Wind Zone 1.
- L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 - 2. Thermal Cycling: 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.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 - c. Interior Ambient-Air Temperature: 75 deg F.
- M. Glazing: Physically isolate glazing from framing members.
- N. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

2.2 MANUFACTURERS

- A. Basis of Design Manufacturer: Provide products manufactured by Arcadia Inc, web: www.arcadiainc.com
- B. Manufacturers: Subject to compliance with requirements, provide equivalent products by one of the following:
 - 1. EFCO Corporation.
 - 2. Kawneer North America; an Alcoa company.
 - 3. Oldcastle Building Envelope™.
 - 4. Or Equal.
- C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally improved.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Front.
 - 4. Finish: As mentioned in drawings
 - 5. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 41 13 - 5

Fontana City Hall – Phase II

- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
 - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: ASTM B209.
 - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
 - c. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
 - d. Structural Profiles: ASTM B308/B308M.
 - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - 2. Door Design: As indicated.
 - 3. Glazing Stops and Gaskets: Manufacturer's standard snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide non-removable glazing stops on outside of door.

2.5 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, non-bleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Do not use exposed fasteners, except for hardware application. For hardware application, use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1-inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A 153M requirements.
- C. Concealed Flashing: Dead-soft, 0.018-inch-thick stainless-steel, ASTM A240/A240M of type recommended by manufacturer.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.6 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.
 3. Physical and thermal isolation of glazing from framing members.
 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 5. Provisions for field replacement of glazing from interior.
 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Storefront Framing: Provide subframes and reinforcing of types indicated or, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- F. Entrance Door Frames: Fabricate door framing in profiles indicated. Reinforce as required to support loads imposed by door operation and for installing entrance door hardware. Cut, drill, and tap for factory-installed hardware before finishing components.
 1. At exterior doors, provide compression weather stripping at fixed stops.
 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 2. At exterior doors, provide weather sweeps applied to door bottoms.
- H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

- I. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual".
- J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018-mm or thicker.
 - 1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 41 13 - 8

Fontana City Hall – Phase II

2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install operable units' level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing.
- G. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- H. Install doors to produce smooth operation and tight fit at contact points.
 1. Install exterior doors to produce weathertight enclosure and tight fit at weather stripping.

3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
 1. Plumb: 1/8-inch in 10 feet; 1/4-inch in 40 feet.
 2. Level: 1/8-inch in 20 feet; 1/4-inch in 40 feet.
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2-inch wide, limit offset from true alignment to 1/16-inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2- to 1-inch wide, limit offset from true alignment to 1/8-inch.
 - c. Where surfaces are separated by reveal or protruding element of 1-inch wide or more, limit offset from true alignment to 1/4-inch.
 - d. Diagonal Measurements: Limit difference between diagonal measurements to 1/8-inch.
 4. Location: Limit variation from plane to 1/8-inch in 12 feet; 1/2-inch over total length.

3.4 ADJUSTING AND CLEANING

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds and dirt from surfaces.

3.5 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

08 41 13 - 9

Fontana City Hall – Phase II

END OF SECTION 08 41 13

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Glazed aluminum curtain wall systems:
 - a. Conventionally glazed.

- B. Related Requirements:

- 1. Consult all other Specification Sections to determine the extent and character of related work, and coordinate work specified in this Section with other work to produce a complete installation meeting the intent of the Contract Documents. Contractor is responsible to coordinate all work.
- 2. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- 3. Section 01 81 13 "Sustainable Design Requirements."
- 4. Section 01 43 39 "Mockup Requirements".
- 5. Section 07 92 00 "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
- 6. Section 08 41 13 "Aluminum-Framed Entrances and Storefronts."
- 7. Section 08 80 00 " Glazing" for curtain wall glazing.

1.3 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. California Energy Commission:
 - 1. Building Energy Efficiency Standards for Residential and Nonresidential Buildings.
- D. California Energy Code:
 - 1. Appendix NA7 - Installation and Acceptance Requirements for Nonresidential Buildings and Covered Processes.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include full-size isometric details of each type of vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- F. Delegated-Design Submittal: For glazed aluminum curtain walls, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Mockup Testing Submittals:
 - 1. Testing Program: Developed specifically for Project.
 - 2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
- B. Qualification Data:

1. For Installer and field testing agency.
 2. For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the state in which Project is located.
- C. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- D. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.
- E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, in accordance with recommendations in ASTM C1401. Include periodic quality-control reports.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
- B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C1401 recommendations for post-installation-phase quality-control program.
- C. Certificate of Acceptance: Refer to California Energy Code Section 110.6.
1. Submit Certificate of Acceptance certifying that the fenestration product meets the required acceptance requirements, completed, signed, and submitted to the enforcement agency, with copies to Owner and Architect.
 2. NFRC 100 Label Certificate: Submit proof of testing of site-built assembly and compliance with NFRC 100. Manufacturer certificates or factory tests are not acceptable for this requirement.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum ten years of documented experience.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer and that employs a qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AGM) contractors.
- C. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of

GLAZED ALUMINUM CURTAIN WALLS

08 44 13 - 3

Fontana City Hall – Phase II

aluminum glazing systems that are similar to those indicated for this Project in material, design, and extent.

- D. NFRC Compliance: Completed site-built assembly shall conform to NFRC 100 requirements and be tested and labeled in accordance with that standard.
- E. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- F. Structural-Sealant Glazing: Comply with ASTM C1401 for design and installation of structural-sealant-glazed curtain wall assemblies.
- G. Structural-Sealant Joints: Design reviewed and approved by structural sealant manufacturer.
- H. Welding Qualifications: Qualify procedures and personnel according to the following.
 - 1. American Welding Society (AWS):
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.9 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Testing shall be performed on mockups in accordance with requirements in "Field Quality Control" Article.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 WARRANTY

- A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

- d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
- 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, peeling, or chipping.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in Section 01 61 16.
- B. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- C. Contractor will assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option". Make all arrangements necessary to perform required testing of site-built assembly and obtain NFRC label as described in NFRC 100.5.6. Contractor is responsible to obtain, including payment of all required fees, a label certificate for the site built fenestration system meeting requirements of California Energy Code Section 10-111(a)2 as described in California Energy Code Section 110.6.
- D. Delegated Design: Engage a qualified professional engineer, as defined in Division to design glazed aluminum curtain walls.
- E. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.

GLAZED ALUMINUM CURTAIN WALLS

08 44 13 - 5

Fontana City Hall – Phase II

F. Weather Resistance:

1. Glazed aluminum curtain walls shall provide waterproofing and an air-vapor retarder that is continuous at all penetrations, transitions, and other conditions. Assemblies shall integrate with the building's waterproofing and air barrier / vapor-retarders to provide a weathertight transition.
2. Air Movement: Assemblies shall not allow the movement of interior or exterior air to flow vertically within the assembly. Methods employed to prevent internal air movement shall not restrict water flow channels or prevent thermal movement of the frames.
3. Water penetration into the assembly is acceptable only if all of the following conditions are satisfied; any other water penetration is considered water leakage and is unacceptable:
 - a. Water is immediately contained and drained to the exterior.
 - b. There is no wetting of a surface that could be damaged by moisture or that would be visible to building occupants.
 - c. There would be no staining or other damage to completed building or its furnishings.
 - d. This definition of water leakage governs over other definitions that may appear in referenced documents.
4. Provide internal gutters and weep system to collect and drain water leakage and condensation to the exterior at the sill of each opening. Glazing assemblies will have:
 - a. An isolated gutter cavity at each glass pane perimeter so that leakage is confined to and wept from the opening of leakage origin.
 - b. Continuous spliced gutters at mullion splices, with sealed end caps at termination conditions. Assemblies shall not direct water to contact edges of insulating glass units. Prevent water infiltration at weeps.
5. Coordinate gutter and weep systems with exterior cladding assemblies specified in other sections, ensure drainage of accumulated water to exterior of building.

G. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Seismic Loads: As indicated on Drawings.
3. Other Design Loads: As indicated on Drawings.

H. Deflection of Framing Members Supporting Glass: At design wind load, as follows:

1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans of greater than 13 feet 6 inches (4.1 m).
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 (3.2 mm).
 - a. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.

I. Structural: Test in accordance with ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.

2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or 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 60 seconds.
- J. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft. (720 Pa).
- K. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement and 1.5 times the design displacement.
 2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.7 at design displacement and 1.5 times the design displacement.
- L. Energy Performance: Certified and labelled by manufacturer for energy performance as follows:
1. Thermal Transmittance (U-factor):
 - a. Fixed Glazing and Framing Areas: U-factor for the system of not more than 0.41 Btu/sq. ft. x h x deg F (2.33 W/sq. m x K) as determined in accordance with NFRC 100.
 2. Solar Heat Gain Coefficient (SHGC):
 - a. Fixed Glazing and Framing Areas: SHGC for the system of not more than 0.26 as determined in accordance with NFRC 200.
 3. Air Leakage:
- M. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa) when tested in accordance with ASTM E283. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested in accordance with AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
 - b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).
- N. Structural-Sealant Joints:
1. Designed to carry gravity loads of glazing.

- O. Structural Sealant: ASTM C1184. Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls 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.

2.2 SOURCE LIMITATIONS

- A. Obtain all components of curtain-wall system and storefront system, including framing, spandrel panels, entrances, aluminum fins, and accessories, from single manufacturer.

2.3 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

- A. Basis of Design Product: T500-OPG3000 Series, T500-OPG6000 series, T500-OPGSPDRL series and T500-OPG1900 self-supporting curtain wall system manufactured by Arcadia; 2301 East Vernon Ave., Vernon, CA, (323) 771-9819, <https://arcadiainc.com>.
 - 1. Subject to compliance with requirements, provide basis of design product or an equivalent product by one of the following manufacturers. Equivalent product or approved substitution shall meet the dimensions and requirements indicated for the basis of design product in the Drawings and Project Manual.
 - a. Kawneer Company Inc.; <https://kawneer.com>.
 - b. Oldcastle Building Envelope, <https://www.oldcastlebe.com/>.
 - c. Wausau Window and Wall Systems, <https://www.wausauwindow.com/>.
 - d. Substitutions: Per Division 01.
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Thermally broken.
 - 2. Glazing System: Retained mechanically with gaskets on two sides and structural sealant on two sides.
 - 3. Glazing Plane: Front.
 - 4. Finish: Clear anodized.
 - 5. System: Either stick or unitized system.
 - 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 7. Steel Reinforcement: As required by manufacturer.
- C. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
 - 1. Include snap-on aluminum trim that conceals fasteners.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 GLAZING

- A. Glazing: Comply with Section 08 80 00 "Glazing."
- B. Glazing Gaskets: ASTM C509 or ASTM C864. Manufacturer's standard. Comply with Section 08 80 13 "Glazing."
 - 1. Color: As indicated in Drawings.
- C. Glazing Sealants: As recommended by manufacturer for joint type.
- D. Structural Glazing Sealants: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes into contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.
 - 1. Color: As selected by Architect from manufacturer's full range of colors.
- E. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes into contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.
 - 1. Color: Match structural sealant.

2.5 MATERIALS

- A. Sheet and Plate: ASTM B209 (ASTM B209M).
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221 (ASTM B221M).
- C. Structural Profiles: ASTM B308/B308M.
- D. Steel Reinforcement:
 - 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- E. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.

- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.
- C. Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A240/A240M of type recommended by manufacturer.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Fabricate components to resist water penetration as follows:
 - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.
- F. Factory-Assembled Frame Units:
 - 1. Rigidly secure nonmovement joints.
 - 2. Prepare surfaces that are in contact with structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 3. Seal joints watertight unless otherwise indicated.
 - 4. Install glazing to comply with requirements in Section 08 80 00 "Glazing."
 - 5. Install structural glazing.
 - a. Set glazing into framing in accordance with sealant manufacturer and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.

- b. Set glazing with proper orientation so that coatings face exterior or interior as specified.
 - c. Apply structural silicone sealant to completely fill cavity, in accordance with sealant manufacturers written instructions with the framing and glazing in a fully supported position.
 - d. Brace or stiffen framing and glazing in such a manner to prevent undue stresses on the glass edge seal and structural joints or movement of the glazing, until sealant is fully cured in accordance with manufacturer's recommendations.
 - e. After structural sealant has completely cured, insert backer rod between lites of glass as recommended by sealant manufacturer.
 - f. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.
 - g. Clean and protect glass as indicated in Section 08 80 00 "Glazing."
 - h. Retain bracing or stiffening until erected to prevent racking of units during transportation and erection.
- G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.8 ALUMINUM FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color and Gloss: Custom factory finish as per schedule.

2.9 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C1401 recommendations, including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.

- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
- G. Seal joints watertight unless otherwise indicated.
- H. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

- A. Install glazing as specified in Section 08 80 00 "Glazing."

3.4 INSTALLATION OF STRUCTURAL GLAZING

- A. Prepare surfaces that will contact structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
- B. Set glazing into framing in accordance with sealant manufacturer's and framing manufacturer's written instructions and standard practice. Use a spacer or backer as recommended by manufacturer.
- C. Set glazing with proper orientation, so that coatings face exterior or interior as specified.
- D. Hold glazing in place using temporary retainers of type and spacing recommended by manufacturer, until structural sealant joint has cured.
- E. Apply structural sealant to completely fill cavity, in accordance with sealant manufacturer's and framing manufacturer's written instructions and in compliance with local codes.
- F. Apply structural sealant at temperatures indicated by sealant manufacturer for type of sealant.
- G. Allow structural sealant to cure in accordance with manufacturer's recommendations.
- H. Clean and protect glass as indicated in Section 08 80 00 "Glazing."

3.5 INSTALLATION OF WEATHERSEAL SEALANT

- A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass, as recommended by sealant manufacturer.
- B. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.

3.6 ERECTION TOLERANCES

- A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
 - 2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
 - c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Test Area: Perform tests on representative areas of glazed aluminum curtain walls. Test one of each type of window including its integration with the exterior cladding, within each type of cladding system, per elevation or as directed by the Architect or Owner
 - 1. Conduct tests for air infiltration and water penetration with manufacturer's representative present.
- C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.
 - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of three tests in areas as directed by Architect.
- D. Structural-Sealant Adhesion: Test structural sealant in accordance with recommendations in ASTM C1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
 - 1. Test a minimum of four areas on each building facade.
 - 2. Repair installation areas damaged by testing.

- E. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- F. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements. Should failure occur, Contractor shall test one additional area for each failed location.
- G. Tests not meeting specified performance requirements and units having deficiencies shall be corrected as part of the contract amount. Additional testing and inspections will be performed, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.
- H. Prepare test and inspection reports.
- I. Fenestration Acceptance Requirements: Refer to California Energy Code Section 110.6.
 - 1. Before an occupancy permit is granted, site-built fenestration products in other than low-rise residential buildings shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified in the Reference Nonresidential Appendix NA7 to ensure that site-built fenestration meet Standards requirements, including a matching label certificate for product(s) installed and be readily accessible at the project location.
 - 2. Contractor is responsible to prepare and obtain a Certificate of Acceptance certifying that the fenestration product meets the acceptance requirements, completed, signed and submitted to the enforcement agency, including payment of all fees, with copies to Owner and Architect.

3.8 PROTECTION

- A. Institute protective measures required throughout the remainder of the construction period to ensure that glazed aluminum curtain walls will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION 08 44 13

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Sliding doors.
 - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical door hardware.
 - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section 08 11 13 "Hollow Metal Doors and Frames"
 - 2. Division 08 Section 08 14 16 "Flush Wood Doors".
 - 3. Division 08 Section 08 41 13 "Aluminum Framed Entrances and Storefronts".
 - 4. Division 08 Section 08 42 29 "Sliding automatic Entrances"
 - 5. Division 28 "Electronic Safety and Security"
 - 6. Division 32 "Gates"
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC – International Building Code.
 - 3. NFPA 70 – National Electrical Code.
 - 4.
 - 5. NFPA 80 – Fire Doors and Windows.
 - 6. NFPA 101 – Life Safety Code.
 - 7. NFPA 105 – Installation of Smoke Door Assemblies.
 - 8. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
 - 1. ANSI/BHMA Certified Product Standards – A156 Series.
 - 2. UL 10C – Positive Pressure Fire Tests of Door Assemblies.
 - 3. ANSI/UL 294 – Access Control System Units.
 - 4. UL 305 – Panic Hardware.
 - 5. ANSI/UL 437 – Key Locks.

DOOR HARDWARE

08 71 00 - 1

Fontana City Hall Renovation – Phase II

1.3 COORDINATION

- A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.
 - 1. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
- E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field-verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.4 PREINSTALLATION MEETINGS

- A. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representative of Supplier (s), Installer(s), and Contractor(s) to review proper methods and the procedure for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspection, testing, commissioning, and demonstration procedures.
- B. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.5 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Par 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of door hardware set, cross-referenced to Drawings, both on the floor plans and in the door and frame schedule.
 - e. Explanation of abbreviations, symbols, and codes contained in schedule.
 - f. Mounting locations for door hardware.
 - g. Door and frame sizes and materials.
 - h. Warranty information for each product.
 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer installed and field installed wiring. Include the following:
 - a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - b. Complete (risers, point to point) access control system block wiring diagrams.
 - c. Wiring instructions for each electronic component scheduled herein.
 2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Proof of Compliance: Provide a list of products containing chemicals known to cause cancer or reproductive toxicity as defined by the Office of Environmental Health Hazard Assessment (OEHHHA) under Proposition 65 (CA Code of Regulations, Title 27, Section 27001). The list includes the specific chemical(s), if the chemical will be exposed to consumers, the means of warning, and an illustration of the label.
- E. Informational submittals

1. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.6 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum of 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum of 3 years' documented experience installing both standard and electrified door hardware similar in material, design, and extent to the indicated for the Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum of 5 years' documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier is recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third-party source will not be accepted.
 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lockup for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1.8 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check

Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

- B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in field modifications.

1.9 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - d. Electrical component defects and failures within the systems operation.
- 2. Warranty Period: Five years from date of Substantial Completion unless otherwise indicated.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
- B. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

2.2 HINGES

- A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
 - 1. Quantity: Provide the following hinge quantity:
 - a. Two Hinges: For doors with heights up to 60 inches.
 - b. Three Hinges: For doors with heights 61 to 90 inches.
 - c. Four Hinges: For doors with heights 91 to 120 inches.
 - d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'-0":4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'1"to 4'0":5" standard or heavy weight as specified.
3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
5. Manufacturers:
 - a. McKinney (MCK) – TA/T4A Series, 5 knuckle.
 - b. Dormakaba Best (STA) – F/FBB Series, 5 knuckle.
 - c. Hager (HAG) - BB1279/BB1168 series, 5 knuckle

2.3 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: ANSI/BHMA A156.17.

1. Manufacturers:
 - a. Norton Rixson (RIX).
 - b. Waterson (WAT)

2.4 CONTINUOUS HINGES

A. Continuous, Gear-Type Hinges: ANSI/BHMA A156.26 Grade i-600; minimum 0.120-inch thick, extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.

1. Manufacturers:
 - a. Pemko (PEM).
 - b. Select (SEL)
 - c. Markar (MAR):

2.5 POWER TRANSFER DEVICES

A. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

1. Provide one each of the following tools as part of the base bid contract:
 - a. McKinney (MK) – Electrical Connecting Kit: QC-R001
 - b. McKinney (MK) – Connector Hand Tool: QC-R003
2. Manufacturers:
 - a. McKinney (MCK) – QC-C Series
 - b. Dormakaba Best (STA) – WH Series

2.6 MORTISE LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
 1. Electromechanical locksets shall have the following functions and features:
 - a. Universal Molex plug-in connectors that have standardized color-coded wiring and are available in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
 - b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
 - c. Options to be available for request-to-exit or enter signaling, latch bolt and deadbolt monitoring.
 - d. Two-year limited warranty on electrified functions.
 2. Manufacturers:
 - a. Schlage L9000 Series
 - b. Corbin Ruswin ML2000 Series
 - c. Stanley Best 45H Series

2.7 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 1. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
 4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.
- B. Standards: Comply with the following:
 1. Strikes for Mortise Locks and Latches; BHMA A156.13
 2. Strikes for Auxiliary Deadlocks: BHMA A156.36
 3. Dustproof Strikes: BHMA A156.16

2.8 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
1. Exit devices shall have a five-year warranty.
 2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
 3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.
 4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the push bar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 6. Flush End Caps: Provide flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.
 7. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where the function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 8. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 9. Rim Exit Devices: Exit device rails shall release with less than 5 pounds of pressure per the California Building Code.
 10. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 11. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 12. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 13. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.

1. Provide exit devices with functions and features as follows:
 - a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
 - b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
 - c. Five-year limited warranty for mechanical features.
2. Electromechanical exit devices shall have the following functions and features:
 - a. Universal Molex plug-in connectors that have standardized color-coded wiring and are field configurable in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
 - b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
 - c. Options to be available for request-to-exit or enter signaling, latch bolt and touch bar monitoring.
 - d. Field configurable electrified trim to fail-safe or fail-secure that operates from 12-24VDC.
 - e. Five-year limited warranty for electromechanical features.
3. Manufacturers:
 - a. Sargent Manufacturing (SAR) – 80 Series
 - b. Dormakaba Best (PRE) – Apex 2000Series
 - c. Von Duprin (VON) – 33/99 series
4. Existing System:
 - a. Permanent keying by facility. 6 pin “0” bitted permanent cores. Keyway as directed by facility.

2.9 KEY CONTROL SYSTEM

- A. Key Control Cabinet: ANSI/BHMA A156.28; metal cabinet with baked-enamel finish, containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of **[150] <Insert number>** percent of the number of locks.
- B. Key Lock Boxes: Designed for storage of **10** keys.
 1. Manufacturers:
 - a. Knox (KNO) – 3200 Series

2.10 DOOR OPERATING TRIM

- A. Flush bolts and Surface bolts: Provide products conforming to ANSI/BHMA A156.3 and A156.16 Grade 1.
 1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 2. Furnish dust proof strikes for bottom bolts.
 3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.

4. Provide related accessories (Mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 5. Manufacturers:
 - a. Rockwood (ROC).
 - b. Trimco (TRI).
 - c. Ives (IVE)
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6; door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 ½ inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape and material as indicated in the hardware sets. Minimum clearance of 2 ½ inches from the face of door and offset of 90 degrees unless otherwise indicated.
 4. Pulls, where applicable, shall be provided with a 10" clearance from the finished floor on the push side to accommodate wheelchair accessibility.
 5. Fasteners: Provide manufacturer's designated fastener type as indicated in hardware sets.
 6. Manufacturers:
 - a. Rockwood (ROC).
 - b. Trimco (TRI).
 - c. Ives (IVE)

2.11 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: ANSI/BHMA A156.3; consisting of active-leaf, hold-open lever, and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.
- B. Carry-Open Bars: ANSI/BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: ANSI/BHMA A156.22.

2.12 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
1. Heavy duty surface mounted door closers shall have a 30-year warranty.
 2. Manufacturers:
 - a. LCN Closers (LCN) – 4040XP Series
 - b. Sargent Manufacturing (SAR) – 1431 Series.
 - c. Norton (NOR) – 9540 Series.
- C. Door Closers, Surface Mounted (Commercial Duty): ANSI/BHMA A156.4; Grade 1 Certified Products Directory (CPD) listed surface mounted, institutional grade door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to the door size, frequency of use, and opening force. Closers to be rack-and-pinion type. One piece cast iron or aluminum alloy body construction, with adjustable backcheck, closing sweep, and latch speed control valves. Provide non-handed units standard.
1. Manufacturers:
 - a. LCN Closers (LC) – 1450 Series
 - b. Sargent Manufacturing (SA) – 1431 Series.
 - c. Norton (NOR) – 9540 Series.

2.13 ELECTROHYDRAULIC DOOR OPERATORS

- A. Electrohydraulic Door Operators (High Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that meet ANSI/BHMA A156.4 requirements and are UL listed for use on fire rated doors and UL10C certified that comply with requirements for the Americans with Disabilities Act (ADA). Operators shall be verified by GreenCircle to offer energy savings of 19% when compared to similar products to accommodate openings up to 250 pounds and 48" wide.
1. Provide operators with features as follows:
 - a. Non-handed with push and pull side mounting.
 - b. Operates as mechanical surface closer during close cycles, when the door is opened manually or if power is off.
 - c. Activation by push button, hands-free or radio frequency devices.

- d. Onboard electronics to collect usage and cycle count data to facilitate preventative maintenance/diagnostics.
 - e. Two-year limited warranty.
 - f. Wi-Fi interface.
 - g. Mounting backplate to simplify and speed up installation.
2. Operators shall have the following functionality:
- a. Adjustable Hold Open: Amount of time a door will stay in the fully open position after an activation.
 - b. Blow Open for Smoke Ventilation: Door opens when signal is received from alarm system allowing air or smoke to flow through opening. The door will stay open until the signal from the alarm system is stopped.
 - c. Infinite Hold Open: Door will hold open at set position until power is turned off.
 - d. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
 - e. Open Delay: Delays operator opening for locking hardware.
 - f. Overload Safety Shut-Off: After two minutes of receiving a door activation signal, inverter times out and door closes to prevent motor/invert damage.
 - g. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
 - h. Push & Go: As the door is manually opened, the operator senses movement and opens door to the full-open position.
 - i. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
 - j. Vestibule Delay: When the wall switch is pressed, the first door in the vestibule will open. Second door will open once vestibule door delay has expired. Delay is adjustable.
3. Manufacturers:
- a. Dorma (DOR) – ED900 Series
 - b. LCN – Senior Swing
 - c. Norton (NOR) 6000 series

2.14 ARCHITECTURAL TRIM

A. Dorr Protective Trim

- 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
- 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
- 3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
- 4. Protection Plates: ANSI/BHMA A156.6 protection plates (kick, armor, or mop), fabricated from the following:

- a. Stainless Steel: 300 grade, 050-inch thick.
- 5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
- 6. Manufacturers:
 - a. Rockwood (ROC).
 - b. Trimco (TRI).
 - c. Ives (IVE)

2.15 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - 1. Manufacturers:
 - a. Rockwood (ROC).
 - b. Trimco (TRI).
 - c. Ives (IVE)

2.16 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to US 1784.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL-10C
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 - 1. Pemko (PEM).
 - 2. National Guard (NG)
 - 3. Zero (ZER)

2.17 THRESHOLDS

- A. Thresholds: ANSI/BHMA A156.21; fabricated to full width of opening indicated.

- 1. Manufacturer:
 - a. Pemko (PEM)
 - b. National Guard (NG)
 - c. Zero (ZER)

2.18 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.

- 1. Manufacturers:
 - a. Securitron (SEC) – DPS Series.
 - b. Schlage (SCH)
 - c. Interlogic (INT)

2.19 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.20 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18 including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal and Frames: Comply with ANSI/DHI A115 series
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION OF DOOR HARDWARE

- A. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface mounted items until finishes have been completed on substrates involved.
- D. Thresholds: Set thresholds for exterior doors and acoustical doors indicated in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- E. Storage: Provide a secure lock-up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

DOOR HARDWARE

08 71 00 - 15

Fontana City Hall Renovation – Phase II

3.4 FIELD QUALITY CONTROL

1. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures". Produce project punch report for each installed door opening indicating compliance with approved submittal and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper function and finish.
- D. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain door hardware.

3.8 DOOR HARDWARE SCHEDULE

HW SET 01; DOORS: 101, 102A,
EACH

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
		ALL HARDWARE	BY DOOR MANUFACTURER		
		REFER TO SECTION	08 42 29		

HW SET 02; DOORS : D100, D200
EACH

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
		ALL HARDWARE	BY DOOR MANUFACTURER		
1	EA	CARD READER	BY SECURITY VENDOR		
		REFER TO SECTION	08 42 29		

HW SET 03; DOORS: 102B
EACH

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	T4A3386 4 1/2 X 4 1/2 NRP	32D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	SET	AUTO FLUSH BOLTS	3810	626	TRI
1	EA	DUSTPROOF STRIKE	3910	626	TRI
1	EA	ELEC. LOCK	L9092 EU RX BDC	626	SCH
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	COORDINATOR	3094 X MTG BRACKETS AS REQ		TRI
2	EA	CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
2	EA	FLOOR STOP	1209		TRI
1	EA	ASTRAGAL	357SP		PEM
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
2	EA	DOOR SWEEP	315CN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346C		PEM
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		
		NOTE:	5" STILE REQUIRED		

HW SET 04; DOORS: 212A, 212B, 240A
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	SET	AUTO FLUSH BOLTS	3815	626	TRI
1	EA	DUSTPROOF STRIKE	3910	626	TRI
1	EA	ELEC. LOCK	L9092 EU RX BDC	626	SCH
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	COORDINATOR	3094 X MTG BRACKETS AS REQ		TRI
2	EA	CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
2	EA	WALL STOP	W1270CX	630	TRI
1	EA	ASTRAGAL	357SP		PEM
1	SET	SEAL	S88D (HEAD & JAMBS)		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

DOOR HARDWARE

08 71 00 - 17

Fontana City Hall Renovation – Phase II

HW SET 05; DOORS : 115

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
1	EA	CON TINUOUS HINGE	SL12 EPT	BRZ	SEL
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC. EXIT DEVICE	QEL RX AX 33NL-OP	710	VON
1	EA	CYLINDER	80-159	613	SCH
1	EA	PERMANENT CORE	80-043	606	SCH
1	EA	OFFSET PULL	1191-4	613	TRI
1	EA	CLOSER	4040XP x 4040-18PA x 4040XP-61	695	LCN
1	EA	FLOOR STOP	1209		TRI
1	SET	SEAL	BY DOOR MANUFACTURER		
1	EA	DOOR SWEEP	315DN		PEM
1	EA	THRESHOLD	AS DETAILED		
1	EA	RAIN DRIP	346D		PEM
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 05A; DOORS : 103B

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGE	T4A3386 4 1/2 X 4 1/2 NRP	628	
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC. EXIT DEVICE	QEL RX AX 99LNL LON		VON
1	EA	CYLINDER	80-159	626	SCH
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP x 4040-18PA x 4040XP-61	689	LCN
1	EA	FLOOR STOP	1209		TRI
1	SET	SEAL	S88D (HEAD & JAMBS)		PEM
1	EA	DOOR SWEEP	315CN		PEM
1	EA	THRESHOLD	AS DETAILED		
1	EA	RAIN DRIP	346C		PEM
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

DOOR HARDWARE

08 71 00 - 18

Fontana City Hall Renovation – Phase II

HW SET 06; DOORS : 110A, 110B
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	T4A3786 4 1/2 x 4 1/2 NRP	4	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	EL. EXIT DEVICE	QEL RX 9947L LBR	606	VON
1	EA	EL. EXIT DEVICE	RX 9947EO LBR	606	VON
1	EA	CYLINDER	80-159	606	SCH
1	EA	PEMANENT CORE	80-043	606	SCH
2	EA	CLOSER	4040XP	633	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
2	EA	WALL STOP	W1270CX	606	TRI
<u>2</u>	<u>EA</u>	<u>AUTO DOOR BOTTOM</u>	<u>411APKL</u>		<u>PEM</u>
2	EA	ASTRAGAL	<u>29324GNB290DS</u>		PEM
<u>24</u>	SET	SEAL <u>(DBL ROWS)</u>	S88D (HEAD&JAMBS)		PEM
1	EA	THRESHOLD	<u>AS DETAILED 151A x MS&ES</u>		<u>PEM</u>
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 06A; DOORS : 204. 210A
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	T4A3786 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	EL. EXIT DEVICE	QEL RX 9947L LBR	626	VON
1	EA	EL. EXIT DEVICE	RX 9947EO LBR	626	VON
1	EA	CYLINDER	80-159	626	SCH
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	COORDINATOR	3094 X MTG BRACKETS AS REQ		TRI
2	EA	CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
2	EA	WALL STOP	W1270CX	630	TRI
2	EA	ASTRAGAL	29324CNB		PEM
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	THRESHOLD	AS DETAILED		
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

DOOR HARDWARE

08 71 00 - 19

Fontana City Hall Renovation – Phase II

HW SET 06B; DOORS : 103A
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	T4A3786 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	EL. EXIT DEVICE	QEL RX 9947L LBR	626	VON
1	EA	EL. EXIT DEVICE	RX 9947EO LBR	626	VON
1	EA	CYLINDER	80-159	626	SCH
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	COORDINATOR	3094 X MTG BRACKETS AS REQ		TRI
2	EA	CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
2	EA	WALL STOP	W1270CX	630	TRI
2	EA	ASTRAGAL	29324CNB		PEM
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	THRESHOLD	AS DETAILED		
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 07; DOORS : 111A, 111B, 111C, 199A
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC. LOCK	L9092 EU RX BDC	626	SCH
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL <u>(DBL ROWS)</u>	S88D (HEAD&JAMBS)		PEM
1	EA	<u>AUTO DOOR BOTTOM</u>	<u>411APKL</u>		<u>PEM</u>
1	EA	THRESHOLD	<u>AS DETAILED 151A x MS&ES</u>		<u>PEM</u>
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

DOOR HARDWARE

08 71 00 - 20

Fontana City Hall Renovation – Phase II

HW SET 08; DOORS : 113, 124,141, 151, 152, 153, 154, 162, 163, 164, 165, 169, 170, 223, 224, 225, 226, 227, 228, 243, 244, 245, 247 254, 258, 273, 274, 275, 276, 277, 280, 281, 282, 283, 284, 285, 286, 287, 289

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	OFFICE LOCKSET	L9050 BDC LON	626	VON
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 09; DOORS : 111D, 123, 128, 142, 182, 211B, 213, 215, 231, 232, 240B

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC LOCKSET	L9092 BDC EU RX LON	626	VON
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP REG/PA	689	LCN
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 09A; DOORS : 112

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	4	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC LOCKSET	L9092 BDC EU RX LON	606	VON
1	EA	PEMANENT CORE	80-043	606	SCH
1	EA	CLOSER	4040XP REG/PA	633	LCN
1	EA	WALL STOP	W1270CX	606	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

DOOR HARDWARE

08 71 00 - 21

Fontana City Hall Renovation – Phase II

HW SET 10; DOORS : 120, 121, 216, 217
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2314 4 1/2 x 4 1/2	32D	MCK
1	EA	PUSH PLATE	1001 4" X 16"	630	TRI
1	EA	PULL PLATE	1013-3B	630	TRI
1	EA	CLOSER	4040XP REG/PA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	MOP PLATE	KM050 6" X 1" LDW X B4E (OMIT @ OUTSWING)	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 11; DOORS : 122, 167, 168, 181, 214, 219, 256, D102, D103
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2314 4 1/2 x 4 1/2	32D	MCK
1	EA	PRIVACY SET	L9040 x L283-721 LON	626	SCH
1	EA	CLOSER	4040XP REG/PA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	MOP PLATE	KM050 6" X 1" LDW X B4E (OMIT @ OUTSWING)	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 12; DOORS : 125A, 130, 155, 246, 255, D105
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	STOREROOM LOCKSET	L9080 BDC LON	626	VON
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP REG/PA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 13; DOORS : 183C, 183D

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2314 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	STOREROOM LOCKSET	L9080 BDC LON	626	VON
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	DOOR SWEEP	315CN		PEM
1	EA	RAIN DRIP	346C		PEM
1	EA	THRESHOLD	AS DETAILED		PEM

HW SET 14; DOORS : 127, 220B, 230B, 240C, 260, D201

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	OFFICE LOCKSET	L9050 BDC LON	626	VON
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP REG/PA	689	LCN
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 14A; DOORS : 114

EACH:

<u>QNTY</u>	<u>UNIT</u>	<u>ITEM</u>	<u>DESCRIPTION</u>	<u>FIN</u>	<u>MFG</u>
<u>4</u>	<u>EA</u>	<u>HINGES</u>	<u>TA2714 4 1/2 x 4 1/2</u>	<u>4</u>	<u>MCK</u>
<u>1</u>	<u>EA</u>	<u>OFFICE LOCKSET</u>	<u>L9050 BDC LON</u>	<u>606</u>	<u>VON</u>
<u>1</u>	<u>EA</u>	<u>PEMANENT CORE</u>	<u>80-043</u>	<u>606</u>	<u>SCH</u>
<u>1</u>	<u>EA</u>	<u>CLOSER</u>	<u>4040XP REG/PA</u>	<u>633</u>	<u>LCN</u>
<u>1</u>	<u>EA</u>	<u>WALL STOP</u>	<u>W1270CX</u>	<u>606</u>	<u>TRI</u>
<u>2</u>	<u>SET</u>	<u>SEAL (DBL ROWS)</u>	<u>S88D (HEAD&JAMBS)</u>		<u>PEM</u>
<u>1</u>	<u>EA</u>	<u>AUTO DOOR BOTTOM</u>	<u>411APKL</u>		<u>PEM</u>
<u>1</u>	<u>EA</u>	<u>THRESHOLD</u>	<u>151A x MS&ES</u>		<u>PEM</u>

DOOR HARDWARE

08 71 00 - 23

Fontana City Hall Renovation – Phase II

HW SET 15; DOORS : 129

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	STOREROOM LOCKSET	L9080 BDC LON	626	VON
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP PA	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
2	SET	SEAL (MOUNT DOUBLE ROWS)	S88D (HEAD&JAMBS)		PEM
1	EA	AUTO DOOR BOTTOM	420APKL		PEM
1	EA	THRESHOLD	151A x MS&ES		PEM

HW SET 16; DOORS: 140, 220A, 230A, 270A

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	SET	AUTO FLUSH BOLTS	3810	626	TRI
1	EA	DUSTPROOF STRIKE	3910	626	TRI
1	EA	OFFICE. LOCKSET	L9050 BDC LON	626	SCH
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	COORDINATOR	3094 X MTG BRACKETS AS REQ		TRI
2	EA	CLOSER	4040XP	689	LCN
2	EA	CLOSER/STOP	4040XP-CUSH @ DOOR 230A	689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
2	EA	WALL STOP	W1270CX	630	TRI
1	EA	ASTRAGAL	357SP		PEM
1	SET	SEAL	S88D (HEAD & JAMBS)		PEM
1	EA	THRESHOLD	AS DETAILED		PEM

HW SET 17; DOORS: 143, 144, 145, 150. 160, 166, 180B, 270B, 271

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	CLASSROOM LOCKSET	L9070 BDC LON	626	VON
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP REG/PA	689	LCN
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

DOOR HARDWARE

08 71 00 - 24

Fontana City Hall Renovation – Phase II

HW SET 17A; DOORS: 272

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	CLASSROOM LOCKSET	L9070 BDC LON	626	VON
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 18; DOORS: 180, 211A

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	POWER TRANSFER	PTM-2		SDC
1	SET	AUTO FLUSH BOLTS	3810	626	TRI
1	EA	DUSTPROOF STRIKE	3910	626	TRI
1	EA	ELEC. LOCK	L9092 EU RX BDC	626	SCH
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	COORDINATOR	3094 X MTG BRACKETS AS REQ		TRI
2	EA	CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
2	EA	WALL STOP	W1270CX	630	TRI
1	EA	ASTRAGAL	357SP		PEM
1	SET	SEAL	S88D (HEAD & JAMBS)		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 19; DOORS : 198B,199B

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2314 4 1/2 x 4 1/2 NRP	32D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	EL. EXIT DEVICE	RX AX99 E LNL FSE LON	626	VON
1	EA	CYLINDER	80-159	626	SCH
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	DOOR SWEEP	315CN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346C		PEM
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

DOOR HARDWARE

08 71 00 - 25

Fontana City Hall Renovation – Phase II

HW SET 20; DOORS: 183B

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
8	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
2	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC. EXIT DEVICE	QEL RX AX9927F LNL LON	626	SCH
1	EA	EXIT DEVICE	RX 9927F EOF	626	SCH
1	EA	CYLINDER	80-159	626	SCH
1	EA	PERMANENT CORE	80-043	626	SCH
2	EA	CLOSER	4040XP SCUSH	689	LCN
2	EA	KICK PLATE	K0050 10" X 1" LDW X B4E	630	TRI
1	EA	ASTRAGAL	357SP		PEM
1	SET	SEAL	S88D (HEAD & JAMBS)		PEM
2	EA	DOOR SWEEP	315CN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346C		PEM
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 20A; DOORS: 183A

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC. EXIT DEVICE	QEL RX AX99F LNL LON	626	SCH
1	EA	CYLINDER	80-159	626	SCH
1	EA	PERMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	SET	SEAL	S88D (HEAD & JAMBS)		PEM
1	EA	DOOR SWEEP	315CN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346C		PEM
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

DOOR HARDWARE

08 71 00 - 26

Fontana City Hall Renovation – Phase II

HW SET 21; DOORS : 198A, 298, 299
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	EL. EXIT DEVICE	RX AX 99F E LNL LON FSE	626	VON
1	EA	CYLINDER	80-159	626	SCH
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	THRESHOLD	AS DETAILED		
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 21A; DOORS : 110C
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	4	MCK
1	EA	POWER TRANSFER	PTM-10		SDC
1	EA	EL. EXIT DEVICE	RX AX 99F E LNL LON FSE	606	VON
1	EA	CYLINDER	80-159	606	SCH
1	EA	PEMANENT CORE	80-043	606	SCH
1	EA	CLOSER	4040XP	633	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	606	TRI
1	EA	WALL STOP	W1270CX	606	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	THRESHOLD	AS DETAILED		
1	EA	POWER SUPPLY	PS902 x 900-4RL		VON
1	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 22; DOORS : 201

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
1	EA	CONTINUOUS HINGE	SL12	BRZ	SEL
1	EA	DEADLATCH	4900 x BS AS REQ	313	ADA
1	EA	MORTISE CYLINDER	80-138	613	SCH
1	EA	PEMANENT CORE	80-043	606	SCH
1	SET	PUSH/PULLS	1738	61	TRI
1	EA	CLOSER	4040XP x 4040-18PA x 4040XP-61	695	LCN
1	EA	WALL STOP	W1270CX	613	TRI
1	SET	SEAL	BY DOOR MANUFACTURER		PEM
1	EA	DOOR SWEEP	315DN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346D		PEM

HW SET 22A; DOORS : 210E

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
2	EA	CONTINUOUS HINGE	SL12	BRZ	SEL
1	SET	AUTO FLUSH BOLTS	3810	613	TRI
1	EA	DUSTPROOF STRIKE	3911	613	TRI
1	EA	DEADLATCH	4900 x BS AS REQ	313	ADA
1	EA	MORTISE CYLINDER	80-138	613	SCH
1	EA	PEMANENT CORE	80-043	606	SCH
2	SET	PUSH/PULLS	1738	613	TRI
1	EA	COORDINATOR	3094 X MTG BRACKETS AS REQ		TRI
2	EA	CLOSER	4040XP x 4040-18PA x 4040XP-61	695	LCN
2	EA	WALL STOP	W1270CX	613	TRI
1	SET	SEAL	BY DOOR MANUFACTURER		PEM
1	EA	DOOR SWEEP	315DN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346D		PEM

DOOR HARDWARE

08 71 00 - 28

Fontana City Hall Renovation – Phase II

HW SET 23; DOORS : 210D

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
2	EA	CONTINUOUS HINGE	SL12	BRZ	SEL
2	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC. EXIT DEVICE	QEL RX AX3347 LNLF LON	626	SCH
1	EA	ELEC. EXIT DEVICE	RX AX3347 EOF	626	SCH
2	EA	CLOSER	4040XP x 4040-18PA x 4040XP-61	695	LCN
1	SET	SEAL & MEETING STILE	BY DOOR MANUFACTURER		PEM
1	EA	DOOR SWEEP	315DN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346D		PEM
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		
		TIE INTO FIRE ALARM			

HW SET 24; DOORS : 210C

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
2	EA	CONTINUOUS HINGE	SL12	BRZ	SEL
2	EA	POWER TRANSFER	PTM-10		SDC
1	EA	ELEC. EXIT DEVICE	QELRX AX3347 LNL LON	626	SCH
1	EA	ELEC. EXIT DEVICE	QEL RX AX3347 EOF	626	SCH
2	EA	AUTO OPERATOR	ED900 J8 x MTG PLATES AS REQ	695	DOR
2	EA	ACTIVATOR	484AA A36	628	SDC
2	EA	BOLLARD	BPS6	628	SDC
1	EA	DOOR SWEEP	315DN		PEM
1	EA	THRESHOLD	AS DETAILED		PEM
1	EA	RAIN DRIP	346D		PEM
2	EA	DOOR CONTACT	DPS-M		SEC
1	EA	CARD READER	BY SECURITY VENDOR		

HW SET 25; DOORS : 218

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2314 4 1/2 x 4 1/2	32D	MCK
1	EA	PRIVACY SET	L9040 x L283-721 LON	626	SCH
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM
1	EA	AUTO DOOR BOTTOM	411APKL		PEM
1	EA	THRESHOLD	151A x MS&ES		PEM

DOOR HARDWARE

08 71 00 - 29

Fontana City Hall Renovation – Phase II

HW SET 26; DOORS : 248, 259

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2314 4 1/2 x 4 1/2	32D	MCK
1	EA	PRIVACY SET	L9040 LON	626	SCH
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 27; DOORS : 249, 250, 251, 251B, 252, 253, 278

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	CONTINUOUS HINGE	SL12	628	SEL
1	EA	DEADLATCH	4510	626	VON
1	EA	MORTISE CYLINDER	80-138	626	SCH
1	EA	PEMANENT CORE	80-043	626	SCH
2	EA	PULLS	1191-3 BTB	630	TRI
1	EA	OH STOP	OH1003	630	ROC
1	SET	SEAL	BY DOOR MANUFACTURER		

HW SET 28; DOORS : 262

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	PASSAGE SET	L9010 LON	626	VON
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 29; DOORS : 290

EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	STOREROOM LOCKSET	L9080 BDC LON	626	VON
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	MOP PLATE	KM050 6" X 1" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

DOOR HARDWARE

08 71 00 - 30

Fontana City Hall Renovation – Phase II

HW SET 30; DOORS : D101
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2 NRP	26D	MCK
1	EA	STOREROOM LOCKSET	L9080 BDC LON	626	VON
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	CLOSER/STOP	4040XP CUSH	689	LCN
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET 31; DOORS : 288A, 288B
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	HINGES	TA2714 4 1/2 x 4 1/2	26D	MCK
1	EA	PASSAGE SET	L9010 LON	626	VON
1	EA	CLOSER	4040XP		
1	EA	KICK PLATE	K0050 10" X 2" LDW X B4E	630	TRI
1	EA	WALL STOP	W1270CX	630	TRI
1	SET	SEAL	S88D (HEAD&JAMBS)		PEM

HW SET G-01; GATES : VG1, VG2
EACH:

ALL HARDWARE BY GATE MANUFACTURER

HW SET G-02; GATES : PG1, PG2, PG3, PG4
EACH:

QNTY	UNIT	ITEM	DESCRIPTION	FIN	MFG
4	EA	SELF CLOSING HINGES	K51MP		WAT
1	EA	EXIT DEVICE	99NL-OP WH	626	VON
1	EA	CYLINDER	80-159	626	SCH
1	EA	PEMANENT CORE	80-043	626	SCH
1	EA	ANT VANDAL PULL	1096 VD	630	TRI
		BALANCE OF HARDWARE	BY GATE MANUFACTURER		

HW SET G-03; GATES : PG5, PG6, PG7, PG8, PG9, PG10
EACH:

CUSTOM PIVOTS BY GATE MANUFACTURER
BALANCE OF HARDWARE BY GATE MANUFACTURER

MISCELLANEOUS

2	EA	LOCK BOX	3200 SERIES		KNO
		LOCATIONS AS DIRECTED			

END OF SECTION 087100

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SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Glass for windows doors interior borrowed lites storefront framing glazed curtain walls glazed entrances.
 - 2. Glazing sealants and accessories.

1.3 DEFINITIONS

- A. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C1036.
- B. CBC: California Building Code.
- C. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

GLAZING

08 80 00 - 1

Fontana City Hall – Phase II

1. Insulating glass.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturers of insulating-glass units with sputter-coated, low-E coatings.
- B. Product Certificates: For glass.
- C. Product Test Reports: For tinted glass coated glass insulating glass and glazing sealants, for tests performed by a qualified testing agency.
 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. SWRI Validation Certificate: For each elastomeric glazing sealant specified to be validated by SWRI's Sealant Validation Program.
- F. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
- B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 2. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 3. Test no fewer than nine Samples of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, and insulating units) as well as one sample of each glazing accessory (gaskets, tape sealants, spacers, setting blocks, shims, sealant backings, secondary seals, and miscellaneous materials).

4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.12 WARRANTY

- A. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturer: Vitro Architectural Glass; 400 Guys Run Road, Cheswick, PA 15024, (855) 887-6457, <https://vitroglazings.com>.
- B. Subject to compliance with requirements, provide named products or equivalent products by one of the following manufacturers:
 1. Glasswerks LA, Inc.
 2. Oldcastle BuildingEnvelope™.
- C. Source Limitations: Obtain all types of glass products and accessories from single source manufacturer.

2.2 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. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
 - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 2. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 - 3. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - 4. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IgCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum.
 - 1. Minimum Glass Thickness for Exterior Lites: 6-mm.
 - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I (transparent glass, flat); Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

2.5 COATED FLOAT GLASS

- A. General: ASTM C1048. Provide coated glass complying with requirements indicated in this Article and in schedules at the end of Part 3.
 - 1. Provide Kind HS (heat strengthened) coated float glass in place of coated annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass requirements specified in "Performance Requirements" Article.
 - 2. Provide Kind FT (fully tempered) products where coated safety glass is indicated.
- B. Pyrolytic-Coated, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
- C. Ceramic-Coated Spandrel Glass: ASTM C1048, Type I, Condition B, Quality-Q3.
 - 1. Factory apply manufacturer's standard opacifer to coated second surface of lites, with resulting products complying with GTA 89-1-6.

2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
 - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article.
 - 2. Provide Kind FT (fully tempered) where safety glass is indicated.
 - 3. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - 4. Perimeter Spacer: Manufacturer's standard spacer material and construction complying with the following requirements:
 - a. Aluminum with mill or clear-anodized finish.
 - b. Aluminum with black color-anodized finish.
 - c. Aluminum with bronze color-anodized finish.
 - d. Aluminum with powdered metal paint finish in color selected by Architect.
 - 5. Desiccant: Molecular sieve or silica gel, or a blend of both.
 - 6. Corner Construction: Manufacturer's standard.

- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal. The overall thickness of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. Basis-of-Design Low-E Clear Insulating Glass: Solar Control Low-E Clear Insulating Glass "Solarban" 90 (2) Clear + Clear as manufactured by Vitro Architectural Glass.
1. Outdoor Lite: Clear (transparent) Float Glass, Sputter Coated on second surface (2).
 2. Indoor Lite: Clear (transparent) Float Glass.
 3. Low-E Coating: "Solarban®" 90 Solar Control (Sputtered).
 4. Location: Second Surface (2).
 5. Performance Values:
 - a. Visible Light Transmittance (VLT): 51%
 - b. Exterior Reflectance: 12%
 - c. Solar Heat Gain Coefficient (SGHC): 0.23
 - d. Winter U-Value (Air): 0.29 (BTU/hr x sq ft x deg F)
 - e. Winter U-Value (Argon): 0.24 (BTU/hr x sq ft x deg F)
 6. Approved Manufacturers: Vitro Certified™ Fabricator Required.
 7. Certification: Both lites to be Cradle to Cradle Certified™, minimum Bronze Level, by Cradle to Cradle Product Innovation Institute (www.c2ccertified.org).
 8. Outdoor Appearance: Clear.
 9. Insulating Unit Construction: 1/4-inch (6mm) glass + 1/2-inch (13mm) air space + 1/4-inch (6mm) glass.
- D. Basis-of-Design Low-E Ultra Clear Insulating Glass: Solar Control Ultra-Clear Low-E Insulating Glass "Solarban®" 90 (2) "Acuity" + "Acuity™" as manufactured by Vitro Architectural Glass.
1. Outdoor Lite: "Acuity™" (low-iron) Float Glass, Sputter Coated on second surface (2).
 2. Indoor Lite: "Acuity™" (Low-iron) Float Glass.
 3. Low-E Coating: "Solarban®" 90 Solar Control (Sputtered).
 4. Location: Second Surface (2).
 5. Performance Values:
 - a. Visible Light Transmittance (VLT): 53%
 - b. Exterior Reflectance: 12%
 - c. Solar Heat Gain Coefficient (SGHC): 0.23
 - d. Winter U-Value (Air): 0.29 (BTU/hr x sq ft x deg F)
 - e. Winter U-Value (Argon): 0.24 (BTU/hr x sq ft x deg F)
 6. Approved Manufacturers: Vitro Certified™ Fabricator Required.
 7. Certification: Both lites to be Cradle to Cradle Certified™, minimum Bronze Level, by Cradle to Cradle Product Innovation Institute (www.c2ccertified.org).
 8. Outdoor Appearance: Clear.
 9. Insulating Unit Construction: 1/4-inch (6mm) glass + 1/2-inch (13mm) air space + 1/4-inch (6mm) glass.

2.7 GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates,

- under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealant Standard: Comply with ASTM C920 and additional requirements indicated for single component silicone sealants.
 - 1. Movement Capability: Where movement capability is specified, provide products with the capability when tested for adhesion and cohesion under maximum cyclic movement per ASTM C719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements in ASTM C920 for uses indicated.
- C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corp.
 - c. Tremco Incorporated.
 - d. Substitutions: Per Division 01.
- D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. Pecora Corporation.
 - c. Tremco Incorporated.
 - d. Substitutions: Per Division 01.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.9 GLAZING GASKETS

- A. Soft Compression Gaskets: Extruded or molded, closed cell, integral-skinned gaskets of material indicated below; complying with ASTM C509, Type II, black, and of profile and hardness required to maintain watertight seal:
 - 1. EPDM.
 - 2. Silicone.
 - 3. Thermoplastic polyolefin rubber.

2.10 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.11 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and

glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface.
- B. Immediately after installation remove nonpermanent labels and clean surfaces.
- C. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 INSULATING GLASS SCHEDULE

- A. Glass Type: Class I, Clear insulating glass.
 - 1. Overall Unit Thickness: 1-inch.
 - 2. Minimum Thickness of Each Glass Lite: 6-mm.
 - 3. Outdoor Lite: Fully tempered float glass.
 - 4. Interspace Content: Air.
 - 5. Indoor Lite: Fully tempered float glass.
 - 6. Safety glazing required.

3.9 GLAZING SEALANT SCHEDULE

- A. Joint-Sealant Application: Non-staining silicone glazing sealant for exterior vertical non-traffic surfaces
 - 1. Uses related to Joint Substrates: M, G, A and applicable substrates indicated O.
 - a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, and wood.
 - 2. Joint Locations:
 - a. Glazing sealant
 - b. Exterior Joints for which no other sealer is indicated.
 - 3. Joint Sealant: Silicone, S, NS, Class 50, NT.

END OF SECTION 08 80 00

SECTION 09 05 11
CONCRETE FLOOR PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Mechanical preparation and cleaning of new concrete floor surfaces for application of the following finishes:
 - a. Moisture Mitigation Control Coating.
 - b. Other Coatings.
 - c. Finish Flooring.

1.3 RELATED REQUIREMENTS

- A. Section 01 81 13 "Sustainable Design Requirements".
- B. Section 03 30 00 "Cast-In-Place Concrete" for concrete floor slabs.
- C. Section 07 26 33 "Moisture Mitigation Control Coating".
- D. Division 09 Sections for applied floor finishes.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 - 1. Review conditions affecting substrate preparation.
 - 2. Review procedures that will be used for substrate preparation.

3. Require attendance by Moisture Mitigation System and Finish Flooring installers to review preparation requirements of floor finish product and flooring adhesive manufacturers

1.6 SUBMITTALS

- A. Product Data: For each type of mechanical cleaning equipment used on the project.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer performing surface preparation.
- B. Field quality-control reports.
 1. Submit report of observations.
 2. Certify installation is complete in accordance with manufacturer's instructions.
 3. Indicate supplementary instructions provided for Project specific conditions.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained in the use of the equipment and techniques required to produce the specified results.
- B. Mockups: Provide field mockups to set quality standards for surface preparation execution and for preconstruction testing.
 1. Provide mockup of typical surface preparation, minimum 100 sq. ft. area. Coordinate required size with requirements for preconstruction testing.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work when undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify new concrete floors have cured minimum 28 days.
- B. Examine substrates, with Installer present, for compliance with requirements for surface contamination, damage, and other conditions affecting performance of the Work.
- C. Examine substrate to determine repairs required to restore substrate surface to be within tolerances required for floor finishes specified in other sections, prior to completing Work of this section.

- D. Examine substrate to verify surfaces prepared in accordance with this section will be suitable for application of finishes specified in other sections.
- E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance with recommendations for methods and materials required to correct conditions before proceeding with work of this section.
- F. Proceed with surface preparation only after unsatisfactory conditions have been corrected.
 - 1. Proceeding with surface preparations indicates acceptance and of surfaces and conditions of substrate.

3.2 SURFACE PREPARATION EQUIPMENT

- A. Mechanical Cleaning Equipment: Automatic, dry abrasive blast type, with vacuum recovery systems to control dust and collect surface abrasions.
- B. Mechanical Cleaning Equipment: Automatic, dry shot blast type, self contained capable of recycling blast materials and collecting surface abrasions.

3.3 SURFACE PREPARATION

- A. Mechanically clean concrete substrate and create surface profile in existing concrete substrate in accordance with ASTM D4259.
 - 1. Mechanically clean concrete substrate to remove surface and penetrating contaminants to produce a surface profile of ICRI CSP 3 minimum, and greater as required by coating manufacturer in related sections, all in accordance with ICRI Technical Bulletin No. 03732.
 - 2. Acceptable substrate surfaces will be free of laitance, oil, grease, flooring adhesive, paint, and other surface contaminants capable of affecting bond of specified floor finishes to concrete substrate.
- B. Repair surface irregularities after cleaning.
 - 1. Fill bugholes, spalls, cracks, deteriorated joints and other surface damage exposed or created as a result of substrate cleaning operations flush with adjacent surfaces to provide sound substrate for specified floor finish.
- C. Dry broom or vacuum clean concrete substrates immediately before application of specified floor finishes in accordance with ASTM D4258 to remove loose materials on substrate surface.
- D. When field quality control report indicates portions are unsatisfactory, repeat process until field quality control report indicates there are no unsatisfactory portions remaining.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
1. Visual inspection of completed substrate preparation to verify contamination is removed.
 2. Visual inspection of completed substrate preparation to verify surface profile matches ICRI profile required for specified coating or finish, using ICRI standard rubber mold for visual comparison.
 3. Prepare field quality control report. Clearly indicate the locations, extents, and conditions of areas where surface preparation does not conform to specified profile and cleanliness. Document observed conditions with digital photographs.
 4. Repeat inspections when additional surface preparation for unsatisfactory conditions indicated in the previous field quality control report.

3.5 PROTECTION

- A. Protect prepared concrete substrates from contamination.
1. Reclean substrates that are contaminated by construction operations prior to installation of specified floor finishes.

END OF SECTION 09 05 11

SECTION 09 05 12
CONCRETE FLOOR MOISTURE CONTENT AND PH TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Concrete moisture content testing using relative humidity method.
 - 2. Concrete pH testing.

1.3 RELATED REQUIREMENTS

- A. Division 03 sections specifying concrete substrates and finishing concrete surfaces.
- B. Section 07 26 33 "Moisture Mitigation Control Coatings".
- C. Division 09 flooring sections specifying adhered flooring and accessories requiring moisture and pH testing.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

1.5 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- B. Scheduling: Schedule work to permit concrete moisture testing to be completed minimum one week and maximum 3 weeks before floor coverings are installed.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.

1. Submit data indicating model, manufacturer, and calibration record for relative humidity measuring equipment.
2. Submit data for floor slab treatment products.

B. Shop Drawings:

1. Indicate test locations shown on building floor plans.

1.7 INFORMATIONAL SUBMITTALS

A. Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for concrete moisture acceptable limits.

B. Test Reports: Report test results in chart form.

1. Relative Humidity Test Method: Indicate test dates, time, depth of test well, in-situ temperature, relative humidity and pH levels.
2. Submit record of ambient air temperature, ambient relative humidity, and floor slab surface temperature when test sites are prepared, start of test, and end of test.
3. Indicate condition of building enclosure including position of operable windows and exterior doors when test sites are prepared, start of test, and end of test.
4. Submit transcript of datalogger.
5. Indicate operational status of HVAC systems maintaining environmental condition of spaces where tests are conducted when test sites are prepared, start of test, and end of test.

1.8 FIELD CONDITIONS

A. Ambient Conditions:

1. Do not perform concrete moisture testing until building is enclosed and HVAC system is operational.
2. Maintain building test areas at design operating conditions for minimum 48 hours before, during, and continuously after conducting testing.
3. When HVAC system is not operational at start of tests, maintain ambient conditions within test areas at 65 to 85 degrees F and 40 to 60 percent relative humidity for minimum 48 hours before, during, and continuously after conducting testing until building HVAC system is capable of maintaining design operating conditions.

PART 2 - PRODUCTS

2.1 RELATIVE HUMIDITY TEST EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Vaisala; www.vaisala.com.
2. Wagner Moisture Meters, Rapid RH; www.wagnermeters.com.
3. Substitutions: Section 01 25 00.

B. Humidity and Temperature Probe and Meter: Comply with ASTM F2170.

CONCRETE FLOOR MOISTURE CONTENT AND PH TESTING

09 05 12 - 2

Fontana City Hall – Phase II

2.2 PH TEST MATERIALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Micro Essential Laboratory; www.microessentiallab.com.
 - 2. Substitutions: Section 01 25 00.
- B. pH Test Paper: Capable of indicating minimum 7.0 to 13 pH range.
- C. pH Color Gage: Furnish pH test paper manufacturer's visual color gage to identify measured pH.
- D. Water: Distilled or de-ionized.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify new concrete floors have cured minimum 28 days.

3.2 PREPARATION

- A. When a building HVAC system is not operational and maintaining test areas at design operational conditions, install recording hygrometer or data logger in each separate test area to record ambient temperature and relative humidity beginning 48 hours before start of tests until completion of tests within each area.
- B. Identify three moisture test sites for first 1,000 sf and one moisture test site for each additional 1,000 sf of floor area receiving floor covering on each separate floor slab.
 - 1. Layout test site locations uniformly distributed throughout each test area.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform concrete moisture tests and inspections and prepare test reports:
- B. Acceptance Criteria:
 - 1. Concrete floor slabs will be considered acceptable for installation of floor finishes when:
 - a. Relative Humidity Test Result: 75 percent maximum relative humidity.
 - b. pH Test Result: Within alkalinity range of 7.0 to 9.0.
- C. Concrete Moisture Testing – General
 - 1. Conduct relative humidity test at each test site.
 - 2. Conduct one pH test at each test site.
- D. Relative Humidity Testing:

1. Perform tests in accordance with ASTM F2170.
 2. Conduct relative humidity testing at the following depths:
 - a. Basement Slabs and Slabs-On-Grade: Measure temperature and relative humidity at 40 percent of slab thickness measured from top surface.
 - b. Elevated Slabs: Measure temperature and relative humidity at 20 percent of slab thickness measured from top surface.
 3. Drill test hole at each test site to accommodate test sleeve.
 - a. Hole Diameter: In accordance with test equipment manufacturer's instructions.
 - b. Drilling Fluids: Not permitted.
 4. Vacuum dust and debris from test hole.
 5. Insert sleeve, to the full depth of test hole. Cap or plug sleeve to prevent test hole contamination.
 6. Permit the test site to acclimate for minimum 72 hours before measuring relative humidity.
 7. Remove sleeve plug and insert probe to bottom of test hole. Allow test probe to reach temperature equilibration with concrete slab.
 8. Measure and record temperature and relative humidity at the test site.
- E. pH Testing:
1. Place several drops of water onto the concrete surface to form a puddle approximately 1 inch in diameter.
 2. Allow the water to set for approximately 60 seconds
 3. After 60 seconds, dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading.
 4. Record and report results.

END OF SECTION 09 05 12

**SECTION 09 29 00 -
GYPSUM BOARD**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Interior gypsum board.
- 2. Trim and Accessories

- B. Related Requirements:

- 1. Pertinent Sections specifying Sustainable Design Requirements.
- 2. Section 03 30 00 "Cast in place concrete"
- 3. Section 05 40 00 "Cold Formed Metal Framing", for non-structural steel framing.
- 4. Section 06 16 00 "Sheathing" for sheathing for exterior walls.
- 5. Section 09 22 16 "Non-Structural Metal Framing" for suspension systems that support gypsum board panels.
- 6. Section 09 30 00 "Tile" for cementitious backer units installed as substrates for ceramic tile.

1.3 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

- 1. Gypsum wallboard.
- 2. Gypsum board, Type X.
- 3. Acoustical Gypsum ceiling board.
- 4. Cementitious backer units.
- 5. Interior trim.
- 6. Aluminum trim.
- 7. Joint treatment materials.
- 8. Laminating adhesive.
- 9. Acoustical sealant.

- B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.
- C. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
- D. Samples for Verification: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.7 WARRANTY

- A. Manufacturer Standard Warranty: Manufacturer and Installer agrees to repair and replace any damage or deterioration on gypsum board within 1 year(s) from the time of substantial completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include those specified as Basis-of-Design and those specifically listed for each type as Alternates.
 - 1. CertainTeed Corp. www.certainteed.com
 - 2. Georgia-Pacific Gypsum LLC. www.gp.com/gypsum
 - 3. National Gypsum Company. www.nationalgypsum.com
 - 4. USG Corporation www.usg.com
 - 5. Or Approved Equal
- C. All gypsum boards to be mildew and mold resistant, with a score of 10 on ASTM D3273.

2.4 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered.
- B. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Basis of Design: ToughRock® Fireguard X™ gypsum board as manufactured by GP, Georgia Pacific Gypsum LLC.
 - 2. Alternate products that may be incorporated into the Work include the following:
 - a. National Gypsum, Gold Bond Brand Fire Shield Gypsum Board
 - b. USG, SHEETROCK® FireCode
 - 3. Thickness: 5/8 inch (15.9 mm).
 - 4. Long Edges: Tapered.
- C. Gypsum Ceiling Board: ASTM C1396/C1396M.
 - 1. Basis of Design: Gold Bond Brand XP® Gypsum Board, as manufactured by National Gypsum Company.
 - 2. Alternate products that may be incorporated into the Work include the following:
 - a. USG, SHEETROCK® Mold Tough

3. Thickness: 1/2 inch (12.7 mm).
4. Long Edges: Tapered.

D. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 SPECIALTY GYPSUM BOARD

A. Glass-Mat Interior Gypsum Board: ASTM C1658/C1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.

1. Basis Of Design: "DensArmor Plus Interior Guard" as manufactured by GP, Georgia Pacific Gypsum LLC.
2. Alternate available products that may be incorporated into the Work include the following:
 - a. National Gypsum, Gold Bond Brand eXP Interior Extreme Gypsum Panel
 - b. USG, Sheetrock Brand®, Glass-Mat Panels, Mold Tough®, Firecode® X
3. Core: 5/8 inch (15.9 mm), Type X.
4. Long Edges: Tapered.
5. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Basis of Design: PermaBase Brand Cement Board as manufactured by National Gypsum.
2. Available products that may be incorporated into the Work include the following:
 - a. USG, DUROCK Brand Cement Board Next Gen
3. Thickness: 5/8 inch, unless indicated otherwise.
4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.7 TRIM AND ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.

- f. Expansion (control) joint.
- g. Curved-Edge Cornerbead: With notched or flexible flanges.
- h. Base-of-Wall Galvanized Moisture Barrier Trim: Galvanized-steel sheet, 2 inches (50 mm) high.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

- 1. Manufacturer: As noted on drawings.
- 2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221 (ASTM B221M), Alloy 6063-T5.
- 3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:

- 1. Interior Gypsum Board: Paper.
- 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
- 3. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

- 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
- 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

a. Use setting-type compound for installing paper-faced metal trim accessories.

- 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
- 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
- 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

- 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
- 2. Cementitious Backer Units: As recommended by backer unit manufacturer.
- 3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

E. High Build Drywall Surfacers: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

- 1. Product recommended by manufacturer for application, or equivalent.

2.9 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 - 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: As specified in Section 07 92 00 "Interior Joint Sealants."
- F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."
- G. Vapor Retarder: As specified in Division 07.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.

- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in locations as indicated on Drawings in the largest pieces possible for any surface.
 - 1. Wallboard Type: Vertical surfaces unless otherwise indicated.
- B. Ceiling Type: As indicated on DrawingsSingle-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - 3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
 - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to

- framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLATION OF TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations where indicated on Drawings. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.11, at locations where indicated on Drawings.
- C. Water-Resistant Backing Board: Install where indicated with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners unless otherwise indicated.
 2. Bullnose Bead: Use where indicated on Drawings.
 3. LC-Bead: Use at exposed panel edges.
 4. L-Bead: Use where indicated on Drawings.
 5. U-Bead: Use at exposed panel edges.
- D. Aluminum Trim: Install in locations indicated on Drawings.
- E. Acoustical Mullion Caps Installation: Install mullion cap as per manufacturer's written information.

3.6 FINISHING OF GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile and panels that are substrate for acoustical tile.
 - 3. Level 3: Where heavy wallcovering is installed
 - 4. Level 4: At panel surfaces exposed to view, unless otherwise indicated. Light orange peel finish.
 - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLICATION OF TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written instructions.

3.8 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 13
CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Porcelain tile – wall and floor (PT1, PT2, PT3, PT4).
 - 2. Exterior porcelain large format tile.
 - 3. Thresholds.
 - 4. Trim and accessories.
 - 5. Tile backing panels.
 - 6. Setting Materials.
 - 7. Waterproof anti-fracture membranes.

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Sections 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".
- B. "California Building Code (CBC)", International Building Code 2021, with 2022 California Amendments, California Code of Regulations, Title 24, Part 2.
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.
- D. Tile Council of North America, Inc. (TCNA): "Handbook for Ceramic, Glass and Stone Tile Installation."

1.5 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

- B. Large Format Tile: Tile that is greater than 15 -inches (381 mm) in width or length.
- C. Wet Area: Includes tile surfaces that are either soaked, saturated, or regularly and frequently subjected to moisture such as tub enclosures, showers, swimming pools, commercial kitchens and exterior areas.

1.6 PREINSTALLATION MEETINGS

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

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product, demonstrate compliance with specified attributes.
- B. 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.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
 - 2. Full-size units of each type of trim and accessory for each color and finish required.
 - 3. .
 - 4. Metal edge strips in 6-inch (150-mm) lengths.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products and certified porcelain tile.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 5 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 5 percent of amount installed for each type, composition, and color indicated.

- B. This extra stock is in addition to unused product remaining at completion of work, which shall be left for Owner's use, and in addition to product used in construction of mockups.

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: Employ only thoroughly trained and experienced journeyman tile setters completely familiar with the requirements of this work and the recommendations contained in the referenced standards. No allowance will be made for lack of skill on the part of tile setters in acceptance or rejection of installed tile and related products.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units.
 - 1. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.12 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.
- B. Illuminate the work area during installation providing the same level and angle of illumination as will be available for final inspection.

1.13 SEQUENCING AND SCHEDULING

- A. Sequence tile installation with other work to minimize possibility of damage and soiling during remainder of construction period.
- B. Install tile and accessories only after other finishing operations, including painting, have been completed.

1.14 WARRANTY

- A. Provide single source warranty by setting, grout and liquid applied waterproof/anti-fracture membrane manufacturer for not less than Twenty-Five (25) years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC Limits for adhesives sealants, fillers primers, and coatings. Comply with limits specified in related section.
- B. Slip Resistance: For tile installed on walking surfaces, stair treads and landings, provide products with the following values as determined by testing identical products per ANSI A137.1-2012, Section 9.6
 - 1. Method: Dynamic Coefficient of Friction DCOF AcuTest method, wet test using 0.05 percent sodium lauryl sulfate solution.
 - 2. Application: Level interior flooring surface
 - 3. Tested value: 0.42 or greater
- C. Shear bond strength between the backing and the tile shall be a minimum of 50 psi in accordance with "California Building Code (CBC)", International Building Code with California Amendments, California Code of Regulations, Title 24, Part 2.

2.2 MANUFACTURERS, GENERAL

- A. Source Limitations for Tile: Obtain tile of each type from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
 - 2. Obtain waterproof crack isolation membrane [waterproof membrane] [and] [crack isolation membrane], except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Stone thresholds.
 - 2. Waterproof membrane.
 - 3. Cementitious backer units.
 - 4. Metal edge strips.

2.3 MANUFACTURERS - TILING

- A. Manufacturers: Subject to compliance with requirements, provide product from one of the following manufacturers:
 - 1. Dal-Tile International Corp
 - 2. Buchtal Corporation USA.
 - 3. Arizona Tiles

2.4 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation [in swimming pools] [on exteriors] in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.
- F. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes selected by Architect from manufacturer's standard shapes.
 - 1. Base: Refer to drawings and as selected by Architect.
 - a. Coved with surface bullnose top edge unless indicated otherwise in Drawings.

2.5 PORCELAIN TILE

- A. Porcelain Tile Type (PT1, PT2, PT3, PT4): Floor and Wall Tiles
 - 1. Basis of Design Product: Shibusa series, as manufactured by Arizona Tiles, web: www.arizonatile.com
 - 2. Certification: Tile certified by the Porcelain Tile Certification Agency.
 - 3. Face Size: As indicated on Drawings, and as per manufacturer's standard size.
 - 4. Face Size Variation: Rectified.
 - 5. Thickness: As per manufacturer's standard size.
 - 6. Product Use Classification: Interior, Wet (IW).
 - 7. Physical Properties:
 - a. Dynamic Coefficient of Friction: Dynamic wet ≥ 0.42 as per ANSI A137.1:2012
 - b. Visible Abrasion Resistance: Resistant as per UNI EN ISO 10545-07
 - c. Chemical Resistance: Resistant as per UNI EN ISO 10545-13
 - d. Frost Resistance: Resistant as per UNI EN ISO 10545-12
 - e. Water Absorption: $\leq 0.05\%$ as per UNI EN ISO 10545-03
 - f. Breaking Strength: $\geq 57.3 \text{ N/mm}^2$ as per UNI EN ISO 10545-04
 - 8. Tile Color, Glaze, and Pattern: As indicated on Drawings.

9. Grout Color: As selected by Architect from manufacturer's full range.
10. Precoat with temporary protective coating.
11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as selected from manufacturer's standard shapes.

2.6 EXTERIOR PORCELAIN LARGE FORMAT TILES

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide acceptable product from one of the following manufacturers:
 1. Dal-Tile International Corp
 2. Buchtal Corporation USA.
 3. Arizona Tiles
- B. Size: 5 feet by 10 feet
- C. Thickness: 6mm
- D. Color and pattern: Tile to match Architect's sample.
- E. Mounting:
 1. Exterior tiles to be mounted to CMU units and Rainscreen system should comply with Drawings.
 - a. Mounting on CMU Units: Use adhesives or installation material to mount the tiles.
 - b. Mounting on Rainscreen System: Tile mounting to comply with installation information as per Section 07 05 43 "Cladding Support System".

2.7 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.

2.8 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints as mentioned in Section 09 29 00 "Gypsum Board".

2.9 MANUFACTURERS – INSTALLATION MATERIALS

- A. Basis-of-Design: The design is based on products by Laticrete International, www.laticrete.com as specified.
 1. Alternate Manufacturers: Subject to compliance with requirements including "System Warranty", manufacturers offering products that may be incorporated into the Work are:

- a. MAPEI Corporation, www.mapei.com
- b. Custom Building Products, www.custombuildingproducts.com

2.10 WATERPROOF / ANTI-FRACTURE MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 and ANSI A118.12, specifically intended for bonding to cementitious substrate under thick mortar bed or thin-set tile, and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Waterproof / Anti-Fracture Membrane:
 - 1. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 - a. Nominal Thickness: 0.025 inch (0.6 mm).
 - b. LATICRETE International, Inc; LATICRETE Hydro Ban.
 - c. Mapei Corp; Mapelastic™ AquaDefense.
 - d. Custom Building Products; RedGard Waterproofing and Crack Prevention Membrane.
 - 2. Chlorinated Polyethylene (CPE) Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with polyester fabric.
 - a. Nominal Thickness: 0.030 inch (0.8 mm).
 - b. Noble Company (The); NobleSeal TS.

2.11 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
 - 1. Cleavage Membrane: Asphalt felt, ASTM D 226/D 226M, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, 4.0 mils (0.1 mm) thick.
 - 2. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57-mm) diameter; comply with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.
 - 3. Latex Additive: Manufacturer's standard acrylic resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
 - 4. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Laticrete International, Inc.; LATICRETE 3701 Fortified Mortar Bed.
 - b. MAPEI Corporation: 4 To 1 Mud Bed Mix.
 - c. Custom Building Products. Thick Bed Bedding mortar.
- B. Latex-Portland Cement Mortar (Thinset): ANSI A118.4. Use this type of bond coat where indicated and where no other type of bond coat is indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:

- a. Custom Building Products; ProLite Lightweight Fortified Thin-set mortar (Basis of Design).
 - b. Laticrete International, Inc.: LATICRETE Platinum 254.
 - c. MAPEI Corporation; Kerabond™ Thin-set Mortar gauged with Keralastic™ Latex Additive.
2. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.12 GROUT MATERIALS

- A. High-Performance Tile Grout: ANSI A118.7. Use this type of grout where indicated and where no other type of grout is indicated.
 1. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Laticrete International, Inc.: LATICRETE PERMACOLOR Grout.
 - b. MAPEI Corporation; Ultracolor™ Plus.
 - c. Custom Building Products: Prism Sure Color Grout.
- B. General:
 1. Grout Admixture: Type as recommended by the manufacturer.
 2. Grout Color: As indicated on Drawings.

2.13 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric silicone sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 7 Section "Joint Sealants."
 1. Acrylic sealants are not acceptable.
 2. Sealant to match grout color.
 3. Primer for substrates indicated, as recommended by sealant manufacturer.
 4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Laticrete International, Inc.; LATICRETE LATASIL™.
 - b. Single-component, mildew-resistant, neutral-curing silicone sealant, type recommended by grout manufacturer.

2.14 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Base: Shapes as indicated, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications.

1. Description: roll-formed stainless steel profile with integrated trapezoid perforated anchoring legs, connected at a 90-degree angle by a cove shaped section with 23/32" (18.5 mm) radius that forms the visible surface
 2. Basis of Design Product: Dilex-EHK Cove Shaped Profile, as manufactured by Schluter System, web: www.schluter.com
 - a. Corners: Provide matching inside, outside corners.
 - b. End Caps: Provide matching end caps.
 - c. Finish: As indicated on Drawings.
- C. Protective Coating: Liquid grout-release coating that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with stone, mortar, and grout products; easily removable after grouting is completed without damaging grout or stone tile; and recommended for use as temporary protective coating for stone tile.
1. Floor sealer, complying with "Floor Sealer" Paragraph below, may be used provided it is recommended by manufacturer for use as a grout release.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: (Non epoxy grouts): Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
- F. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout. Colorless, no-sheen, water-based penetrating slip and stain-resistant sealer, not affecting color or physical properties of surfaces as recommended by tile manufacturers.
1. Products: Subject to compliance with requirements, products that may be incorporated into the Work are:
 - a. Dupont, www.dupont.com; DuPont™ StoneTech® Professional Impregnator Pro® Sealer as supplied by Laticrete, www.laticrete.com
 - b. MAPEI Corporation, www.mapei.com; Ultracare™ line of products.
 - c. Custom Building Products, www.custombuildingproducts.com; Aqua Mix® Sealers Choice® Gold.
 - d. Miracle, www.miraclesealants.com, Impregnator 511 (Original).

2.15 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer. Correct conditions that do not comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
 - 1. Remove protrusions, bumps, and ridges by sanding or grinding.
- B. Remove coatings that are incompatible with tile-setting materials from substrates, including curing compounds and other substances that contain soap, wax, oil, or silicone.
- C. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- D. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation

methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors consisting of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - c. Tile floors consisting of rib-backed tiles.

B. Large Format Tiles:

1. Use notched trowel of size recommended by tile manufacturer to achieve 100 percent mortar coverage on back of tile.
2. The use of "glass handling" suction cups is recommended for flat-setting heavy large format tile into fresh mortar.
 - a. These "glass handlers/suction cups" can assist in working large format tiles into the mortar for maximum coverage, but are most effective with smooth, glazed or polished surfaces.
3. If tiles are installed in a condition where one edge of the tile is higher than adjacent tile, giving the finished surface an uneven appearance (lippage), the use of a high speed orbital sander (remove all abrasive/sanding paper before applying vibrating pressure to the tile) applied along the edge of the elevated tile can be effective in vibrating excess mortar out for removal, and lowering the tile into alignment with the adjoining tiles.
4. Where excessive lippage may occur due to excess mortar behind the tile, obtain written direction from tile manufacturer for corrective procedures which not affect appearance of finished surfaces or damage adjacent work.

C. Wipe backs of tiles with a damp cloth to remove dirt and dust before units are installed.

D. Mix tiles to achieve a uniformly random distribution of color shadings and patterns.

E. Pattern Orientation: For tile varieties with directional pattern, orient pattern as indicated on drawings. If no pattern is shown, request direction from Architect.

F. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

G. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

H. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

I. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

J. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
 4. Large format tile set in a running bond/ brick joint pattern utilizing tiles with any side greater than 15 -inches, offset tiles shall be maximum of 1/3 of the tiles longest edge length.
- K. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
- L. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- M. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- N. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thinset).
 2. Do not extend [cleavage membrane] waterproofing or crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on [cleavage membrane] waterproofing or crack isolation membrane with elastomeric sealant.
- O. Metal Edge Strips: Install at locations indicated and where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated. Provide sizes required for transition.
- P. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile.
1. Do not saw-cut joints after installing tiles.
 2. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 3. Prepare joints and apply elastomeric sealants to comply with requirements in Division 7 Section "Joint Sealants."
- Q. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- R. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- S. Tiles to be installed on Rainscreen system to comply with information as per Section 07 05 43 "Cladding Support System".

3.4 INSTALLATION OF TILE BACKING PANELS

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 INSTALLATION OF WATERPROOF / ANTI-FRACTURE MEMBRANE

- A. Install waterproof / crack isolation membrane to comply with ANSI A108.13, ANSI A108.17, and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely, or unbonded, to substrate.

3.6 INSTALLATION TOLERANCES

- A. Variation from Plumb: For vertical joints, external corners, and other conspicuous lines, do not exceed 1/8 -inch in 10 -feet.
- B. Variation in Level: For horizontal joints and other conspicuous lines, do not exceed 1/4 -inch in 20 -feet (6 mm in 6 m), or 1/2 -inch (12 mm) maximum.
- C. Variation in Surface Plane of Flooring: Do not exceed 1/8 -inch in 10 -feet (3 mm in 3 m) from level or slope indicated when tested with a 10 -foot (3-m) straightedge.
- D. Variation in Plane between Adjacent Units (Lipping): Do not exceed the following differences between faces of adjacent units as measured from a straightedge parallel to stone tiled surface:
 - 1. Units with Polished Faces: 1/64 -inch (0.4 mm).
 - 2. Units with Honed Faces: 1/32 -inch (0.8 mm).
 - 3. Units with Sand-Rubbed Faces: 1/32 -inch (0.8 mm).
 - 4. Units with Thermal-Finished Faces: Depth of thermal finish or 3/16 -inch (5 mm), whichever is less.
 - 5. Units with Natural-Cleft Faces: Depth of natural-cleft finish or 3/16 -inch (5 mm), whichever is less.
- E. Variation in Joint Width: Do not vary joint thickness more than 1/16 -inch (1.6 mm) or one-fourth of nominal joint width, whichever is less.

3.7 GROUTING

- A. Joints shall be packed full and free of all voids or pits, joints shall not be raked. Clean excess grout and mortar from tile surface with water as work progresses. Clean while mortar is fresh and before it hardens on the surface.
- B. Epoxy Grout: Install in accordance with ANSI A108.3 and A108.6 for epoxy and the manufacturer's recommended procedures and precautions during application and cleaning.
- C. Epoxy Emulsion Grout: Install in accordance with ANSI A108.6 and A118.3 for epoxy emulsion type and the manufacturer's recommended procedures and precautions during application and cleaning.
- D. High Performance Sanded Grout: Install accordance with ANSI A108.7 and A108.10 for cement based grout and the manufacturer's recommended procedures and precautions during application and cleaning.

3.8 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.9 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.10 INTERIOR FLOOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations: Standard tile size (Above ground concrete floors)
 - 1. Description: Concrete Subfloor, cementitious acrylic fortified thin set mortar with Waterproofing / Anti-fracture membrane.
 - 2. Tile Installation **TCNA F115A**: Tile thin set bonded over liquid applied Waterproof / Anti-fracture membrane.
- B. Interior Floor Installations: Large format tile (Above ground concrete floors)
 - 1. Description: Cementitious self-leveling underlayment bed over concrete subfloor with Waterproofing / Anti-fracture membrane.
 - 2. Tile Installation **TCNA F205A**: Tile bonded over liquid applied Waterproof / Anti-fracture membrane which is applied to un-reinforced cementitious self-leveling underlayment bed bonded to primed concrete. Mortar bed depth minimum 3/4 -inch minimum to 1 -inch maximum.
- C. Thresholds: Install thresholds at termination of floor tile or where exposed edge of tile flooring meets carpet, wood, or other dissimilar flooring material. Threshold finishes flush with top of tile; set in same type of setting bed as abutting field tile unless otherwise indicated.
 - 1. Set thresholds in latex-portland cement mortar for locations where mortar bed would otherwise be exposed above adjacent non-tile floor finish.

3.11 INTERIOR WALL TILE INSTALLATION SCHEDULE

A. Interior Wall Installations: (Non wet areas)

1. Type: Metal Studs or Furring:
2. Tile Installation **TCNA W245**: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board, ANSI A118.3 (Epoxy grout) and ANSI A137.(Ceramic Tile)
 - a. Glass faced gypsum sheathing:
 - 1) ASTM C1178
 - b. Thin-Set adhesive Mortar: Per manufacturers written recommendations.
 - c. Grout: Per manufacturers written recommendations.
 - d. Liquid applied Waterproof / Anti-Fracture membrane over concrete: Per manufacturers written recommendations.
 - e. Expansion Joints: TCNA EJ171E

B. Interior Wall Installations: (Wet areas)

1. Type: Metal Studs or Furring:
2. Tile Installation **TCNA W245**: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board, ANSI A118.3 (Epoxy grout) and ANSI A137.(Ceramic Tile)
 - a. Thin-Set adhesive Mortar: Per manufacturers written recommendations.
 - b. Grout: Per manufacturers written recommendations.
 - c. Liquid applied Waterproof / Anti-Fracture membrane over concrete: Per manufacturers written recommendations
 - d. Expansion Joints: TCNA EJ171E
 - e. Tie into waterproofing assembly at shower floor.

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SECTION 09 51 23
ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical tiles (ACT2, ACT3, ACT4, ACT5).
2. Metal suspension system.
3. Metal edge moldings and trim.

B. Related Requirements:

1. Section 09 51 13 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

B. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.

C. Samples for Initial Selection: For components with factory-applied finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Tiles: Set of full-size Samples of each type, color, pattern, and texture.
2. Concealed Suspension-System Members: 6-inch- (150-mm-) long Sample of each type.
3. Exposed Moldings and Trim: Set of 6-inch- (150-mm-) long Samples of each type and color.
4. Seismic Clips: Full size.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.
 - a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical tile.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.
 - e. Sprinklers.
 - f. Access panels.
 - g. Perimeter moldings.
7. Show operation of hinged and sliding components adjacent to acoustical tiles.
8. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical tile ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical tile ceiling suspension system, from ICC-ES.

E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockup of typical ceiling area as indicated on Drawings.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Source Limitations for Suspended Acoustical Tile Ceiling System: Obtain each type of acoustical ceiling tile and its suspension system from single source from single manufacturer.
- B. Source Limitations for Directly Attached Acoustical Tile Ceiling Tile: Obtain each type of acoustical ceiling tile from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: Class A in accordance with ASTM E1264.
 2. Smoke-Developed Index: 450 or less.

2.3 ACOUSTICAL TILES, GENERAL

- A. Acoustical Tiles:
 - 1. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E1264 classifications as designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- B. Light Reflectance (LR): Not less than LR indicated on Drawings.
- C. Noise Reduction Coefficient (NRC): Not less than NRC indicated on Drawings.
- D. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested in accordance with ASTM D3273, ASTM D3274, or ASTM G21 and evaluated in accordance with ASTM D3274 or ASTM G21.

2.4 ACOUSTICAL TILES (ACT2, ACT3, ACT4, ACT5)

- A. Basis of Design Product (ACT2): Calla Series, vector model as manufactured by Armstrong.
 - 1. Classification: Provide tiles as follows:
 - 2. Type and Form, Type III: Mineral base with painted finish; form and pattern as indicated on Drawings.
 - 3. Color: As indicated on Drawings.
 - 4. Edge/Joint Detail: As indicated on Drawings.
 - 5. Thickness: As indicated on Drawings.
 - 6. Modular Size: As indicated on Drawings.
- B. Basis of Design Product (ACT3): Immix linear model, metal works series as manufactured by Armstrong. as manufactured by Armstrong.
 - 1. Classification: Provide tiles as follows:
 - a. Type and Form: Metal with pre-coat finish; form and pattern as indicated on Drawings.
 - 2. Color: As indicated on Drawings.
 - 3. Edge/Joint Detail: As indicated on Drawings.
 - 4. Thickness: As indicated on Drawings.
 - 5. Modular Size: As indicated on Drawings.
- C. Basis of Design Product (ACT4): Grid ceiling tiles series, as manufactured by Autex Acoustics.
 - 1. Classification: Provide tiles as follows:
 - a. Type and Form: 100% polyester fiber; form and pattern as indicated on Drawings.
 - 2. Color: As indicated on Drawings.
 - 3. Edge/Joint Detail: As indicated on Drawings.
 - 4. Thickness: As indicated on Drawings.
 - 5. Modular Size: As indicated on Drawings.
- D. Basis of Design Product (ACT5): Tartan custom model, metal works series as manufactured by Armstrong. as manufactured by Armstrong.

1. Classification: Provide tiles as follows:
 - a. Type and Form: Metal with pre-coat finish; form and pattern as indicated on Drawings.
2. Color: As indicated on Drawings.
3. Edge/Joint Detail: As indicated on Drawings.
4. Thickness: As indicated on Drawings.
5. Modular Size: As indicated on Drawings.

2.5 METAL SUSPENSION SYSTEM

A. Concealed or Semi-Exposed Metal Suspension System:

1. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, fully concealed, metal suspension system and accessories of type, structural classification, and finish indicated that complies with applicable requirements in ASTM C635/C635M.
2. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 (Z90) coating designation.
 - a. Fire Rating: As indicated on Drawings.
 - b. Structural Classification: Heavy-duty system.
 - c. Access: Downward and end pivoted or side pivoted, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.
 - 1) Initial Access Opening: In each module, As indicated on Drawings.

2.6 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
- B. Wire Hangers, Braces, and Ties: Provide wires as follows:
 1. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.135-inch- (3.5-mm-) diameter wire.
- C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.
- E. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- F. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.

- G. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical tiles in-place during a seismic event.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Metal Edge Moldings and Trim:

1. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for of suspension-system runners.
 - a. Edge moldings to fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 - b. Finish: Painted to match color indicated by manufacturer's designation.
2. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
 - a. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
 - b. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils (0.04 mm). Comply with ASTM C635/C635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.8 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 07 92 19 "Acoustical Joint Sealants."

2.9 MISCELLANEOUS MATERIALS

- A. Acoustical Tile Adhesive: Type recommended in writing by acoustical tile manufacturer, bearing UL label for Class 0-25 flame spread.
- B. Staples: 5/16-inch- (8-mm-) long, divergent-point staples.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Testing Substrates: Before adhesively bonding tiles to wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- C. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. Install suspended acoustical tile ceilings in accordance with ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems in accordance with tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - 8. Do not attach hangers to steel deck tabs.
 - 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - 10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
 - C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
 - D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
 - E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
 - F. Arrange directionally patterned acoustical tiles as follows:
 1. As indicated on reflected ceiling plans.
 2. Install tiles with pattern running in one direction parallel to **[long]** **[short]** axis of space.
 3. Install tiles in a basket-weave pattern.
 - G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges of tiles so tile-to-tile joints are interlocked.
 1. Fit adjoining tiles to form flush, tight joints. Scribe and cut tiles for accurate fit at borders and around penetrations through ceiling.
 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tiles and moldings, spaced 12 inches (305 mm) o.c.
 3. Protect lighting fixtures and air ducts in accordance with requirements indicated for fire-resistance-rated assembly.
- 3.4 INSTALLATION OF DIRECTLY ATTACHED ACOUSTICAL TILE CEILINGS
- A. Adhesive Installation: Install acoustical tile by bonding to substrate, using acoustical tile adhesive and procedure recommended in writing by tile manufacturer and as follows:
 1. Wipe and prime ceiling.
 2. Remove loose dust from backs of tiles by brushing.
 3. Install splines in joints between tiles and maintain bottom surface to a uniform level. Shim tile or correct substrate as required to maintain levelness.
 4. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
 - B. Stapled Installation: Fasten acoustical tile to substrate using a minimum of two staples per tile that are installed in flanges of tile and as follows:
 1. Form double-lapped joint between tiles by securely pressing tile tongues into corresponding tile grooves.

2. Maintain bottom surface of tiles to a uniform level. Shim tile or correct substrate as required to maintain levelness.
 3. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.
- D. Arrange directionally patterned acoustical tiles as indicated on Drawings.

3.5 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m), non-cumulative.

3.6 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
1. Periodic inspection during the installation of suspended ceiling grids in accordance with ASCE/SEI 7.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical tile ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no tiles have been installed. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.
1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical tile ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.7 ADJUSTING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

- B. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23

SECTION 09 54 26
SUSPENDED WOOD CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood veneer, linear ceiling panels.
 - 2. Wood Veneer, linear-plank ceilings.
 - 3. Wood Veneer, micro-perforated plank ceilings.
 - 4. Suspension system.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.4 COORDINATION

- A. Coordinate layout and installation of wood ceilings and suspension systems with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For suspended wood ceilings.
 - 1. Include reflected ceiling plans, sections, and details, drawn to scale, showing the following:
 - a. Wood ceiling patterns and joints.
 - b. Ceiling suspension members.
 - c. Method of attaching hangers to building structure and locations of cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

- d. Ceiling-mounted items including, but not limited to, light fixtures, diffusers, grilles, speakers, sprinklers, and access panels.
 - e. Ceiling perimeter and penetrations through ceiling; trim and moldings.
- C. Samples: For each exposed product and for each type, color, and finish specified, 12 inches (305 mm) long by 12 inches (305 mm) wide or full width in size.
- D. Samples for Initial Selection: For units with factory-applied colors and finishes.
 - 1. Include Samples of accessories involving color and finish selections.
- E. Samples for Verification: For the following products:
 - 1. Wood Ceilings: 12-inch- (305-mm-) long by 12-inch- (305-mm-) wide or full-width Samples of each type, color, and finish.
 - 2. Suspension-System Members: 12-inch- (305-mm-) long Sample of each type.
 - 3. Exposed Molding and Trim: 12-inch- (305-mm-) long Samples of each type, color, and finish.
 - 4. Veneer Edge Banding: Applied to a cut end of a wood-ceiling Sample for each type, color, and finish.
 - 5. Filler Strips: 12-inch- (305-mm-) long Samples of each type, color, and finish.
 - 6. Sound Absorbers: 12 inches (305 mm) long by full width.
- F. Delegated Design Submittals: For design of seismic restraints and attachment devices.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Product Test Reports: For each suspended wood ceiling, for tests performed by a qualified testing agency.
- C. Evaluation Reports: For suspended-wood-ceiling framing systems.
- D. Field quality control reports.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Suspended-Wood-Ceiling Components: Quantity of each wood-ceiling unit, suspension-system component, accessory, and exposed molding and trim equal to 2 percent of quantity installed.

1.10 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by National Voluntary Laboratory Accreditation Program for testing indicated.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Deliver ceiling components and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

- 1. Store materials flat and level, raised from the floor.

- B. Handle ceiling components and accessories in a manner that prevents damage.

1.12 PROJECT CONDITIONS

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

- 1. Store and acclimatize wood products in the spaces where they will be installed for a minimum of 72 hours immediately before ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements" to design seismic restraints and attachment devices.
- B. Seismic Criteria: Provide suspended wood ceilings designed and installed to withstand the effects of earthquake motions in accordance with ASCE/SEI 7 and requirements of authorities having jurisdiction.
- C. Recycled Content of Composite-Wood Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- D. All material should come from FSC-certified forests.

2.2 WOOD VENEER – LINEAR PANEL CEILINGS

- A. Wood-Veneer, Linear-Panel Ceilings (AWC3): Linear panels fabricated from planks consisting of wood veneer adhered to backs and exposed surfaces of ANSI A208.1 particle board composite-wood cores. Planks run parallel to panel length.

- 1. Basis of Design Product: Woodworks linear veneered panels as manufactured by Armstrong World Industries, Inc.

SUSPENDED WOOD CEILINGS

09 54 26 - 3

Fontana City Hall – Phase II

2. Surface-Burning Characteristics: Provide products with the following characteristics when tested in accordance with ASTM E84:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 or less.
3. Plank:
 - a. Face Grade: Manufacturer's standard.
 - b. Adhesive: Manufacturer's standard that complies with "Performance Requirements" Article.
 - c. Species: As indicated on Drawings.
 - d. Cut: Quarter sliced.
 - e. Width: 4 inches.
 - f. Depth: 3/4 inch.
 - g. Length: 96 inches
 - h. Edges: Square.
 - i. Reveal Spacing: Equal spaces between long edges of planks.
 - j. Backing Boards: Manufacturer's standard; 1/2 inch (13 mm) thick.
 - 1) Backing Board Gloss and Color: Flat black.
4. Panel Module: As per manufacturer's standard size.
 - a. Attachment: Provide manufacturer's standard attachment hooks or clips for attaching panels to grid suspension system, spaced to support ceiling loads and in accordance with manufacturer's written installation instruction.
5. Factory Finish: Manufacturer's standard finish; applied on every wood surface.
 - a. Stain: As selected by Architect from manufacturer's standard range.
 - b. Gloss: Manufacturer's standard.
6. Accessories: Manufacturer's accessories required to provide a complete installation of ceiling in accordance with manufacturer's written installation instructions.
 - a. Safety Cables: 24 inches (610 mm).
 - b. Panel Splice Plates: Manufacturer's standard.
 - c. Acoustic Infill Panels: Nonwoven black fabric with 1-inch- (25-mm-) thick glass fiber, 1 lb/cu. ft. (16 kg/cu. m) density, enclosed in black polyethylene, with flame-spread index of 25 or less and smoke-developed index of 50 or less as determined by testing in accordance with ASTM E84.
 - 1) NRC: 0.75 when tested in accordance with ASTM C423.
 - d. Acoustic Felt: Nonwoven cellulose- and glass-fiber fabric, factory applied, black, backer with flame-spread index of 25 or less and smoke-developed index of 50 or less as determined by testing in accordance with ASTM E84.
 - e. End Caps: Manufacturer's standard units for exposed field-cut edges; solid wood finished to match planks.
 - f. Trim: As indicated on Drawings; with trim connectors recommended in writing by ceiling and suspension-system manufacturers.
 - 1) Material: Aluminum, painted black with trim connectors recommended by manufacturer.

7. Grid Suspension System: ASTM C635/C635M; recommended in writing by ceiling and suspension-system manufacturers for applications indicated; main- and cross-runner system complete with suspension-system components required to support ceiling units and other ceiling-supported construction.
 - a. Material: ASTM A653/A653M, hot-dip galvanized, cold-rolled sheet steel, G60 (Z180) coating designation.
 - b. Structural Classification: Heavy-duty system.
 - c. Face Width: 15/16 inch (24 mm)
 - d. Finish: Flat black.

2.3 WOOD VENEER, LINEAR PLANK CEILING

- A. Wood-Veneer, Linear-Plank Ceilings (AWC2): Planks consisting of wood veneer adhered to backs and exposed surfaces of ANSI A208.1 particle board composite-wood cores; with square-cut ends.
 1. Basis of Design Product: Woodworks channeled plank as manufactured by Armstrong World Industries, Inc.
 2. Surface-Burning Characteristics: Provide products with the following characteristics when tested in accordance with ASTM E84:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 or less.
 3. Plank:
 - a. Face Grade: Manufacturer's standard.
 - b. Adhesive: Manufacturer's standard that complies with "Performance Requirements" Article.
 - c. Species: As indicated on Drawings.
 - d. Cut: Manufacturer's standard.
 - e. Width: 5.5 inches.
 - f. Depth: 3/4 inch (19 mm).
 - g. Length: 120 inches
 4. Factory Finish: Manufacturer's standard finish; applied on every wood surface.
 - a. Stain: Match Architect's sample.
 - b. Gloss: Satin.
 5. Accessories: Manufacturer's accessories required to provide a complete installation of ceiling in accordance with manufacturer's written installation instructions.
 - a. Attachment Clips: Manufacturer's standard metal clips for attaching planks to suspension system.
 - 1) Plank Splice Plates: Manufacturer's standard.
 - b. Acoustic Infill Panels: 1-inch- (25-mm-) thick glass fiber, 1 lb/cu. ft. (16 kg/cu. m) density, enclosed in black polyethylene, with flame-spread index of 25 or less and smoke-developed index of 50 or less as determined by testing in accordance with ASTM E84.

- 1) NRC: 0.80 when tested in accordance with ASTM C423.
- c. Edge Banding: Manufacturer's standard matching planks for treating cut edges; with pressure-sensitive adhesive backing.
- d. Trim: As indicated on Drawings; with trim connectors recommended in writing by ceiling and suspension-system manufacturers.
- 1) Material: Wood-veneer-wrapped aluminum, finished to match planks.
- 6. Grid Suspension System: ASTM C635/C635M; recommended in writing by ceiling and suspension-system manufacturers for applications indicated; main- and cross-runner system complete with suspension-system components required to support ceiling units and other ceiling-supported construction.
 - a. Material: ASTM A653/A653M, hot-dip galvanized, cold-rolled sheet steel, G60 (Z180) coating designation with ASTM B209 (ASTM B209M) aluminum cap.
 - b. Structural Classification: Heavy-duty system.
 - c. Face Width: 15/16 inch (24 mm).
 - d. Finish: Flat black.

2.4 WOOD VENEER, MICRO-PERFORATED CEILING PANELS

- A. Veneer-Wood, Perforated Ceilings (AWC1): Perforated panels fabricated from real wood veneers on fire rated particle board.
- B. Basis of Design Product: Woodworks vector series, microperf model as manufactured by Armstrong, web: www.armstrong.com.
- C. Flame Spread: ASTM E84; Class A
- D. Accessories: Manufacturer's accessories required to provide a complete installation of ceiling in accordance with manufacturer's written installation instructions.
 - 1. Acoustic Infill Panels: Manufacturer's standard to provide NRC rating indicated, with flame-spread index of 25 or less and smoke-developed index of 50 or less as determined by testing in accordance with ASTM E84.
 - a. NRC: 0.80 when tested in accordance with ASTM C423.
 - 2. End Caps: Manufacturer's standard units for exposed field-cut edges; solid wood finished to match planks.
 - 3. Trim: As indicated on Drawings; manufacturers standard solid wood finished to match planks; with trim connectors recommended in writing by ceiling and suspension-system manufacturers.
 - 4. Insert additional accessories required to suit Project.
- E. Grid Suspension System: ASTM C635/C635M; recommended in writing by ceiling and suspension-system manufacturers for applications indicated; main- and cross-runner system complete with suspension-system components required to support ceiling units and other ceiling-supported construction.
 - 1. Material: ASTM A653/A653M, hot-dip galvanized, cold-rolled sheet steel, G60 (Z180) coating designation with ASTM B209 (ASTM B209M) aluminum cap.
 - 2. Structural Classification: Heavy-duty system.

SUSPENDED WOOD CEILINGS

09 54 26 - 6

Fontana City Hall – Phase II

3. Face Width: 15/16 inch (24 mm).
4. Finish: As per manufacturers standard finish.

2.5 SUSPENSION-SYSTEM HANGERS, BRACES, AND TIES

- A. Attachment Devices: Size for 5 times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated.
- B. Wire Hangers, Braces, and Ties: Provide wire complying with the following requirements:
 1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 2. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C635/C635M, Table 1, Direct Hung is less than yield stress of wire, but provide not less than 0.106-inch- (2.7-mm-) diameter wire.
- C. Seismic Stabilizer Bars: Grid-suspension-system manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- D. Seismic Struts: Suspension-system manufacturer's standard compression struts designed to accommodate seismic forces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which suspended wood ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and with requirements for installation tolerances and other conditions affecting performance of suspended wood ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of suspended wood ceilings.
 1. Balance border widths at opposite edges of each ceiling.
 2. Avoid using less-than-half-width units.

3.3 INSTALLATION OF SUSPENDED WOOD CEILINGS

- A. Comply with ASTM C636/C636M and seismic requirement indicated, in accordance with manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns in 3 inches (76 mm). Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate to which hangers are attached and for type of hanger involved.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that does not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, power-actuated fasteners, or postinstalled mechanical or adhesive anchors that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches (1219 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (203 mm) from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns in 1-1/2 inches (38 mm). Suspend bracing from building's structural members as required for hangers and without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim at perimeter of ceiling area and where necessary to conceal edges and ends of wood units.
1. Screw-attach metal moldings to substrate at intervals of not more than 16 inches (406 mm) o.c. and not more than 3 inches (76 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 ft. (3 mm in 3.7 m). Miter corners accurately and connect securely.
 2. Do not use exposed fasteners on moldings and trim.
- E. Grid Suspension Systems: Space main beams at 48 inches (1219 mm) o.c.
1. Install cross tees to form modules sized in accordance with manufacturer's written installation instructions.
 2. Remove and replace dented, bent, or kinked members.
- F. Linear-Carrier Suspension Systems: Install carriers at no more than 24 inches (610 mm) o.c. aligned and securely interlocked with one another.
1. Install stabilizer channels, tees, and bars at regular intervals to stabilize carriers and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated.
 2. Remove and replace dented, bent, or kinked members.

- G. Install wood components and accessories in accordance with manufacturer's written instructions and to accommodate natural expansion and contraction of wood products resulting from fluctuations in humidity.
- H. Cut wood components for accurate fit at borders and at interruptions and penetrations by other work through ceilings.
 - 1. Stiffen edges of cut wood components as required to eliminate variations in flatness.
- I. Treat field-cut edges of wood components in accordance with manufacturer's written recommendations; finish exposed field cuts to match factory finish.
 - 1. Wood-Veneer Units: Edge band exposed field-cut edges.
- J. Install wood components in coordination with suspension system and moldings and trim.
 - 1. Install wood components in patterns indicated on Drawings.
- K. Install field-constructed access panels in locations indicated on Drawings.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Suspended ceiling system.
 - 2. Hangers, anchors, and fasteners.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Tests and Inspections: Testing and inspecting of completed installations of ceiling hangers, anchors, and fasteners to take place in successive stages, in test areas and using methods as follows. Do not proceed with installations of ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
 - 1. Test Areas: Test installation of ceiling suspension systems on each floor when installation has reached 20 percent completion but before wood ceilings have been installed.
 - a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented units.

END OF SECTION 09 54 26

SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rubber base (RB1, RB2)
 - 2. Rubber molding accessories.

1.3 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches (300 mm) long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches (300 mm) long.
- E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).

1.7 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive resilient products during the following periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RUBBER BASE

- A. Basis of Design Product (RB1 and RB2): Top Set Cove rubber wall base as manufactured by Mannington Mills, web: www.manningtoncommercial.com
- B. Thickness: As indicated on Drawings.
- C. Height: 4" minimum.
- D. Color: As indicated on Drawings.

2.2 RUBBER MOLDING ACCESSORY

- A. Profile and Dimensions: As indicated.
- B. Locations: Provide rubber molding accessories in areas indicated on Drawings.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

RESILIENT BASE AND ACCESSORIES

09 65 13 - 2

Fontana City Hall – Phase II

- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Luxury vinyl plank (LVT1)
 - 2. Vinyl composition tile (VCT1)

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E648 by an independent testing and inspecting agency.
- B. Shop Drawings: For each type of resilient sheet flooring.
 - 1. Include sheet flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
 - 3. Show edge accessory details.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.
- D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Coordinate mockups in this Section with mockups specified in other Sections.
 - a. Size: Minimum 100 sq. ft. (9.3 sq. m) for each type, color, and pattern in locations indicated.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Do not install resilient sheet flooring over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by sheet flooring manufacturer.

- D. Close spaces to traffic during floor tile installation.
- E. Close spaces to traffic for 48 hours after floor tile installation.
- F. Install floor tile after other finishing operations, including painting, have been completed.

1.10 WARRANTY

- A. Manufacturer's Warranty: Submit manufacturer's standard warranty document.
 - 1. Warranty Period: Five (5) year limited warranty commencing on Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm according to NFPA 253.
 - 2. Smoke Density: Not more than 450 according to ASTM E662.
- B. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and CBC Section 11B-302.1.

2.2 LUXURY VINYL PLANK (LVT 1)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Interface
 - 2. Congoleum Corporation.
 - 3. Johnsonite; A Tarkett Company.
- B. Basis of Desing Product: Northern grain series as manufactured by Interface, web: www.interface.com
- C. Thickness: As indicated on Drawings.
- D. Size: 25 cm by 1m
- E. Edge: Straight
- F. Finish: As per manufacturer's standard finish.
- G. Colors and Patterns: As indicated on Drawings.

2.3 VINYL COMPOSITION FLOOR TILE (VCT1)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong
 - 2. Shaw industries group, Inc.
 - 3. Tarkett Company.
- B. Basis of Design Product: Standard Excelon Imperial Texture series as manufactured by Armstrong, web: www.armstrong.com.
- C. Tile Standard: ASTM F1066, Class 2, through-pattern.
- D. Wearing Surface: Manufacturer's standard finish; Smooth.
 - 1. Armstrong Fast Start.
 - 2. Or Equal
- E. Thickness: As indicated on Drawings.
- F. Size: As indicated on Drawings.
- G. Colors and Patterns: As indicated on Drawings.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, Portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
- C. Floor Polish: Provide minimum five coats of protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient tile flooring manufacturer. Do not use solvents.
 - 3. Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - a. Owner will test concrete substrate for pH and moisture vapor emission level. Concrete must have a pH and a moisture vapor emission level per flooring manufacturer's recommendation. If these levels are exceeded, a moisture vapor emission control system must be used before installation of resilient tile flooring.
 - 4. If moisture vapor emission control system is not required, grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
 - 5. If moisture vapor emission control system is required, prepare substrate in accordance with Section 09 05 61.13 "Moisture Vapor Emission Control."
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. If tile color varies slightly by container, mix all tile product together prior to installing to avoid large areas of color variation. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction.

- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, accessible cabinets open to the floor, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for protecting installed resilient floor tile during installation and construction. At a minimum:
 - 1. Protection from general construction: Plain, undyed kraft paper
 - 2. Protection when moving heavy loads across installed flooring on casters or dollies: ¼ inch thick minimum underlayment panels, such as plywood or hardboard.
- B. Comply with manufacturer's written instructions for cleaning resilient floor tile.
- C. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- D. Protect floor tile from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- E. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Products without diamond-infused wear surface: Apply minimum five coat(s).
 - 2. Products with diamond-infused wear surface: Polish per manufacturer's instructions.
- F. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

SECTION 09 68 13
TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Modular carpet tile (CPT1, CPT2, CPT3, CPT4, CPT5 and CPT6).

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.
- C. ADA Standards – Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- D. American Association of Textile Chemists and Colorists (AATCC):
 - 1. AATCC 134 - Electrostatic Propensity of Carpets.
- E. Carpet and Rug Institute (CRI):
 - 1. CRI 104 – Standard for Installation of Commercial Carpet.
- F. National Fire Protection Association (NFPA):
 - 1. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.
 - 3. Refer to Sustainable Design Requirements in Section 01 81 13"
- B. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Type, color, and location of insets and borders.
 - 8. Type, color, and location of edge, transition, and other accessory strips.
 - 9. Transition details to other flooring materials.
- C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - 1. Carpet Tile: Full-size Sample.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch (300-mm) long Samples.
- D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.10 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floor covering Installers Association at the Commercial II certification level minimum.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.

1.12 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.13 WARRANTY

- A. Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 - 3. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in Section 01 81 13.
- B. Tile Carpeting: Comply with Title 24, Part 11, 5.504.4.4; meet testing and product requirements of one of the following:
 - 1. Carpet & Rug Institute "Green Label Plus".
 - 2. California Department of Public Health Standard Practice for testing of VOC's (Specification 01350).
 - 3. NSF/ANSI 140 at Gold Level.
 - 4. Scientific Certification Systems Sustainable Choice.
- C. Critical Radiant Flux (CRF): Class I, minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
- D. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.
- E. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.2 MANUFACTURERS

- A. Basis of Design Manufacturer: Interface, Inc, Atlanta, web: www.interface.com
- B. Alternate Manufacturer: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - 1. Millikem & Company, web: www.floors.milliken.com
 - 2. Shaw Contract, web: www.shawcontract.com

2.3 CARPET TILE

- A. Basis of Design Product (CPT1 and CPT6): Open air collection, pattern 408 as manufactured by Interface, Inc. web: www.interface.com
 - 1. Color: As indicated on Drawings.
 - 2. Size: 25 cm by 1m
 - 3. Installation: Ashlar
 - 4. Location: As indicated on Drawings.
- B. Basis of Design Product (CPT2): Open air collection, pattern 442 as manufactured by Interface, Inc. web: www.interface.com
 - 1. Color: As indicated on Drawings.
 - 2. Size: 1m by 1m
 - 3. Installation: Non-directional
 - 4. Location: As indicated on Drawings.

- C. Basis of Design Product (CPT3 and CPT5): Open air collection, pattern 407 as manufactured by Interface, Inc. web: www.interface.com
1. Color: As indicated on Drawings.
 2. Size: 25 cm by 1m
 3. Installation: Ashlar
 4. Location: As indicated on Drawings.
- D. Basis of Design Product (CPT4): Open air collection, pattern 442 as manufactured by Interface, Inc. web: www.interface.com
1. Color: As indicated on Drawings.
 2. Size: 1m by 1m
 3. Installation: Non-directional
 4. Location: As indicated on Drawings.
- E. Carpets shall be from one dye lot for each product type, unless otherwise indicated on Drawings.
- F. Furnish first quality carpet; free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Provide carpet materials and treatments as reasonably nonallergenic and free of other recognized health hazards. Provide a static control construction on all grade carpets which gives adequate durability and performance. Provide the Carpet and Rug Institute (CRI) Indoor Air Quality (IAQ) Label. Carpet type bearing the label will indicate that carpet has been tested and meets the criteria of the CRI Green Label Requirements for Indoor Air Quality Test Criteria.
- G. Carpet shall meet the following minimum standards:
1. Dye Method: 100 percent Solution Dyed Method
 2. Construction: Tufted textured loop with UPS backing (no cut or cut loop accepted)
 3. Pile / Yarn weight: Minimum 18 oz per square yard.
 4. Anti-Microbial Protection Required both and top bottom.
 5. Moisture impermeable: Carpet shall be unaffected by water and moisture.
 6. Static Protection: The manufacturer warrants that the carpet will not static discharge in excess of 3.0 KV or under when tested under the AATCC Test Method 134 for the life of the carpet.
 7. Calcium Chloride: Carpets shall be able to be installed with 5 lbs. hydrostatic pressure or better (pounds) per 1000 square feet per 24 hours with a written documentation from manufacturer, per CRI-104.
 8. Finish or Color: As per finish schedule in drawings.
 9. Stain and Soil Protection: 10 year stain removal guarantee.
 10. Contaminants: No atmospheric contaminants.
 11. NBS Smoke Density: Less than 450 per test ASTM E 662; NFPA-258
 12. Flame Resistant: Shall pass Methenamine pill test ASTM E 662.
 13. Indoor Air Quality: Carpet shall meet or exceed CRI and EPA guidelines (green label certified and labeled).
 14. Run Resistant Strength: Guarantee period shall be the length of the product material warranty period.
 15. Edge Ravel: Carpet will not have continuous pile yarn coming out at seams for a minimum of 20 years from the date of Substantial Completion.

2.4 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.

- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer and as indicated on Drawings..
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Provide cutouts where required, and bind cut edges where not concealed.
- I. Fit sections of carpet prior to application of adhesive.
- J. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions. Butt edges tight to form seams without gaps. Roll entire area lightly to eliminate air pockets and ensure uniform bond.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

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SECTION 09 75 13
STONE WALL FACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Marble.
2. Setting materials.
3. Grout.
4. Pointing mortar.
5. Sealants.
6. Stone anchors and attachments.
7. Stone accessories.

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for installing concrete inserts for anchoring stone wall facing.
2. Section 07 92 00 "Joint Sealants" for sealing joints in stone wall facing system with elastomeric sealants.

1.2 COORDINATION

- A.** Coordinate installation of inserts that are to be embedded in concrete or masonry and similar items to be used by Installer for anchoring and supporting stone wall facing. Furnish setting drawings, templates, and directions for installing such items and deliver to Project site in time for installation.
- B.** Time delivery and installation of stone wall facing to avoid extended on-site storage and to coordinate with adjacent Work.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A.** Product Data: For each variety of stone wall facing, stone accessory, and manufactured product.
- B.** Shop Drawings: Show fabrication and installation details for stone wall facing assembly, including dimensions and profiles of stone units.
1. Show locations and details of joints both within stone wall facing assembly and between stone wall facing system and adjacent Work.
 2. Show locations and details of anchors, including locations of supporting construction.

3. Show direction of veining, grain, or other directional pattern.
 4. Include large-scale details of carvings and inscriptions.
- C. Samples for Initial Selection: For stone wall facing and joint materials involving color selection.
- D. Samples for Verification:
1. For each stone type indicated, in sets of Samples not less than 300 mm square. Include four or more Samples in each set and show the full range of variations in appearance characteristics in completed Work.
 2. For each color of grout pointing mortar and sealant required for jointing.
- E. Delegated Design Submittals: For stone wall facing assembly.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Fabricator and Installer.
- B. Material Test Reports:
1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, in accordance with referenced ASTM standards. Base reports on testing done within previous five years.
 2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Include product data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate stone wall facing assemblies similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: A firm or individual experienced in installing stone wall facing assemblies similar in material, design, and extent to that indicated for this Project, whose work has a record of successful in-service performance.

1.8 MOCKUPS

- A. Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
1. Build mockup of typical wall area as shown on Drawings.
 2. Build mockups for the following:

- a. Typical stone wall facing, not less than 1800 mm long by 2400 mm high.
 - b. Typical stone wainscot wall facing, not less than 1800 mm long by full wainscot height.
 - c. Typical column facing, one complete column.
 - d. Grouting Pointing Sealing of joints.
- 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Sealant Adhesion and Compatibility Testing: Submit Samples of materials that will contact or affect joint sealants to joint-sealant manufacturers, for compatibility and adhesion testing in accordance with sealant manufacturer's standard testing methods and Section 07 92 00 "Joint Sealants."

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
 - 1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
 - 2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
- B. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical stone wall facing so that they are right side up when units are installed.
- C. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.
- D. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.11 FIELD CONDITIONS

- A. Maintain air and material temperatures to comply with requirements of installation material manufacturers, but not less than 10 deg C during installation and for seven days after completion.
- B. Field Measurements: Verify dimensions of construction to receive stone wall facing by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each variety of stone, regardless of finish, from a single quarry, whether specified in this Section or in another Section of the Specifications, with resources to provide materials of consistent quality in appearance and physical properties.
 - 1. For stone types that include same list of varieties and sources, provide same variety from same source for each.
 - 2. Make quarried blocks available for examination by Architect.
 - 3. Make stone slabs available for examination by Architect.
 - a. Architect will select aesthetically acceptable slabs and will indicate aesthetically unacceptable portions of slabs.
 - b. Segregate slabs selected for use on Project and mark backs indicating approval.
 - c. Mark and photograph portions of slabs that are not aesthetically acceptable as directed by Architect.
- B. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from sources in accordance with Section 04 22 00 "Exterior Stone Cladding."

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stone wall facing assembly.
- B. General: Design stone anchors and anchoring systems in accordance with ASTM C1242.
- C. Seismic Performance: Stone wall facing assembly to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
 - 1. Component Importance Factor: 1.5.

2.3 MARBLE

- A. Wall Facing Application: Marble wall cladding.
- B. Material Standard: Comply with ASTM C503/C503M[, **Classification I Calcite**] [, **Classification II Dolomite**] [, **Group A**] [, **Group B**] [, **Group C**] [, **Group D**].
- C. Description: Uniform, fine- to medium-grained, stone with only slight veining.
- D. Varieties and Sources: Subject to compliance with requirements, [provide the following] [provide one of the following] [available stone varieties that may be incorporated into the Work include, but are not limited to, the following]:
 - 1. <Insert, in separate subparagraphs, names of varieties and producers, distributors, or importers>.
- E. Cut: Fleuri.

1. Orientation of Veining: As indicated on Drawings.
- F. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
- G. Finish: As indicated on Drawings.
- H. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
- I. Dimensions:
 1. Nominal Thickness: 7/8 inch (22 mm).
 2. Edge Detail: As indicated on Drawings.
 3. Joints: 1/8-inch- (3-mm-) wide, grouted joints.

2.4 SETTING MATERIALS

- A. Molding Plaster: ASTM C59/C59M.
- B. Portland Cement: ASTM C150/C150M, Type I or Type II.
 1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested in accordance with ASTM C114.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Aggregate: ASTM C144.
- E. Water: Potable.

2.5 GROUT

- A. Grout Colors: As selected by Architect from manufacturer's full range.
- B. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate to produce required color.
- C. Water-Cleanable Epoxy Grout: ANSI A118.3, packaged, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.

2.6 SEALANTS

- A. Joint Sealants: Manufacturer's standard sealants that comply with applicable requirements in Section 07 92 00 "Joint Sealants" and will not stain the stone to which they are applied.
 1. Use mildew-resistant joint sealant at plumbing fixtures and for control and expansion joints in toilet rooms and other wet locations.
 2. Colors: Provide colors of exposed sealants to match other joints in stone adjoining sealed joints unless otherwise indicated.

- B. Sealant for Filling Kerfs: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Section 07 92 00 "Joint Sealants" and that do not stain stone:
 - 1. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
 - 2. Urethane, M, NS, 25, T, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

2.7 STONE ANCHORS AND ATTACHMENTS

- A. Stainless Steel Anchors: ASTM A240/A240M or ASTM A666/A666M, Type 304.
 - 1. Fasteners for Stainless Steel Anchors: Annealed stainless steel bolts, nuts, and washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group A1.
- B. Stainless Steel Dowels: ASTM A276/A276M, Type 304.
- C. Extruded-Aluminum Anchors: ASTM B221M, Alloy 6063-T6.
 - 1. Fasteners for Extruded-Aluminum Anchors: Annealed stainless steel bolts, nuts, and washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group A1.
- D. Anchor Support Grids: Roll-formed steel channels, of size and shape required for application indicated, formed from galvanized-steel sheet not less than 2.8 mm thick and complying with ASTM A653/A653M, Z275.
 - 1. Fittings and Fasteners: System manufacturer's standard components of design, size, and material required to securely attach grids to building structure and stone anchors to grids. Fabricate components in contact with stone from same material specified for anchors.
- E. Wire Tiebacks: 3.0-mm- diameter, stainless steel wire.
- F. Dovetail Slots: Furnish dovetail slots with filler strips of slot size required to receive anchors provided, fabricated from 0.86-mm- thick, galvanized-steel sheet complying with ASTM A653/A653M, Z275.

2.8 STONE ACCESSORIES

- A. Temporary Setting Shims: Rigid plastic shims, nonstaining to stone, sized to suit joint thickness.
- B. Stone Cleaner: Cleaning system compound and accessories specifically formulated for stone types, finishes, and applications indicated, as recommended in writing by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.
- C. Stone Sealer: Colorless, stain-resistant sealing solution that does not affect color or physical properties of stone surfaces, as recommended in writing by stone producer for application indicated.

2.9 FABRICATION OF STONE WALL FACING, GENERAL

- A. Select stone for intended use free from damage, cracks, and starts that could impair structural integrity or function.
 - 1. Repairs that are characteristic of the stone varieties specified may be acceptable provided they do not impair structural integrity or function and are aesthetically acceptable, as judged by Architect.
- B. Fabricate stone wall facing in sizes and shapes required to comply with requirements indicated.
 - 1. Comply with published recommendations in NSI's "Dimension Stone Design Manual."
- C. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.
 - 1. Where items are installed with adhesive or where stone edges are visible in the finished work, make items uniform in thickness and of identical thickness for each type of item; gage back of stone if necessary.
 - 2. Clean sawed backs of stones to remove rust stains and iron particles.
 - 3. Dress joints straight and at right angle to face unless otherwise indicated.
 - 4. Cut and drill sinkages and holes in stone for anchors, supports, and lifting devices as indicated or needed to set stone securely in place; shape beds to fit supports.
 - 5. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
- D. Finish exposed faces and edges of stone to comply with requirements indicated for finish of each stone type required and to match approved Samples and mockups.
- E. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
 - 1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved Samples and mockups.

2.10 FABRICATION OF STONE WALL FACING UNITS

- A. Arrange facing units in shop or other suitable space in proposed orientation and sequence for examination by Architect. Mark units with temporary sequence numbers to indicate position in proposed layout.
 - 1. Lay out one elevation at a time if approved by Architect.
 - 2. Notify Architect seven days in advance of date and time when layout will be available for viewing.
 - 3. Provide lighting of similar type and level as that of final installation for viewing layout unless otherwise approved by Architect.
 - 4. Rearrange facing as directed by Architect until layout is approved.
 - 5. Do not trim nonmodular-size units to less than modular size until after Architect's approval of layout, unless otherwise approved by Architect.
 - 6. Mark backs of units and Shop Drawings with sequence numbers based on approved layout. Mark backs of units to indicate orientation of units in completed Work.

- B. Control depth of stone to maintain minimum clearances of 20 mm between backs of facing and structural members, fireproofing if any, backup walls, and other work behind stone. Do not back check stone less than 25 mm thick.
- C. Cut stone to produce uniform joints 3 mm wide and in locations indicated.
- D. Pattern Arrangement: Fabricate and arrange stone wall facing panels with veining and other natural markings to comply with the following requirements:
 - 1. Arrange panels with veining as indicated on Drawings.
 - 2. Book and slip match units, single-course height.

2.11 MIXES

- A. Spotting Plaster: Stiff mix of molding plaster and water.
- B. Mortar, General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
 - 1. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated. Do not use calcium chloride.
 - 2. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer unless otherwise indicated. Discard mortar when it has reached initial set.
- C. Setting Mortar: Comply with ASTM C270, Proportion Specification.
 - 1. Type: Type N.
 - 2. Mix Proportions: 1 part portland cement and 2-1/2 to 4 parts lime with aggregate ratio of 2-1/4 to 3 times the volume of cement and lime.
- D. Grout: Comply with mixing requirements of referenced ANSI standards and with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone wall facing.
- B. Verify suitability of substrates, including surface conditions and compatibility. Proceed with stone wall facing installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of stone wall facing indicates acceptance of substrates and conditions.

3.2 PREPARATION

- A. Clean substrate surfaces that are dirty or stained by removing soil, stains, and foreign materials.
- B. Clean stone wall facing with stone cleaner by thoroughly scrubbing with fiber brushes and then drenching with clear water.

3.3 INSTALLATION OF STONE WALL FACING, GENERAL

- A. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snipping.
- B. Contiguous Work: Provide reveals and openings as required to accommodate contiguous work.
- C. Set stone to comply with requirements indicated. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with edges and faces aligned in accordance with established relationships and indicated tolerances.
- D. Erect stone units level, plumb, and true with uniform joint widths. Use temporary shims to maintain joint width.
- E. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing of expansion and other joints is specified in Section 07 92 00 "Joint Sealants."
 - 2. Keep expansion joints free of plaster, mortar, grout, and other rigid materials.

3.4 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 3 mm in 2400 mm, 6 mm maximum.
- B. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 3 mm in 3 m, 6 mm in 6 m, 10 mm maximum.
- C. Variation of Linear Building Line: For position shown in plan and related portion of walls and partitions, do not exceed 3 mm in 3 m, 6 mm in 6 m, 10 mm maximum.
- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 3 mm.
- E. Variation in Joint Width: Do not vary from average joint width more than plus or minus 1.5 mm or one-fourth of nominal joint width, whichever is less.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 0.8-mm difference between planes of adjacent units.

3.5 INSTALLATION OF STONE WALL FACING UNITS

- A. Set stone wall facing units firmly against setting spots. Locate setting spots at anchors and spaced not more than 450 mm apart across back of unit, but provide no fewer than one setting spot per 0.18 sq. m unless otherwise indicated.

1. Moisture Exposure: Use portland cement mortar for setting spots where stone is applied to inside face of exterior walls and where indicated on Drawings.
- B. Set stone wall facing units on direct-mount anchoring system with anchors securely attached to stone and to backup substrate surfaces. Comply with anchoring recommendations in ASTM C1242.
 1. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant for filling kerfs.
 2. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back from face of stone a distance at least equal to width of joint.
 3. Provide anchors at a maximum of 600 mm o.c. around perimeter of stone wall facing with a minimum of four anchors per panel.
 4. Provide a minimum of four anchors per panel up to 1.1 sq. m in face area, plus a minimum of two additional anchors for each additional 0.7 sq. m.
- C. Grout joints after setting stone wall facing units.
- D. Fill indicated joints with sealant after setting and pointing stone.

3.6 GROUTING JOINTS

- A. Remove temporary shims before grouting.
- B. Grout stone to comply with ANSI A108.10.
 1. Use sanded grout mixture for joints wider than 3 mm.
 2. Use unsanded grout mixture for joints 3 mm and narrower.
- C. Tool joints uniformly and smoothly with plastic tool.

3.7 INSTALLATION OF JOINT SEALANT AT JOINTS

- A. Remove temporary shims before applying sealants.
- B. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Section 07 92 00 "Joint Sealants."

3.8 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean stone wall facing as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Remove and replace stone wall facing under following conditions:
 1. Broken, chipped, stained, or otherwise damaged or defective stone. Stone may be repaired if methods and results are approved in advance by Architect.
 2. Defective joints, including misaligned joints.
 3. Stone wall facing and joints not matching approved Samples and mockups.

- C. Replace in a manner that results in stone wall facing that matches approved Samples and mockups, complies with other specified requirements, and shows no evidence of replacement.
- D. Clean stone wall facing no fewer than six days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.
- E. Apply stone sealer in accordance with stone producer's and sealer manufacturer's written instructions and recommendations.

3.9 PROTECTION

- A. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.
- B. Before inspection for Substantial Completion, remove protective coverings and clean surfaces.

END OF SECTION 09 75 13

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SECTION 09 77 13

STRETCHED-FABRIC WALL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes site-upholstered wall systems.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing, and mounting indicated.
- B. Shop Drawings: For each stretched-fabric system.
 - 1. Include plans, elevations, sections, and installation and system details.
 - 2. Include details at head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate frame-edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
 - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Verification: For the following products:
 - 1. Fabric: Full-width by approximately 36-inch-long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Frame System: 12-inch-square Sample(s) showing each edge profile and corner.
 - 3. Assembled System: Approximately 36 by 36 inches, including joints and seams in mockup.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

STRETCHED-FABRIC WALL SYSTEMS

09 77 13 - 1

Fontana City Hall – Phase II

1. Electrical outlets, switches, and thermostats.
2. Items penetrating or covered by stretched-fabric systems including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Access panels.
3. Show operation of hinged and sliding components covered by or adjacent to stretched-fabric systems.

B. Qualification Data: For Installer.

C. Product Certificates: For each type of stretched-fabric system.

D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For stretched-fabric systems to include in maintenance manuals. Include fabric manufacturer's written cleaning, stain-removal, restretching, and reupholstering instructions.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fabric: For each fabric, color, and pattern installed, furnish length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.
 2. Framing and Related Installation Items: Furnish manufacturer's full-length units equal to 5 percent of amount installed, but no fewer than five units, including unopened adhesives.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
1. Build mockup of typical wall area as indicated on Drawings. Include intersection of wall and ceiling, corners, and perimeters.
 2. Review of mockups does not constitute acceptance of deviations from the Contract Documents contained in mockups unless Architect specifically reviewed such deviations in writing.
 3. Subject to compliance with requirements, reviewed mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and stretched-fabric system manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.

- B. Deliver materials in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not install stretched-fabric systems until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install stretched-fabric systems until a permanent level of lighting is provided on surfaces to receive stretched-fabric systems.
- C. Air-Quality Limitations: Protect stretched-fabric systems from exposure to airborne odors such as tobacco smoke, and install systems under conditions free from odor contamination of ambient air.

1.12 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of stretched-fabric systems that fail in performance, materials, or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain stretched-fabric wall systems specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Limits for Adhesives, Sealants, Fillers, Primers, Paints, and Coatings:
 - 1. Comply with limits specified in "California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. Fire-Test-Response Characteristics: Stretched-fabric wall systems are to comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency on systems prepared according to ASTM E2573. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.

STRETCHED-FABRIC WALL SYSTEMS

09 77 13 - 3

Fontana City Hall – Phase II

- b. Smoke-Developed Index: 450 or less.
- 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.3 STRETCHED-FABRIC WALL SYSTEMS

- A. Stretched-Fabric Wall System: Manufacturer's standard system consisting of facing material stretched tightly over building frame.

2.4 MATERIALS

- A. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations.
 - 1. Manufacturer: Guildford of Maine.
 - 2. Product Line/Pattern: Marin 1300
 - 3. Style Number (FR701): 2100
 - 4. Color: As indicated on Drawings.
 - 5. Fiber Content: 100 percent woven polyester.
 - 6. Applied Treatments: Stain resistance, flame retardant, and acrylic backing, single coat.
 - 7. Lining Material: Manufacturer's standard fabric for each use indicated. Install when required to ensure uniform appearance of face fabric.

2.5 INSTALLATION MATERIALS

- A. Installation Products: Concealed on back of system, recommended by stretched-fabric system manufacturer to support weight of system, fabric tension, and as follows:
 - 1. Fasteners: Manufacturer's standard.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, materials, substrates, areas, and conditions, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of stretched-fabric systems.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.
- B. Before installation, allow fabric to adjust and become stable in spaces where it will be installed according to stretched-fabric system manufacturer's written instructions. Acclimatize fabric for minimum of 24 hours at ambient temperature and humidity conditions indicated for spaces when occupied for their intended use.

3.3 INSTALLATION

- A. Install stretched-fabric systems according to system manufacturer's written instructions.
 - 1. Provide continuous perimeter frames of each profile indicated, designed to be inconspicuous when covered by fabric facing, with smooth edges, and with surface finish that will not telegraph through fabric facing.
 - 2. Install framing around penetrations.
 - 3. Tightly fit framing to adjacent construction and securely attach to substrate.
 - 4. Attach frame to substrate with adhesive or fasteners or both to support system and prevent deformation of components.
 - 5. Install stretched-fabric systems level and plumb unless otherwise indicated, true in plane, and with fabric square to the grain.
 - 6. Install jointed panels with butt joints and reveals as indicated.
 - 7. Provide continuous 6-inch-wide by 1-inch-thick, wood nailing strips and blocking attached to supporting substrate with suitable fasteners for hanging artwork, centered at 60 inches above finish floor, unless otherwise indicated.
- B. Fabric Installation: Apply fabric monolithically in continuous run over area, without joints or reveals, except where panel joints or midspan frames are indicated.
 - 1. Fabric Seams:
 - a. Sewn seams are not permitted.
 - 2. Stretch and secure fabric to frame edges and so frame and frame attachment method are concealed by fabric unless otherwise indicated.
 - 3. Stretch fabric tightly and square without puckers, ripples, or distortions. Acclimatize and restretch if recommended by stretched-fabric system manufacturer. Repair distortions, wrinkles, and sagging.

3.4 INSTALLATION TOLERANCES

- A. Edge Straightness: Plus or minus 1/16 inch in 48 inches.
- B. Variation from Level and Plumb: Plus or minus 1/16 inch in 48 inches, noncumulative.
- C. Variation of Joint Width: Not more than 1/16 inch in 48 inches from hairline, noncumulative.

3.5 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

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SECTION 09 78 00
INTERIOR WALL PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal laminate wall paneling

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.
- B. Shop Drawings: Show location and extent of each paneling type. Indicate seams and termination points.
 - 1. Show fabrication and installation layouts, details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, accessories; and special details.
- C. Samples: For each type of wall paneling and for each color, and finish specified, full width by 36 inches (914 mm) long in size.
 - 1. Wall-Paneling Sample: From same production run to be used for the Work, with specified finish applied.
- D. Samples for Initial Selection: For each type of wall Paneling.
- E. Samples for Verification: For each type of wall paneling and for each color, and finish specified, full width by 36 inches (914 mm) long in size.
- F. Product Schedule: For wall paneling. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each wall paneling, for tests performed by a qualified testing agency.
- B. Installation Instructions: Submit manufacturer instructions including surface preparation and installation procedures.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wall panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.
 - 1. Build mockups for each type of wall panel on each substrate required.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install wall panels until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.
 - 1. Wall Panels: Condition spaces for not less than 48 hours before installation.
- B. Lighting: Do not install wall paneling until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall paneling.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-paneling manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: As determined by testing identical wall panelings applied with identical adhesives to substrates in accordance with test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- a. Flame-Spread Index: 25 or less.
- b. Smoke-Developed Index: 450 or less.

2.2 METAL LAMINATES

- A. Basis of Design Manufacturer (ML1): Product selected by Architect and manufactured by Chemetal, web: www.chemetal.com.
- B. Material: Aluminum on laminate backing.
- C. Size: As indicated on Drawings.
- D. Color: As indicated on Drawings.

2.3 ACCESSORIES

- A. Manufacturer standard components as required for complete installation.
- B. Adhesive: Manufacturer recommended.
- C. Edgebanding: As recommended by manufacturer.

2.4 FABRICATION

- A. Comply with manufacturer's recommendations for fabrication including the following:
 - 1. Materials shall be conditioned to ambient conditions of the surrounding before use as per manufacturers recommended temperature..
 - 2. Use tools in accordance with manufacturer's recommendations.
 - 3. Use protective mask for chemetal application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation surfaces being true in plane and vertical and horizontal alignment, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall paneling, including dirt, oil, grease, mold, and mildew.

- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
 - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
- D. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

3.3 INSTALLATION OF INTERIOR WALL PANELING

- A. Install interior wall paneling as per manufacturer's written information.
- B. Maintain perimeter clearance of 1/4 inch (6 mm), minimum between each panel and to adjacent materials.

3.4 CLEANING

- A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wood panel manufacturer.
- C. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 09 78 00

SECTION 09 84 33
SOUND - ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sound-absorbing wall panels.
 - 2. Sound-diffusing and -reflecting wall panels.
- B. Related Requirements:
 - 1. Section 01 43 39 "Mockup Requirements".
 - 2. Section 09 77 13 "Stretched-Fabric Wall Systems" for site-upholstered systems applied to walls and for coordinated requirements for fabric.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
 - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing.

1. Include Samples of hardware and accessories involving color or finish selection.

D. Samples for Verification: For the following products:

1. Fabric: Full-width by approximately 36-inch- (900-mm-) long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
2. Panel Edge: 12-inch- (300-mm-) long Sample(s) showing each edge profile, corner, and finish.
3. Core Material: 12-inch- (300-mm-) square Sample at corner.
4. Mounting Devices: Full-size Samples.
5. Assembled Panels: Approximately 36 by 36 inches (900 by 900 mm), including joints and mounting methods.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Electrical outlets, switches, and thermostats.
2. Items penetrating or covered by units including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Access panels.
3. Show operation of hinged and sliding components covered by or adjacent to units.

B. Product Certificates: For each type of unit.

C. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but no fewer than 10 sq. yd. (9 sq. m), full width of bolt.
2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

1.9 QUALITY ASSURANCE

- A. Manufacturer: Minimum of 2 years manufacturing similar products.
- B. Installer: Minimum of 2 years installing similar products.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
 - 1. Build mockup of typical wall area as indicated on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- C. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.12 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain wall units specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units to comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

2.3 SOUND-ABSORBING WALL UNITS

- A. Sound-Absorbing Wall Panels : Manufacturer's standard panel construction consisting of facing material, 100% Wool Design Felt and Cork Composite Backing.
 - 1. Basis of Design Product: Index color blocked series, as manufactured by Filzfelt, web: www.filzfelt.com
 - 2. Materials:
 - a. Felt: 100% Wool Design Felt, 100 percent biodegradable.
 - b. Substrate: Cork composite, 3 percent pre-consumer recycled content.
 - c. Contains no formaldehyde, chemical irritants, or harmful substances.
 - d. VOC free.
 - 3. Panel Shape: As indicated on Drawings.
 - 4. Size and Thickness: As indicated on Drawings.
 - 5. Color: As selected by Architect from Manufacturer's full range.
 - 6. Mounting:
 - a. Back mounted with manufacturer's standard adhesive, secured to substrate.
 - 7. Core: Manufacturer's standard.
 - 8. Acoustical Performance: Sound absorption NRC of 0.20 in accordance with ASTM C423.

2.4 MATERIALS

- A. Core Materials: Manufacturer's standard.
- B. Facing Material: Fabric from same dye lot; color and pattern as selected by Architect from manufacturer's full range.

- C. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit.

2.5 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch (1.6 mm) for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.
 - 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align fabric pattern and grain as indicated on Drawings.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch (1.6 mm) in 48 inches (1200 mm), noncumulative.
- B. Variation of Joint Width: Not more than 1/32-inch (0.79-mm) variation from reveal line in 48 inches (1200 mm), noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials in accordance with manufacturer's written instructions.

END OF SECTION 09 84 33

SECTION 09 84 36
SOUND-ABSORBING CEILING UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
 - 1. Sound-absorbing baffle panels (ACB1).

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
 - 1. Include reflected ceiling plans, elevations, sections, and mounting devices and details.
 - 2. Include details at joints and corners; and details at ceiling intersections and intersections with walls. Indicate panel edge profile and core materials.
- C. Samples for Initial Selection:
 - 1. Include Samples of hardware and accessories involving color or finish selection.
- D. Samples for Verification: For the following products:
 - 1. Panel Edge: 12-inch- (300-mm-) long Sample(s) showing each edge profile, corner, and finish.
 - 2. Core Material: 12-inch- (300-mm-) square Sample at corner.

3. Mounting Devices: Full-size Samples.
4. Assembled Panels: Approximately 36 by 36 inches (900 by 900 mm), including joints and mounting methods.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Electrical outlets.
 2. Suspended ceiling components above ceiling units.
 3. Structural members to which suspension devices will be attached.
 4. Items penetrating or covered by units including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - f. Access panels.
 5. Show operation of hinged and sliding components covered by or adjacent to units.
- B. Product Certificates: For each type of unit.
- C. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Acoustical performance.
 - b. Warping of core.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain ceiling units specified in this Section from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.3 SOUND-ABSORBING CEILING UNITS

- A. Sound-Absorbing Baffle Panel: Manufacturer's standard panel construction consisting of facing material laminated to front and back faces and edges of core.
 - 1. Basis of Design Product: Folded Baffles 008, model BFL-LD-008 as manufactured by CSI Creative, web: www.csicreative.com
 - 2. Other Acceptable Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. Armstrong World Industries.
 - b. Acoustical Panel Systems, Inc.
 - 3. Panel Shape: As indicated on Drawings.
 - 4. Mounting: Top-edge mounted with manufacturer's standard suspension system, secured to substrate.
 - 5. Core: Manufacturer's standard.
 - 6. Edge Construction: Manufacturer's standard construction.
 - 7. Corner Detail in Elevation: As indicated on Drawings with continuous edge profile indicated.
 - 8. Facing Material: As indicated on Drawings.
 - 9. Acoustical Performance: Sound absorption NRC of 0.75 – 0.95 according to ASTM C423.
 - 10. Nominal Overall Panel Thickness: As indicated on Drawings.
 - 11. Panel Width: As indicated on Drawings.
 - 12. Panel Height: As indicated on Drawings.
 - 13. Color: As indicated on Drawings.

2.4 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated, with facing material applied to face, edges, and back border of dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.
- C. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch (1.6 mm) for the following:
 - 1. Thickness.
 - 2. Edge straightness.
 - 3. Overall length and width.
 - 4. Squareness from corner to corner.
 - 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

3.3 INSTALLATION TOLERANCES

- A. Variation from Alignment with Surfaces: Plus or minus 1/16 inch (1.6 mm) in 48 inches (1200 mm), noncumulative.
- B. Variation from Level or Slope: Plus or minus 1/16 inch (1.6 mm).
- C. Variation of Joint Width: Not more than 1/32 inch (0.79 mm) wide from reveal line in 48 inches (1200 mm), noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 09 84 36

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SECTION 09 91 23
INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Wood.
 - 2. Gypsum board.
 - 3. Concrete masonry units (CMU).
 - 4. Steel.
 - 5. Galvanized metal.
 - 6. Aluminum (not anodized or otherwise coated).
 - 7. Concrete.
- B. Surface preparation of new surfaces, priming, and finish coats specified in this Section are in addition to prepping, shop priming and surface treatment specified in other Sections. The number of coats specified for each substrate are the minimum to be provided.

1.3 RELATED REQUIREMENTS

- A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 01 81 13 "Sustainable Design Requirements".
- C. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
- D. Division 06 Sections for shop priming carpentry with primers specified in this Section.
- E. Section 09 29 00 "Gypsum Board" for Level 5 Finish Primer/Prep Coat applied to surface of Gypsum Board to provide a smooth finish.
- F. Section 09 96 00 "High-Performance Coatings" for special paint coatings.

1.4 REFERENCES

- A. Manufacturer's recommendations and specifications, including installation instructions.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.

- C. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- D. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

1.5 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g., "alkyd enamel").
 - 2. MPI product number (e.g., MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
 - 6. Resin Type.
 - 7. Total VOC Content in grams per liter.
 - 8. Solids Content by Volume SCBV (not solids by weight). All products shall be minimum 35% SCBV.
 - 9. Composition-By-Weight. Demonstrate composition by percentage related to total weight of all components.
 - 10. Film Thickness Per Coat, Wet and Dry.
 - 11. Prime Pigment: Demonstrate prime pigment by percentage related to total volume of all components.
- B. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 3. VOC content.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
1. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 2. Where sheen is specified, submit samples in only that sheen.
 3. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
 4. Allow 30 days for approval process, after receipt of complete interior finish samples by Architect.
 5. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished metals, wood cabinets, wood doors, and wall coverings, masonry, and tile have been approved.
 6. Cascade coats on Samples to show each coat required for system.
 7. Label each coat of each Sample.
 8. Label each Sample for location and application area.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same production run that match products installed. Package coating materials in unopened, factory-sealed containers for storage and identify with labels describing contents.
1. Coatings Quantity: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.
 - a. Provide two copies of the mixing formula to the Architect in addition to the instructions attached to paint containers.

1.8 CLOSEOUT SUBMITTALS

- A. Warranty: Submit specified warranty.
- B. At completion of Work of this Section, submit manufacturer's or distributor's numbered invoices showing type and quantity of products used on this Project.
- C. Coating Maintenance Manual: Upon conclusion of the project, the contractor and paint manufacturer/supplier for each paint manufacturer used shall furnish a Coating Maintenance Manual.
1. Manual shall include the following.
 - a. Area Summary with Finish Schedule.
 - b. Area Detail designating where each product, color and finish was used.
 - c. Product Data pages.
 - d. Material Safety Data Sheets (MSDS).
 - e. Care and Cleaning instructions.
 - f. Touch-up procedures.
 - g. Color samples of each color and finish used.

2. Manufacturers other than Sherwin Williams shall provide a manual which matches or exceeds the content of a "Custodian Project Color and Project Information Report" as provided by Sherwin Williams.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten (10) years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years of experience and approved by manufacturer.
- C. MPI Standards: Preparation and Workmanship; Comply with requirements in "MPI Architectural MPI Standards: Preparation and Workmanship; Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated for new construction and re-finished surfaces.
- D. Coordination of Work: Review other sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify Architect of problems anticipated using the materials specified.
- E. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Provide door and frame assembly illustrating paint color, texture, and finish.
 - c. Locate where directed by Architect.
 - d. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained within the temperature ranges required by the paint product manufacturer and at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

1.11 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain, high wind or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
1. Do not paint exterior materials when inclement weather is expected within the full drying time specified by the manufacturer.
 2. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated and dry within temperature and humidity limits specified by paint manufacturer during application and drying periods.
- D. Schedule work to avoid painting surfaces, when surfaces are exposed to direct sunlight.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in related section.
- B. Paint all surfaces exposed to weather or to view, whether or not the item or surface is specifically identified within the Contract Documents. For surfaces not specifically identified, propose compatible coating system consistent with quality of those for surrounding surfaces.
- C. The number of coats specified is the minimum to be applied. Provide paint finishes of even, uniform color, free from cloudy or mottled surfaces. Provide one additional coat as necessary where "deep colors" are selected.
- D. Non-scheduled items: Provide manufacturer's approved and recommended system as set forth in Manufacturer's "Specifications Architectural Finishes".

2.2 MANUFACTURERS

- A. Basis of Design: Components specified in this Section are manufactured by Sherwin Williams and Dunn Edwards which are the standard of quality against which the Architect will judge equivalency of materials. Other acceptable manufacturers are listed below.

1. Manufacturer: Subject to compliance with requirements, provide products of one of the following:

- a. Sherwin Williams Co. (800) 321-8194.
- b. Dunn-Edwards Corporation. (888) 337 2468.
- c. Vista Paints (714) 680-3800.
- d. PPG Architectural Coatings, www.ppgpaints.com

B. Manufacturer's proprietary names or catalog numbers are indicated for convenience in identifying products. Manufacturer's complete product catalog description and composition for indicated product names or numbers shall constitute requirements for each product specified. Products shall incorporate all attributes set forth in the manufacturer's catalog description for the specified item, except for such modifications thereto as may be indicated in the Contract Documents.

C. Products: Subject to compliance with requirements, provide one of the products listed in following articles for the paint category indicated.

D. Source Limitations: Provide paints and finishes from the same manufacturer to the greatest extent possible. Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided Architect's approval is obtained using the specified procedures for substitutions.
2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
3. Substitutions: See Division 01 Section "Substitutions".
4. Provide product data documenting conformance to specified requirements and provide all specified information as listed above in SUBMITTALS article. Failure to include all information specified is grounds for rejection of substitution.

E. Discontinued or Unavailable Products: Paint and coating regulations and products are in continuous flux. In the event that specified products are discontinued, superseded or otherwise unavailable, submit manufacturer's recommended alternate with written recommendation signed by product representative. Intent of the specification is to provide manufacturer's current premium grade products for all coating systems and substrates and comply with prevailing regulations.

2.3 PAINT MATERIALS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As indicated on Drawings. If no colors are indicated, request color and sheen selections from the Architect.

1. To be selected from manufacturer's full range of available colors.
2. Selection to be made by Architect after award of contract.

3. Allow for minimum of four colors for each system, unless otherwise indicated, without additional cost to Owner.
 4. Extend colors to surface edges; colors may change at any edge as directed by Architect.
 5. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
 6. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color-coding scheme indicated.
- C. Detailed specifications for the various surfaces are shown in the Paint Schedule at the end of this Section. If these specifications conflict with the recommendations of the manufacturer, this discrepancy shall be brought to the attention of the Owner's Representative, the Owner's Representative shall decide which method shall be followed.
- D. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- E. Volatile Organic Compound (VOC) Content: Comply with requirements specified in related section.
1. Provide products conforming with local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product does not comply with current requirement, provide conforming product at no additional cost.
- F. Chemical Content: The following compounds are prohibited:
1. Intentionally added methylene chloride or perchloroethylene.
 2. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 3. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di
 4. (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, ethylene glycol, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.
- G. Flammability: Comply with applicable code for surface burning characteristics.
- H. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

1. Finish Sheen: The following designations are measured in percentage of reflectance when viewed at a 60-degree angle. Provide manufacturer's standard sheen most closely matching the characteristic of specified sheen.

- a. Flat: 0-5%.
- b. Velvet: 5-9%.
- c. Eggshell: 10-15%.
- d. Low Sheen: 20-25%.
- e. Semi-Gloss: 40-50%
- f. Gloss: 70-80%
- g. High Gloss: >85%

- I. Colors: To be selected from manufacturer's full range of available colors.

1. Selection to be made by Architect after award of contract.
2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under unless accent colors are denoted.

- J. Fabricate in accordance with the Color Schedule issued by the Architect, which will include both standard colors and special, non-standard colors.

1. If deep colors are not available in a specified product, propose alternate formula for approval
2. Tint undercoats slightly to approximate finish coat color.

2.4 PRIMERS

- A. Primers: As required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

2.5 ACCESSORY MATERIALS

- A. Accessory Materials: Provide base coats, barrier coats, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Sanding materials: 120-180 grit, for architectural woodwork, finish carpentry, wood doors, or other surfaces requiring touch-up.
- C. Patching Material: Latex filler.
- D. Fastener Head Cover Material: Latex filler.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.
- F. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
- G. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

3.2 PROTECTION OF ADJACENT WORK

- A. Protect surrounding elements from damage from painting procedures. Provide temporary facilities and barricades required. Additional requirements specified in Division 01.
- B. Carefully remove and store removable items located in areas to be painted, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.
- C. Separate areas to be protected from painting areas using means adequate to prevent damage.
- D. Cover existing landscaping with tarpaulins or similar covers.
- E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.
- F. Close off adjacent occupied areas with dust proof and weatherproof partitions.
- G. Protect floors and surfaces from damage with 1/2-inch plywood laid on surfaces over full extent of work area and traffic route.
- H. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

3.3 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.4 PREPARATION - EXISTING SURFACES

- A. General: As specified above and as follows below. For substrates not listed, prepare as recommended by paint manufacturer.

- B. Remove or repair existing coatings that exhibit surface defects or lack of adhesion. Feather-edge patches to make finished edges inconspicuous.
- C. Existing Cement Plaster Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Surfaces to be clean, dry, free of dirt, dust, grease, oil, mildew, efflorescence and other contaminants affecting paint adhesion or performance. Completely remove all loose, peeling or checked paints by power-washing, scraping or other methods. Spot-prime and point-up cracks, voids or other surface fissures by methods recommended by paint manufacturer. Spot-prime again following patching. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- D. Existing Gypsum Board Surfaces to be Painted: Remove dirt, loose texturing, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Surfaces to be clean, dry, free of dirt, dust, grease, oil, mildew, efflorescence and other contaminants affecting paint adhesion or performance. Completely remove all loose, peeling or checked paints by sanding, scraping or other methods. Fill all holes and defects with suitable patching or spackling material compatible with the substrate material, allow to completely dry and sand to approximate existing adjacent textures. Spot prime patched areas.
- E. Existing Metal Surfaces with Existing Coatings to be Recoated; sheet metal flashings and trim, hollow metal doors, frames, columns and similar items. Sand and scrape to remove existing finishes, loose primer and rust. Clean surfaces with solvent. Prime bare metal surfaces. Feather edges to make touch-up patches inconspicuous.
- F. Existing Wood to Receive Opaque Finish: Completely remove all loose, peeling chalking, flaking or peeling paint by pressure-washing, scraping, wire brushing, sanding or other appropriate methods which will not damage existing substrates or adjacent finishes. Dull glossy surfaces to provide roughened surface for proper adhesion. Remove all loose sealant and glazing compounds. Feather back rough paint edges and weathered wood material by sanding. Spot prime all areas before and after application of new sealants, patching or glazing materials. Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior sealant compound after prime coat has been applied. Remove mildew growth as recommended by paint manufacturer.
- G. Existing Wood Surfaces Previously Stained with Semi-Transparent or Transparent finishes: Prepare as for Existing Wood to Receive Opaque Finish and as follows; Completely remove existing finishes to bare wood. Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces. Apply finish stains of selected colors, equal to or darker than original finish, blending carefully to achieve color and finish uniformity.
- H. Existing Wood Doors to be Field-Finished: Patch, fill holes and defects, sand and clean. Seal wood door top, bottom edge and minor defects in surfaces with clear sealer. Finish otherwise as for Existing Wood Surfaces Previously Stained with Semi-Transparent or Transparent finishes.
- I. Existing Metal Doors to be Painted: Sand, patch, clean with solvent. Prime metal door top and bottom edge surfaces. Finish otherwise as for Existing Metal Surfaces With Existing Coatings to be Recoated.

3.5 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Provide full number of coats specified for each coating system indicated. Where recommended alternate compatible primers or undercoats require fewer coats than specified products, provide additional finish coat so that specified number of coats is not reduced.
- C. Intermediate Coat: Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- F. Back-prime all concealed surfaces of finish carpentry, architectural woodwork, wood doors and unclad wood windows.
- G. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- H. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.

- b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.6 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
- 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.7 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. Upon completion of the painting work, clean window glass and other paint-splattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Provide "Wet Paint" signs as required to protect newly-painted finishes.
- D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
- F. Below up Adjusting: Following owner's move-in and occupancy at a time acceptable to the Owner, touch-up and adjust blemishes and other defects incurred by move-in operations and the actions of the Owner and their separate contractors. Limit: Two workers for two full days labor, per building.

3.8 SCHEDULE - SURFACES TO BE FINISHED

- A. Do Not Paint or Finish the Following Items:
- 1. Items that are factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.

2. Items indicated to receive other finishes.
 3. Items indicated to remain unfinished.
 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead items.
 6. Marble, granite, slate, and other natural stones.
 7. Ceramic and other types of tiles.
 8. Pre-finished wall, ceiling and floor materials or coverings, unless specifically scheduled for field painting.
 9. Floors, unless specifically indicated.
 10. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco unless specifically indicated.
 11. Glass.
 12. Concealed pipes, ducts, and conduits.
- B. General: Paint the surfaces described below under Schedule - Paint Systems and as indicated in Schedule on Drawings. All surfaces exposed to weather, or visible to the eye, exterior and interior, unless specifically excluded by the Article titled "Do Not Paint or Finish the Following Items". If a coating system is not specified for a particular surface or substrate, provide a three-coat finish system recommended by the paint or coating manufacturer for that surface or substrate. Include all preparation necessary as appropriate for a similar substrate listed in the Article titled "PREPARATION", or preparation for that substrate as recommended by the paint or coating manufacturer.
- C. Mechanical and Electrical: Use paint systems defined for the materials to be finished.
1. Paint all conduit, insulated and exposed pipes, boxes, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and exposed ducts occurring in finished areas to match background surfaces, unless otherwise indicated.
 2. Paint all equipment, including that which is factory-finished, exposed to weather or to view on the roof and outdoors.
 3. Paint shop-primed items occurring in finished areas.
 4. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
 5. Paint dampers exposed behind louvers, grilles, to match face panels.
- D. Paint behind moveable equipment and furniture.
- E. Finish top, bottom, and side edges of interior doors the same as exposed faces.
- F. Paint access doors, fire hose and extinguisher cabinets, panelboards, conduits and exposed plumbing piping.
- G. Paint all exposed and semi-exposed galvanized metal, projections through and on roofs.
- H. Paint reveal moldings, expansion joints, and handrails.
- I. Paint tube column and miscellaneous connections.
- J. Provide split finishes for painted doors and interior windows where different connected room colors are selected.
- K. Paint continuous surfaces with the same paint system. Do not change systems at elevation breaks.

- L. Touch-up factory paint finishes where damaged.
- M. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

3.9 INTERIOR PAINT SCHEDULE – CONCRETE AND MASONRY

- A. If products in this schedule are discontinued or unavailable, submit latest alternate products by the same manufacturer, with letter signed by manufacturer's representative describing the reason for change.
- B. Concrete – Acrylic Latex, Satin Sheen: Verify sheen with Architect.
 - 1. Satin Acrylic Latex System Finish (Satin Level 4): Two finish coats over a primer.
 - a. Primer Coat: 4.0 mils WFT, 1.4 mils DFT.
 - b. Intermediate: 4.0 mils WFT, 1.6 mils DFT.
 - c. Final Coat: 4.0 mils WFT, 1.6 mils DFT.
 - 2. Sherwin Williams Products:
 - a. Loxon Concrete & Masonry Primer LX02
 - b. ProMar 200 Zero VOC Eg-shel, B20W2651
 - c. ProMar 200 Zero VOC Eg-shel, B20W2651
 - 3. Dunn-Edwards Products:
 - a. Ultra-Grip Multi-Surface Primer, UGPR00, 2.0 mil D.T.M.
 - b. Spartawall Zero VOC Interior Latex Eggshell, SWLL30 1.5 mils D.T.M.
 - c. Spartawall Zero VOC Interior Latex Eggshell, SWLL30 1.5 mils D.T.M.

3.10 INTERIOR PAINT SCHEDULE – METAL

- A. If products in this schedule are discontinued or unavailable, submit latest alternate products by the same manufacturer, with letter signed by manufacturer's representative describing the reason for change.
- B. AESS fabrications, handrails, guards, and similar items for high performance finish: Refer to Section 09 96 00 "High Performance Coatings".
- C. Metal Surfaces, All – Catalyzed Epoxy (Gloss Sheen):
 - 1. Acrylic Epoxy Coating "Low VOC" Finish (Gloss Sheen): Two finish coats.
 - a. Clean with phosphoric acid or water based cleaner, remove all oil and debris.
 - b. First Coat: 5 mils DFT.
 - c. Top Coat: 5.0 mils DFT.
 - 2. Sherwin-Williams Products:
 - a. Pro Industrial ProCryl Primer, B66W1310
 - b. Pro Industrial Catalyzed Water based Epoxy, B73-00
 - c. Pro Industrial Catalyzed Water based Epoxy, B73-300

3. Dunn-Edwards Products:
 - a. Galvanized Metal Primer: Ultrashield Galvanized Metal Primer USGM00, 2.0 mils DTM.
 - b. All Other Metals, Primer: Bloc-Rust Rust Preventive Primer BRPR00-1 WH or BRPR00-1 RO, 2.0 mils DTM.
 - c. Endura-Coat Low VOC Single Component Industrial Coating ENCT60, 1.5 mils DTM.
 - d. Endura-Coat Low VOC Single Component Industrial Coating ENCT60, 1.5 mils DTM.
- D. Metal Surfaces: Non-Ferrous Metals and Zinc-Coated (Galvanized) Steel.
1. Semi-Gloss Acrylic-Enamel Finish: Two finish coats over a primer.
 - a. Primer Coat: 5.0 - 10.0 mils WFT, 2.0 – 4.0 mils DFT.
 - b. Intermediate: 6.0 - 12.0 mils WFT, 2.5 – 4.0 mils DFT.
 - c. Final Coat: 6.0 - 12.0 mils WFT, 2.5 – 4.0 mils DFT.
 2. Sherwin Williams Products:
 - a. ProCryl Universal Primer Cross Linking Acrylic, B66-1310.
 - b. Pro Industrial Acrylic Semi-Gloss, B66-650.
 - c. Pro Industrial Acrylic Semi-Gloss, B66-650
 3. Dunn-Edwards Products:
 - a. Ultra-Grip Multi-Surface Primer UGPR00 2.0 mils D.T.M.
 - b. Aristoshield Interior/Exterior Urethane Alkyd Semi-Gloss ASHL50 1.5 mils D.T.M.
 - c. Aristoshield Interior/Exterior Urethane Alkyd Semi-Gloss ASHL50 1.5 mils D.T.M.
- E. Metal Surfaces: Ferrous Metals- Uncoated:
1. Gloss Acrylic-Enamel Finish (Gloss Level 6): Two finish coats over a primer.
 - a. Primer Coat: 5.0 - 10.0 mils WFT, 2.0 – 4.0 mils DFT.
 - b. Intermediate: 4.0 mils WFT, 1.5 mils DFT.
 - c. Final Coat: 4.0 mils WFT, 1.5 mils DFT.
 2. Sherwin Williams Products:
 - a. Pro Industrial ProCryl I Primer B66-1310.
 - b. Pro Industrial Pre-Catalyzed Water based Urethane, B65-1120.
 - c. Pro Industrial Pre-Catalyzed Water based Urethane, B65-1120
 3. Dunn-Edwards Products:
 - a. Bloc-Rust Rust Preventive Primer BRPR00-1 WH or BRPR00-1 RO, 2.0 mils DTM.
 - b. Endura-Coat Low VOC Single Component Industrial Coating ENCT60, 1.5 mils DTM.
 - c. Endura-Coat Low VOC Single Component Industrial Coating ENCT60, 1.5 mils DTM.

3.11 INTERIOR PAINT SCHEDULE – WOOD

- A. If products in this schedule are discontinued or unavailable, submit latest alternate products by the same manufacturer, with letter signed by manufacturer's representative describing the reason for change.
- B. Interior Wood Glu-lam Beams, Heavy Timbers, Ceiling Planks and similar items for transparent finish: Refer to Section 09 93 00 "Wood Stains & Transparent Finishes".
- C. Wood Substrates: Including wood trim and plywood backboards (Semi-Gloss):
 - 1. Semi-Gloss Acrylic-Latex System Finish (Gloss Level 5): Two finish coats over a primer.
 - 1. Acrylic-Latex System Finish: Two finish coats over a primer.
 - a. Primer Coat: 4.0 mils WFT, 1.4 mils DFT.
 - b. Intermediate:
 - 1) Application Thickness: 4.0 mils WFT, 1.6 mils DFT.
 - c. Final Coat: 4.0 mils WFT, 1.6 mils DFT.
 - 2. Sherwin Williams Products:
 - a. PrepRite ProBlock Acrylic Latex Primer, B51 Series.
 - b. ProMar 200 Zero Latex Semi-Gloss, B31-2600.
 - c. ProMar 200 Zero Latex Semi-gloss, B31-2600
 - 3. Dunn-Edwards Products:
 - a. Ultra-Grip Multi-Surface Primer UGPR00 2.0 mils D.T.M.
 - b. Spartawall Zero VOC Interior Latex Semi-Gloss, SWLL50, 1.5 mils DTM.
 - c. Spartawall Zero VOC Interior Latex Semi-Gloss, SWLL50, 1.5 mils DTM.

3.12 INTERIOR PAINT SCHEDULE – PLASTER AND GYPSUM BOARD

- A. If products in this schedule are discontinued or unavailable, submit latest alternate products by the same manufacturer, with letter signed by manufacturer's representative describing the reason for change.
- B. Plaster & Gypsum Wallboard (Eggshell Sheen):
 - 1. Vinyl Acrylic - "Low VOC" Finish: Two finish coats over a primer, verify sheen with Architect.
 - a. Primer Coat*: 4.0 mils WFT, 1.0 mils DFT.
 - b. Intermediate: 4.0 mils WFT, 1.7 mils DFT.
 - c. Final Coat: 4.0 mils WFT, 1.7 mils DFT.
 - 2. Sherwin Williams Products:
 - a. ProMar 200 Zero Interior Latex Primer, B28W2600
 - b. ProMar 200 Zero VOC Eg-shel, B20W2651
 - c. ProMar 200 Zero VOC Eg-shel, B20W2651

3. * Dunn-Edwards Products:

- a. Vinylastic Select Zero VOC Interior Latex Wall Sealer VNSL00, 2.0 mils DTM.
- b. Spartawall Zero VOC Interior Latex Eggshell, SWLL30, 1.5 mils DTM.
- c. Spartawall Zero VOC Interior Latex Eggshell, SWLL30, 1.5 mils DTM.

Note:* Surfaces that were prepared to a Level 5 Finish, using the Level 5 Primer/Prep Coat (as specified in related section “Gypsum Board) may omit primer coat noted above. Verify with paint manufacture that this primer is compatible with the finish coats as specified.

C. Gypsum Wallboard and Concrete– Catalyzed Epoxy (Gloss Sheen):

- 1. Acrylic Epoxy Coating “Low VOC” Finish (Gloss Sheen): Two finish coats over a primer.
 - a. Primer Coat: 4.0 mils WFT, 1.0 mils DFT.
 - b. Intermediate: 2-3.0 mils DFT.
 - c. Top Coat: 2-5.0 mils DFT.
- 2. Sherwin-Williams Products:
 - a. ProMar 200 Zero Interior Latex Primer, B28W2600
 - b. Pro Industrial Catalyzed Water based Epoxy, B73-300
 - c. Pro Industrial Catalyzed Water based Epoxy, B73-300
- 3. Dunn-Edwards Products:
 - a. Primer: Vinylastic Wall Sealer VNPR00 2.0 mils D.T.M.
 - b. Enduracat Pre-Catalyzed, Single Component Epoxy, ENPX60, 1.5 mils DTM.
 - c. Enduracat Pre-Catalyzed, Single Component Epoxy, ENPX60, 1.5 mils DTM.

END OF SECTION 09 91 23

SECTION 09 96 00
HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Block fillers.
- 2. Metal primers.
- 3. Polyurethane coatings.

- B. Related Requirements:

- 1. Section 01 43 39 "Mockup Requirements".
- 2. Section 05 12 00 "Structural Steel Framing" for shop priming structural steel substrates with primers specified in this Section.
- 3. Section 05 52 13 "Pipe and Tube Railings" for shop priming pipe and tube railings with coatings specified in this Section.
- 4. Section 09 91 23 "Interior Painting" for general field painting.

1.3 ACTION SUBMITTALS

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

- 1. Include preparation requirements and application instructions.
- 2. Indicate VOC content.

- B. Samples: For each type of topcoat product.

- C. Samples for Initial Selection: For each type of topcoat product.

- D. Samples for Verification: For each type of coating system and each color and gloss of topcoat. Submit paint manufacturer's standard printed cards for verification Samples.

- 1. Submit Samples on actual substrate material to be coated, 8 inches (200 mm) square.
- 2. Apply coats on Samples in steps to show each coat required for system.
- 3. Label each coat of each Sample.
- 4. Label each Sample for location and application area.

- E. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in High-Performance Coating Schedules. Include color designations and production runs (batch numbers).

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same production run (batch number), that match coating system products applied and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.5 MOCKUPS

- A. Apply mockups of each coating system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

- 1. Architect will select one surface to represent surfaces and conditions for application of each coating system.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

- 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
- C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each coating system product from single source from single manufacturer.

2.2 HIGH-PERFORMANCE COATING PRODUCTS, GENERAL

- A. High-Performance Coating Products: Subject to compliance with requirements, provide one of the products listed in product types below and applicable exterior and interior high-performance coating schedule articles for the coating category indicated.
- B. Material Compatibility:
 - 1. Materials for use within each coating system must be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
 - 2. For each coat in a coating system, provide products recommended in writing by topcoat manufacturer for use in system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

- A. Latex Block Filler: Water-based, pigmented, high-solids, emulsion coating formulated to bridge and fill porous surfaces of CMU substrates in preparation for specified subsequent coatings.

2.4 INTERIOR PRIMERS/SEALERS

- A. Interior Latex Primer Sealer: Pigmented, water-based latex sealer; formulated to reduce porosity of substrate for finish coats; for use on new interior plaster, concrete, and gypsum board substrates. Not intended for use on wood or previously painted surfaces.
- B. Wood-Knot Sealer: White shellac or other sealer recommended in writing by manufacturer for this purpose.

2.5 METAL PRIMERS

- A. Water-Based, Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer; formulated for resistance to flash rusting when applied to cleaned, ferrous metal substrates subject to mildly corrosive environments.

2.6 POLYURETHANE COATINGS

- A. Pigmented Polyurethane: Solvent-based, two-component coating formulated for resistance to abrasion, weathering, and chemical and solvent exposure; for use on interior or exterior substrates.
 - 1. Gloss Level: Manufacturer's standard semigloss.

HIGH-PERFORMANCE COATINGS

09 96 00 - 3

Fontana City Hall – Phase II

2.7 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor to remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, both coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Cementitious Composition Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Portland Cement (Plaster Stucco): 12 percent. Verify that plaster is fully cured.
 - 6. Gypsum Board: 12 percent. Verify that finishing compound is dry and sanded smooth.
- C. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and coating systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

- C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi (10 350 to 27 580 kPa) at 6 to 12 inches (150 to 300 mm).
 - 2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or alkalinity of mortar joints exceeds that permitted in manufacturer's written instructions.
 - 1. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psi (690 to 4140 kPa) at 6 to 12 inches (150 to 300 mm).
- F. Steel Substrates: Remove loose rust, loose mill scale, loose shop primer, and other foreign matter. Clean using methods recommended in writing by coating manufacturer but not less than the following:
 - 1. SSPC-SP 7/NACE No. 4.
 - 2. SSPC-SP 11.
 - 3. SSPC-SP 6/NACE No. 3.
 - 4. SSPC-SP 10/NACE No. 2.
 - 5. SSPC-SP 5/NACE No. 1.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized Metal Substrates: Remove grease and oil residue from galvanized metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer that is recommended in writing by topcoat manufacturer for coating system indicated.
 - 2. Sand surfaces that will be exposed to view and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with filler that is recommended in writing by topcoat manufacturer for coating system indicated. Sand smooth when dried.

3.3 APPLICATION OF HIGH-PERFORMANCE COATINGS

- A. Apply coating system products in accordance with manufacturer's written instructions.

1. Use applicators and techniques suited for coating and substrate indicated.
 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. 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.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
1. Touch up and restore coated surfaces damaged by testing.
 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written instructions, apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written instructions.
 3. Cost of retesting is Contractor's responsibility.

3.5 CLEANING AND PROTECTION

- A. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- B. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- C. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE, METAL SUBSTRATES

- A. Steel Substrates:
1. Pigmented Polyurethane over Epoxy Zinc-Rich Primer and High-Build Epoxy System:
 - a. Prime Coat: Primer, zinc rich, epoxy.
 - b. Intermediate Coat: Epoxy, high build, low gloss.
 - c. First and Second Topcoat: Pigmented polyurethane, gloss.

HIGH-PERFORMANCE COATINGS

09 96 00 - 6

Fontana City Hall – Phase II

END OF SECTION 09 96 00

HIGH-PERFORMANCE COATINGS
09 96 00 - 7
Fontana City Hall – Phase II

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SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Room identification.
 - 2. Accessibility signage.
 - 3. Directional and informational signage.
 - 4. Code Required Signage.

1.3 RELATED REQUIREMENTS

- A. Pertinent sections specifying Sustainable Design Requirements.
- B. Section 09 22 16 "Non-Structural Metal Framing" for backing to support signage at metal framing.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.
- C. Americans with Disabilities Act Title II Regulations Part 35 Nondiscrimination Basis of Disability in State and Local Government Services.
- D. Americans with Disabilities Act Title III Regulations Part 36 Nondiscrimination Basis of Disability in Public Accommodations and Commercial Facilities.
- E. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.5 DEFINITIONS

- A. ADASAD: Americans with Disabilities Standards for Accessible Design.

SIGNAGE

10 14 00 - 1

Fontana City Hall – Phase II

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
 - 1. Manufacturer's standard construction details, including materials, dimensions of individual components, profiles, and finishes for each type of sign required. Provide manufacturer's recommendations for maintenance and cleaning requirements for interior sign surfaces.
- B. Shop Drawings: Submit for each type of sign. Include the following:
 - 1. Signage Plan: Contractor-generated building plans showing the locations of signs. The exact final locations of signs shall be directed by the Owner and as required by code. Contractor shall arrange for meeting at the Project site to accommodate the Owner's direction of final locations.
 - a. Use same sign designations in submittals as indicated on Contractor's Sign Types Drawing.
 - 2. Sign Elevations.
 - 3. Details of fabrication, attachment and erection.
 - 4. Include materials, shapes, dimensions, finishes, anchorage, and method of connections.
 - 5. Show letter spacing, line spacing, fonts, colors and dimensions of letter heights.
 - 6. Anchors, accessories, layout, and installation details.
 - 7. Submit message list for each sign to be provided, including large-scale details of wording and layout of lettering.
 - 8. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
- C. Samples: Provide three sets, nonreturnable, of the following samples of each sign type for verification of compliance with requirements indicated.
 - 1. Material Samples: For verification of color, pattern, and texture selected, and compliance with requirements indicated.
 - a. Acrylic Sheet: Provide a sample panel not less than 8-1/2-inches by 11-inches with a representative sample of graphic image required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.Vinyl Film: Samples of each decal type, not less than 4-inches square.
 - 2. Submit full-size patterns of each sign type with solid black letterforms and graphic elements of a white background with sign face outlined. Typography must be represented in exact typeface and letter spacing specified either as film positives to photocopies produced from camera-ready artwork or typesetting or as pen plots when computer-cut lettering is specified. Graphic elements must be represented either by film positives or photocopies produced from camera-ready artwork.
 - 3. Submit non-returnable samples of each lettering type, finish, color and exposed material to be used in the Work.
- D. Qualification Data:
 - 1. For fabricator and installer.
- E. Operations and Maintenance Data: Submit instructions for maintenance tasks, including cleaning and repair, within the capabilities of Owner's maintenance staff.

- F. Warranty: Special warranty specified in this Section.

1.7 QUALITY ASSURANCE

- A. Installer's Qualifications: Installer shall be either the fabricator or a firm approved by the fabricator which specializes in installation of interior signage, having a minimum of 5 years full time experience installing signage of similar scope and complexity.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements of Division 01.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

1.10 PROJECT COORDINATION

- A. Meet with Owner and confirm in writing all room numbers, copy and layout, and sign quantities prior to production.

1.11 WARRANTY

- A. Signing Warranty:
 - 1. Submit a 5-year written warranty, effective the date of Completion of the Work, signed by the sign subcontractor and installer, agreeing to repair or replace work at no cost to the Client that has failed as a result of defects in materials or workmanship or installation. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at the convenience of the Client or client's design consultant.
- B. Polyurethane Acrylic Paint Factory Finish Warranty:
 - 1. Submit a 5-year written warranty, warranting that the factory-applied linear polyurethane finishes will not develop excessive fading or excessive non-uniformity of color or shade, and will not crack, peel, pit, corrode or otherwise fail as a result of defects in materials or workmanship within the following defined limits. Upon notification of such defects, within the warranty period, make necessary repairs or replacement at no cost to the Client at the convenience and approval of the Client or client's design consultant.
- C. The Sign Fabricator shall strictly adhere to the fabrication and application specifications of all applied materials of manufacturer to ensure the full five (5) year contractual warranty and the full five (5) year manufacture warranty.

- D. Braille Certification: Contractor shall certify braille translation corresponds with raised text, meets and complies with CBC requirements and California Grade II Braille. Should a discrepancy be discovered after completion of the work, the Contractor is responsible to immediately replace the sign and make necessary repairs at no cost to the owner.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in related section.
- B. Regulatory Requirements: Comply with applicable provisions in the following:
 - 1. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.
 - 2. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
 - 3. ICC/ANSI A117.1.
 - 4. In case of conflict, follow the more stringent requirements.

2.2 SIGN MATERIALS

- A. Exterior sign material must withstand exterior elements, corrosion resistant , UV resistant. Applied vinyl film if used must not peel, fall off, or discolor. Braille dots vandal resistant.
- B. Cast Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- C. Colored Coatings for Acrylic Plastic Sheet: As recommended by acrylic manufacturers, including inks and paints for copy and background colors, for optimum adherence to acrylic surface and that are non-fading for application intended.
- D. Vinyl Film: Opaque non-reflective vinyl film, 0.0036 inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior as well as interior applications.

2.3 ACRYLIC PLAQUE SIGNS

- A. Acrylic Signage: Signs complying with requirements of CBC Section 11B-703.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - 1. Alpha Dog ADA Signs, <https://alphadogadasigns.com> .
 - 2. Compliance Signs, www.compliancesigns.com .
 - 3. Mohawk Sign Systems, www.mohawksign.com .
- C. Toilet Room Door Symbols: Shop fabricated signs with pictograms as indicated on the Drawings.
 - 1. Sizes: As indicated on Drawings.
 - a. At MEN, provide equilateral triangle per CBC.

- b. At WOMEN, provide circle per CBC.
 - c. At UNISEX, provide circle and superimpose on and geometrically inscribe equilateral triangle per CBC.
- D. Room Occupancy Signage: Shop fabricated signs with maximum occupancy numbers as indicated on Drawings.
 - 1. Size: As indicated on Drawings.
 - 2. Colors: As indicated on Drawings.

2.4 TACTILE SIGNAGE CHARACTERS

- A. Character (Letter and Number) Style: Characters size as indicated on the Drawings per Campus sign standards and comply with CBC. Character style shall be Sans Serif uppercase letters, accompanied by Contracted Grade 2 Braille. Lettering to be raised minimum 1/32 inches (0.794 mm) above sign surface.

2.5 BRAILLE

- A. Braille Indicators: On surface of signs where required, provide Braille symbols corresponding to sign text, in compliance with CBC Section 11B-703. Braille symbols to be Contracted Grade 2, with dots 1/10-inch (2.54 mm) on centers within each cell and 2/10-inch (5.08 mm) space between cells. Dots to be raised a minimum of 1/40 inch (0.635 mm) above background, domed or rounded.

2.6 FABRICATION

- A. Fabricate all work in accordance with the approved Shop Drawings.
- B. All cutting, fabrication and assembly to be done in the factory and shipped to the job site as one complete unit, unless approved by the Owner.
- C. All priming, surface preparation and paint application to be in accordance with the manufacturer's written data, description and instructions for that type of material.
- D. All signs to be flat, true and free of waviness.
- E. Raised characters must not have sharp or abrasive edges and corners.

2.7 FINISHES, GENERAL

- A. All finishes, including coatings, shall be non-glare to meet requirements of CBC 11B-703.
- B. Metal Finishes:
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work:

1. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.8 FINISHING MATERIALS

- A. Acrylic Polyurethane Paints: Factory applied baked acrylic polyurethane enamel paint that is UV resistant.
 1. Manufacturer: Matthews Paint (MPC); tel: (800) 323-6593; web: www.mathewspaint.com.
- B. Silk Screening Materials:
 1. Provide photo processed screening, arranged to furnish sharp and solid images without edge build-up or bleeding of the coating. Pattern-cut screens may be used for non-repeat copy, provided that final image copy is equal to photo screen quality. Provide only non-glare weather-resistant coating materials, compatible with the intended substrates.
- C. Vinyl Die-Cut and Pattern Cut-out Graphics:
 1. Use pressure-sensitive, non-yellowing, non-peeling and weather resistant vinyl as specified.

2.9 ACCESSORIES

- A. Mounting Methods:
 1. Use concealed fasteners or other products for attachment indicated fabricated from materials that are not corrosive to sign material and mounting surface.
- B. Adhesive: Provided or recommended by manufacturer; compatible with substrates.
 1. Comply with VOC content limits specified in related section.
 2. Two-Sided Tape:
 3. Silicone adhesive:

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with installer present, for compliance with requirements for levelness, wall plumbness, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Perform work in cooperation with other trades and verify size, location and placement of all signage. Coordinate field measurements and Shop Drawings with fabrication and shop assembly.

- B. Where adhesive is specified, only adhesives specifically recommended by the manufacturer for compatibility with the base materials and adhesive strength shall be used.
- C. Sign faces and material shall utilize proper adhesives and shall be smooth, consistent, free of bubbles, bulging and foreign matter.
- D. All finished work shall be non-glare, smooth, free of scratches, gouges, and other imperfections. Sign edges shall be straight, smooth, free of cutting marks and other defects.
- E. Restore all adjoining structures and surfaces of finishes where damaged or soiled by the sign installation. Restoration shall be performed by the Sign Fabricator or by original Trades if requested by the Owner.
- F. Repair and replace materials or signs damaged during installation.
- G. Retain protective coverings on signage and remove only when there is no possibility of damage from other work to be performed at the same location.

3.3 SIGNAGE INSTALLATION

- A. Locate signage and accessories as indicated on the Drawings and as directed by Owner. Install signage using mounting methods of the type described and in compliance with the manufacturer's instructions and recommendations.
 - 1. Layout: Conform to layout information on reviewed shop drawings and as generally indicated on the Drawings. Locate signage to coordinate with joints and panel edges of substrate construction.
 - 2. Fastening: Secure signage to substrate with anchoring method and fasteners as specified and as recommended by signage manufacturer. Make all penetrations of building envelope watertight.
 - 3. Alignment: Install signage level, plumb, and at the height indicated, with sign surfaces free from distortion or other effects in appearance.
 - 4. All signage is to be clean and free of all glue, tape and other extraneous materials.
 - 5. All signage is to be free of fabricator's logo or identification.
- B. Wall-Mounted Tactile Signs:
 - 1. Install signs on walls per CBC adjacent to latch side of single doors; on the right side of right leaf at double doors with two active leaves, or on the inactive leaf at double doors with one active leaf.
 - a. Locate so that a clear floor space of 18 inches minimum by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.
 - 2. Interior Sign Anchorage:
 - a. Two-Sided Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - b. Silicone Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
 - 3. Signs Mounted on Glass: Provide black opaque decal, matching in size, on opposite side of glass to conceal mounting materials.

3.4 CLEANING

- A. All debris relating to signage installation must be removed from the areas of the project after completion of the installation phase.
- B. Provide in writing any specific signage maintenance specifications or up keep instructions to the Client. This information relates specifically to the needs of all provided sign types contained in this document.

3.5 SIGNAGE SCHEDULE

- A. Exit Identification Signs: Acrylic plaques.
- B. Toilet Room Identification Signs: Acrylic plaques.
- C. Toilet Room Door Signs: Acrylic plaques.
- D. Maximum Occupancy Signs: Acrylic plaques.
- E. Exterior Signage: Material shall not corrode, peel, delaminate or fade. As selected by Architect.

END OF SECTION 10 14 00

SECTION 10 14 19
DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cast dimensional characters.
 - 2. Illuminated, molded-plastic dimensional characters.

1.2 DEFINITIONS

- A. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.3 COORDINATION

- A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
 - 4. Show locations of electrical service connections.
 - 5. Include diagrams for power, lighting, signal, and control wiring.
- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Dimensional Characters: Full-size Sample of each type of dimensional character.
 - 2. Exposed Accessories: Full-size Sample of each accessory type.
 - 3. Full-size Samples, if approved, will be returned to Contractor for use in the Project.
- E. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DIMENSIONAL CHARACTERS

- A. Water Jet Cut Aluminum Character: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
 - 1. Character Material: Water jet cut aluminum.
 - 2. Character Height: As indicated on Drawings.
 - 3. Thickness: As indicated on Drawings.

DIMENSIONAL LETTER SIGNAGE

10 14 19 - 2

Fontana City Hall – Phase II

4. Finishes: As indicated on Drawings.
5. Mounting: As indicated on Drawings.
6. Typeface: As indicated on Drawings

2.3 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish hot-dip galvanized devices unless otherwise indicated.
 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 4. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
 - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
 - c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
- B. Adhesive: As recommended by sign manufacturer.
- C. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly

- mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
 6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
 7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match Architect's sample color unless otherwise indicated.
 2. Stainless Steel Brackets: Factory finish brackets to match Architect's sample finish unless otherwise indicated.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

- A. Superior-Performance Organic Finish, Three-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
1. Color and Gloss: Custom factory finish as per schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that electrical service is correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF DIMENSIONAL CHARACTERS

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
 - 3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

DIMENSIONAL LETTER SIGNAGE

10 14 19 - 5

Fontana City Hall – Phase II

4. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position, so that signage is correctly located and aligned.
5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 19

SECTION 10 21 13
STAINLESS STEEL TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Stainless steel toilet compartments.
- B. Related Requirements:
 - 1. Section 01 81 13 "Sustainable Design Requirements."
 - 2. Section 05 50 00 "Metal Fabrications" for supports that attach wall anchored compartments to overhead structural system.
 - 3. Section 10 28 00 "Toilet and Shower Accessories" for accessories mounted on toilet compartments.

1.3 COORDINATION

- A. Coordinate requirements for blocking, reinforcing, and other supports concealed within wall to ensure that toilet compartments can be supported and installed as indicated.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Stainless steel toilet compartments.
 - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Shop Drawings:
 - 1. Shop drawings shall be submitted electronically using the Project BIM model for coordination and location of back plate supports.
 - 2. Include plans, elevations, sections, details, and attachment details.
 - 3. Show locations of cutouts for door hardware.
 - 4. Show locations of reinforcements for compartment-mounted grab bars and locations of blocking for surface-mounted toilet accessories.
 - 5. Show locations of centerlines of toilet fixtures.
 - 6. Show locations of floor drains.
- C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available finishes for each type of toilet compartment.
 - 1. Include Samples of hardware and accessories involving material and color selection.

- D. Samples for Verification: Actual sample of finished products for each type of toilet compartment, hardware, and accessory.
 - 1. Size: Manufacturers' standard size.
- E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For toilet compartments.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Extra Stock Material: Furnish extra materials to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Door Hinges: One hinge(s) with associated fasteners.
 - 2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
 - 3. Door Bumper: One door bumper(s) with associated fasteners.
 - 4. Door Pull: One door pull(s) with associated fasteners.
 - 5. Fasteners: 10 fasteners of each size and type.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain toilet compartments, including urinal screens, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. VOC Limits for Adhesives, Sealants, Fillers, Primers, Paints, and Coatings:
 - 1. Comply with limits specified in "California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- C. Structural Performance: Where grab bars are mounted on toilet compartments, design panels to comply with the following requirements:

STAINLESS STEEL TOILET COMPARTMENTS

10 21 13 - 2

Fontana City Hall – Phase II

1. Panels are able to withstand a concentrated load on grab bar of at least 250 lbf applied at any direction and at any point, without deformation of panel.
- D. Regulatory Requirements: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1 for toilet compartments designated as accessible.

2.3 STAINLESS STEEL TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
1. Bradley Partitions
 2. Bobrick Partitions.
 3. Asi
 4. Hadrian Inc.; Zurn Industries, LLC.
- B. Basis-of-Design Products:
1. Toilet Compartments: Stainless steel partitions as manufactured by Bradley.
- C. Toilet-Enclosure Style: Overhead braced.
- D. Urinal-Screen Style: Wall hung flat panel.
- E. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
1. Door and Panel Height: As indicated on Drawings.
 2. Space From Floor to Panels and Doors: As indicated on Drawings.
 3. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.
- F. Urinal-Screen Construction:
1. Flat-Panel Urinal Screen: Matching panel construction.
 2. Size: As indicated on Drawings.
 3. Stainless steel brackets.
- G. Facing Sheets and Closures: Stainless steel sheet of nominal thicknesses as follows:
1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.038 inch.
 2. Panels: Manufacturer's standard thickness, but not less than 0.031 inch.
 3. Doors: Manufacturer's standard thickness, but not less than 0.031 inch.
 4. Flat-Panel Urinal Screens: Thickness matching panels.
- H. Pilaster Shoes: Formed from stainless steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.
- I. Pilaster Sleeves (Caps): Formed from stainless steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.

STAINLESS STEEL TOILET COMPARTMENTS

10 21 13 - 3

Fontana City Hall – Phase II

- J. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- K. Stainless Steel Finish: Directional Satin Finish: ASTM A480/A480M, No. 4 on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.4 HARDWARE AND ACCESSORIES

- A. Door Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty institutional operating hardware and accessories.
 - 1. Hinges: Manufacturer's minimum 0.062-inch-thick, stainless steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through bolts.
 - 2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast stainless steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at toilet enclosures designated as accessible. Mount with through bolts.
 - 3. Coat Hook: Manufacturer's heavy-duty, combination cast stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.
 - 4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast stainless steel bumper at outswinging doors. Mount with through bolts.
 - 5. Door Pull: Manufacturer's heavy-duty, cast stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at toilet enclosures designated as accessible. Mount with through bolts.
- B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel anchors compatible with related materials.

2.5 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221.
- C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless Steel Castings: ASTM A743/A743M.

2.6 FABRICATION

- A. Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.

- B. Overhead-Braced Units: Manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide inswinging doors for standard toilet enclosures and 36-inch-wide outswinging doors with a minimum 32-inch-wide clear opening for toilet enclosures designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels or Screens: 1/2 inch.
 - b. Panels or Screens and Walls: 1 inch.
 - 2. Full-Height (Continuous) Brackets: Secure panels or screens to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware in accordance with hardware manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed position.

END OF SECTION 10 21 13

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SECTION 10 28 00
TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Childcare accessories.
 - 3. Underlavatory guards.

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."

1.4 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.6 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 3. Include electrical characteristics.
- B. Samples: For each exposed product and for each finish specified, full size.
1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
1. Identify locations using room designations indicated.
 2. Identify accessories using designations indicated.
- 1.7 INFORMATIONAL SUBMITTALS
- A. Sample Warranty: For manufacturer's special warranties.
- 1.8 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For accessories to include in maintenance manuals.
- 1.9 WARRANTY
- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, visible silver spoilage defects.
 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Structural Performance: Design accessories and fasteners to comply with the following requirements:
1. Grab Bars: Installed units are able to resist 250 lbf (1112 N) concentrated load applied in any direction and at any point.
- 2.2 MANUFACTURERS
- A. Basis of Design Manufacturer: Bobrick, unless otherwise noted.

- B. Alternate Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:

1. American Specialties, Inc.
2. Bradley Corporation.
3. Kimberly-Clarke Worldwide, Inc.

2.3 PUBLIC-USE WASHROOM ACCESSORIES

- A. Source Limitations: Obtain each type of public-use washroom accessory from single source from single manufacturer.
- B. Recessed Toilet Tissue Multi-Roll Dispenser (TA-03):
1. Basis of Design Product: Bobrick B-4388.
- C. Surface-Mounted Toilet Tissue Multi-Roll Dispenser (TA-04):
1. Basis of Design Product: Bobrick B-4288.
- D. Combination Towel (Folded) Dispenser/Waste Receptacle (TA-10):
1. Basis of Design Product: Kimberly-Clark worldwide, inc.model number 35370.
- E. Soap Dispenser (TA-06):
1. Basis of Design: Bobrick B-4112.
- F. Grab Bar (TA-01 and TA-02):
1. Basis of Design Product: Bobrick B-5806 Series.
 2. Mounting: Flanges with concealed fasteners and snap flange.
 3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
 4. Outside Diameter: 1-1/4 inches.
 5. Configuration and Length: As indicated on Drawings .
- G. Sanitary-Napkin Disposal Unit (TA-07):
1. Basis of Design Product: Bobrick B-270.
- H. Seat-Cover Dispenser (TA-05): Contura Series Surface Mounted Seat Cover Dispenser.
1. Basis of Design Product: Bobrick B-4221.
- I. Mirror Unit (TA-09): Channel Frame Mirror.
1. Basis of Design Product: Bobrick B-165 1824.

2.4 CHILDCARE ACCESSORIES

- A. Diaper-Changing Station:
- B. Diaper-Changing Station Liner Dispenser:
 - 1. Basis of Design Product: CAMBRINO CAMB20VP.
 - 2. Mounting: Surface.
 - 3. Lockable Dispenser:
 - a. Minimum Capacity: 80 single-use paper covers.
 - b. Max interfolding lining width: 260 mm.
 - 4. Material and Finish: Polypropylene with antibacterial Biocote, white color.
 - 5. Mechanism:: Hinged, with integrated shock absorber for safe opening and closing.
 - 6. Accessories: Nylon safety belt, hooks on both sides.
 - 7. Certifications: EN12221-1 and EN 12221-2.

2.5 UNDERLAVATORY GUARDS

- A. Underlavatory Guard:
 - 1. Description: Insulating pipe covering for supply and drain piping assemblies that prevents direct contact with and burns from piping; allow service access without removing coverings.
 - 2. Material and Finish: Antimicrobial, molded plastic, white.

2.6 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- (0.8-mm-) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.
- C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- (0.9-mm-) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
- G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.7 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories in accordance with manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces in accordance with manufacturer's written instructions.

END OF SECTION 10 28 13

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SECTION 10 44 13
FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-protection cabinets for the following:
 - a. Portable fire extinguisher.

1.3 RELATED REQUIREMENTS:

- A. Section 10 44 16 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
 - 2. Show location of knockouts for hose valves.
- B. Shop Drawings: For fire-protection cabinets.
 - 1. Include plans, elevations, sections, details, and attachments to other work.

- C. Samples for Verification: For each type of exposed finish required, prepared on samples 6 by 6 inches (150 by 150 mm) square.
- D. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.7 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguishers.
 - 1. Basis of Design Manufacturer: Larsen's manufacturing company, Minneapolis, MN; tel: (800) 527-7367; web: www.larsensmfg.com.
 - 2. Alternate Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - a. J.L. Industries
 - b. Potter Roemer.
- B. Cabinet Construction: Nonrated, or one-hour fire rated and two-hour fire rated, contingent upon adjacent wall construction.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- (1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Cold-rolled steel sheet.
1. Shelf: Same metal and finish as cabinet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.
 2. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: Steel sheet.
- G. Door Style: Vertical duo clear acrylic door #4 SS
- H. Door Glazing: Acrylic sheet
1. Acrylic Sheet Color:
 - a. Clear transparent acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
1. Provide projecting lever handle with cam-action latch.
 2. Provide continuous hinge, of same material and finish as trim,, permitting door to open 180 degrees.
- J. Accessories:
1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Lettering Color: Red.
 - 3) Orientation: Vertical.
- K. Materials:
1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.

- b. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - c. Color: As indicated on Drawings.
- 2. Transparent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).

2.4 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Miter corners and grind smooth.
 - 3. Provide factory-drilled mounting holes.
 - 4. Prepare doors and frames to receive locks.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 - 2. Fabricate door frames of one-piece construction with edges flanged.
 - 3. Miter and weld perimeter door frames and grind smooth.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
 - 1. Fire-Protection Cabinet Mounting Height: 42 inches (1067 mm) above finished floor to top of fire extinguisher.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

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SECTION 10 44 16
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.3 RELATED REQUIREMENTS:

- A. Section 10 44 13 "Fire Protection Cabinets."

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.8 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - b. Amerex Corporation.
 - c. Larsen's Manufacturing Company.
 - 2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
 - 3. Valves: Manufacturer's standard.
 - 4. Handles and Levers: Manufacturer's standard.

5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Amerex Corporation.
 - b. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - c. Larsen's Manufacturing Company.
 2. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Horizontal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

1. Mounting Height: Top of fire extinguisher to be at 42 inches (1067 mm) above finished floor.

END OF SECTION 10 44 16

SECTION 10 71 00
EXTERIOR SUN CONTROL DEVICES

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. Perforated sun control devices, structural supports and attachment brackets as shown on the drawings, as specified, and as needed for a complete and proper installation.

1.3 RELATED REQUIREMENTS

- A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 05 50 00 "Metal Fabrications".
- C. Section 07 92 00 "Joint Sealants" for sealants installed in perimeter joints between sun control device frames and adjoining construction.
- D. Section 08 41 13 "Aluminum-Framed Entrance and Storefront"
- E. Section 09 96 00 "High Performance Coating" for coating over exterior sun control devices.

1.4 REFERENCES

- A. The Aluminum Association Incorporated
 - 1. Aluminum Standards and Data
 - 2. Specifications and Guidelines for Aluminum Structures
- B. American Society of Civil Engineers
 - 1. Minimum Design Loads for Buildings and Other Structures
- C. American Society for Testing and Materials
 - 1. ASTM B211 "Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod and Wire".
- D. Architectural Aluminum Manufacturers Association
 - 1. AAMA 800 "Voluntary Specifications and Test Methods for Sealants".

- a. AAMA 2605-98 High Performance Coatings on Aluminum Extrusions and Panels

1.5 PRE-INSTALLATION CONFERENCE

- A. Conduct conference at Project site. Convene two weeks before starting work of this Section, but not before completion of all required submittals.
 - 1. Attendance Required:
 - a. Installer
 - b. Architect.
 - c. Owner.
 - d. Product manufacturer's representative.
 - e. Other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated, demonstrate compliance with specified attributes. Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- B. Shop Drawings
 - 1. Include elevations, sections and specific details for each sun control device.
 - 2. Show anchorage details and connections for all component parts.
 - 3. Include signed and sealed structural calculations.
 - 4. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples: For each finish product specified.
 - 1. Sun Control Device: Submit sample of sun control device to show blades, fasteners, accessories, finish, and color.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For each of the following, demonstrate compliance with specified attributes.
 - 1. Manufacturer.
 - 2. Installer.
 - 3. Manufacturer's Testing Agency.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

- E. Maintenance Data: For sunscreens to include in maintenance manuals.

1.8 EXTRA MATERIALS

- A. Furnish extra materials that match the products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Sun control devices and installation framing: For each type, the lesser quantity of 25 linear feet or 1% of the installed quantity.

1.9 QUALITY ASSURANCE

- A. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated.
- B. Installer Qualifications: Capable of assuming engineering responsibility and performing Work of this Section and who is acceptable to manufacturer.
 - 1. Installer shall have a minimum 10 years of experience with projects of similar type and scope.
- C. Product Options: Information on drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding Qualifications: Qualify procedures and personnel according to the following.
 - 1. American Welding Society (AWS):
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.10 DELIVERY, STORAGE AND HANDLING

- A. Comply with requirements of section in Division 01
- B. Delivery: At the time of delivery all materials shall be visually inspected for damage. Any damaged boxes, crates, sun control device sections, etc. shall be noted on the receiving ticket and immediately reported to the shipping company and the material manufacturer.
- C. Handling:
 - 1. Material shall be handled in accordance with sound material handling practices and in such a way as to minimize racking.

EXTERIOR SUN CONTROL DEVICES

10 71 00 - 3

Fontana City Hall – Phase II

2. Lift sun control device sections only as recommended by manufacturers.
3. Sun control device sections should only be lifted and carried by the jambs. Heads, sills and blades are not to be used for lifting or hoisting sun control device sections.

1.11 SITE CONDITIONS

- A. Installer shall verify actual measurements/connections by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.
- B. Coordinate sun control device installation with other work, including structural support framing, wall cladding, flashing, trim, construction of soffits, and other adjoining work to provide a secure and noncorrosive installation while maintaining the leakproof weather barrier.

1.12 WARRANTY

- A. Sun Control Devices:
 1. Manufacturer shall provide standard limited warranty for sunshade systems for a period of 1 year from date of installation. When notified in writing from the Owner of a manufacturing defect, manufacturer shall promptly correct deficiencies without cost to the Owner.
 2. Manufacturer shall provide 20-year limited warranty for fluoropolymer-based finish on extruded aluminum substrates.
 - a. Finish coating shall not peel, blister, chip, crack or check.
 - b. Chalking, fading or erosion of finish when measured by the following tests:
 - 1) Finish coating shall not chalk in excess of 8 numerical ratings when measured in accordance with ASTM D4214.
 - 2) Finish coating shall not change color or fade in excess of 5 NBS units as determined by ASTM D2244 and ASTM D822.
 - 3) Finish coating shall not erode at a rate in excess of 0.01 mils/year as determined by Florida test sample.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide material ingredient transparency documentation wherever available.
- B. Structural Loads:
 1. Wind Loads: As indicated on the Drawings.
 2. Seismic Loads: As indicated on the Drawings.
 3. Other Design Loads: As indicated on Drawings.
 4. Sun shades shall be factory engineered to withstand wind loads, acting inwards and outwards and specified seismic loads.
 - a. Minimum design loads shall be calculated to comply with ASCE – 7 or local requirements of Authority Having Jurisdiction.

5. Sun shades shall be factory engineered to withstand the thermal stress to which the sunshades will be subjected.

a. Base engineering on a surface design temperature change of 180 degrees F (82 degrees C).

C. Sun shades shall be designed to perform under conditions specified herein or required by site conditions with no permanent damage to or deforming of the sunshade blades or assembly, noise or metal fatigue caused by sunshade blade rattle or flutter, or permanent damage to fasteners and anchors.

2.2 SUN CONTROL DEVICES

A. Basis of Design Product: Perforated sunshades product as manufactured by Architectural grilles and sunshades, Inc., web: www.agsshade.com.

B. Alternative Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:

1. Industrial Louvers, Inc.

C. Description: Custom perforated metal panels with custom support brackets and attachments as shown and detailed on Drawings.

D. Components:

1. Sunshades component shall be 6063 T5 extruded aluminum.

2. Outriggers shall be 6063 T5 extruded aluminum.

3. Fascia shall be 6063 T5 extruded aluminum.

4. Components shall be shop assembled in large practical sections to allow for immediate erection.

E. Finishes: All aluminum components to be finished as specified in section 09 96 00 and color as selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive the work. Do not proceed until any unsatisfactory conditions have been corrected.

B. Verify all required components are present. Promptly report any observed damage to manufacturer in writing. Include digital photographs of any observed damage as well as a copy of the Bill of Lading disclosing the damage.

C. Prior to Sun Control Device Installation contractor shall field confirm openings widths and elevations as shown on shop drawings prior to fabrication of shade sections.

D. Proceed only after all the unsatisfactory conditions have been corrected.

EXTERIOR SUN CONTROL DEVICES

10 71 00 - 5

Fontana City Hall – Phase II

3.2 SUN CONTROL DEVICE INSTALLATION AND ERECTION

- A. Comply with manufacturer's instructions and recommendations for installation of the work.
- B. Verify dimensions of supporting structure at the site by accurate field measurements so that the work will be accurately designed, fabricated, and fitted to the structure.
- C. Anchor sunshades to building as indicated on the shop drawings and verified by the engineer of record.
- D. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate the possibility of electrolytic action between metals.
- E. A maximum of +/- 1/8" tolerance between any column to column spacing is acceptable.
- F. Do not field cut or trim units. Cut and trim component parts during erection only with the approval of the manufacturer, and in accordance with his recommendations. Restore finish completely. Remove and replace members where cutting and trimming has impaired the strength or appearance of the assembly as directed.
- G. Do not erect warped, bowed, deformed or otherwise damaged or defaced members. Remove and replace any members damaged in the erection process as directed.
- H. Set units level, plumb and true to line, with uniform joints.
- I. Erect sun control device sections after all adjacent painting, masonry (including chemical treatments), roofing, electrical, glazing, and other similar work is completed above and below the shade sections.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed sun control devices installation, including accessories.
- B. Sun control devices will be considered defective if they do not pass test and inspections as defined in the manufacturer's written warrantee.

3.4 PROTECTION

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

3.5 ADJUSTING AND CLEANING

- A. Immediately clean exposed surfaces of the sun control devices to remove fingerprints and dirt accumulation during the installation process. Do not let soiling remain until the final cleaning.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to the material finishes. Thoroughly rinse surfaces and dry.

- C. Restore sun control devices and accessory components damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Architect, remove damaged materials and replace with new materials.

END OF SECTION 10 71 00

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SECTION 11 12 00
PARKING CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Automatic barrier gates.
- 2. Parking facility management software.
- 3. Access control units.

- B. Related Requirements:

- 1. Section 05 50 00 "Metal Fabrications" for pipe bollards to protect parking control equipment.

1.3 PREINSTALLATION MEETINGS

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

- 1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
- 2. Verify that equipment operation is consistent with system description.
- 3. Review sequence of operation for each type of parking control equipment.
- 4. Review coordination of interlocked equipment specified in this Section and elsewhere.
- 5. Review required testing, inspecting, and certifying procedures.

1.4 ACTION SUBMITTALS

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

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for parking control equipment.
- 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties.

- B. Shop Drawings: For parking control equipment.

- 1. Include plans, elevations, sections and attachment details.
- 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

- 3. Include diagrams for power, signal, and control wiring.
 - 4. Vehicle Detectors: Layout and method of placement of vehicle loop detector system.
 - C. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) square in size.
 - D. Samples for Initial Selection: For units with factory-applied finishes.
 - E. Samples for Verification: For each type of exposed finish 6 inches (150 mm) square in size.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
 - B. Field quality-control reports.
- 1.6 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For parking control equipment to include in emergency, operation, and maintenance manuals.
 - B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On approved online or cloud solution.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

- 2.1 SYSTEM DESCRIPTION
- A. Electrical Components and Devices: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 2.2 SOURCE LIMITATIONS
- A. Obtain parking control equipment from single source from single manufacturer.

2.3 AUTOMATIC BARRIER GATES

- A. General: Provide parking control device consisting of operator and controller housed in a weathertight, tamper-resistant cabinet enclosure. Device shall be activated by a signal from access or revenue control device.
 - 1. Standards: Barrier gate operators that are listed and labeled according to UL 325 by a qualified testing agency.
- B. Controller: Factory-sealed, solid-state, plug-in type, with galvanized-steel box for wiring connections. Communicating type.
 - 1. Communicating Type:
 - a. Real-time communication of lane counts, status messages, and execute commands.
 - b. Monitor illegal entries and exits, tailgates, monthlies, and backouts.
 - c. Status messages for gate up too long, backouts.
 - d. Communication commands for resetting loops, turning "Full" signs on/off, closing gate, and disabling card readers, barcode imagers, license plate recognition and automatic vehicle identification.
 - 2. Physical Characteristics:
 - a. On-off power supply switch.
 - b. Automatic-manual switch.
 - c. Differential counter.
 - d. Communication port.
 - e. Internal resettable counters.
 - f. Thermal-overload protection with manual reset.
 - g. Thermostatically controlled heater with on/off/auto switch.
 - h. Thermostatically controlled fan with on/off/auto switch.
 - i. Switch to test motor and limit switches.
 - j. Emergency manual disconnect.
 - k. Battery backup.
 - l. Single, 115-V ac grounded power receptacle.
 - 3. Operational Characteristics:
 - a. Able to store successive inputs and sequentially processing each one.
 - b. Programmable automatic timer.
 - c. Diagnostic mode for on-site testing, with LEDs for inputs and outputs.
 - d. Automatic and continuous testing of inputs and outputs.
- C. Cabinets: Fabricated from sheet metal with seams welded and ground smooth; approximately 15 inches square by 40 inches tall (381 mm square by 1016 mm tall). Provide single, gasketed access door for each cabinet with flush-mounted locks. Furnish two keys for each lock, all locks keyed alike. Fabricate cabinet with internal reinforcing and four mounting holes accessible only from inside cabinet.
 - 1. Steel Sheet: Not less than 0.097-inch- (2.5-mm-) thick, galvanized- steel sheet.
 - a. Finish cabinet, interior and exterior, powder-coat finish.
 - b. Color: Color to match Architect's sample.

- D. Gate Operator: Class III (Limited Access W/O Security), Horizontal sliding gate, type A & B1 entrapment protection type preferred, no contact sensor or continuous pressure device.

- 1. Opening Time: Three seconds.
 - 2. Inherently adjustable, torque limiting clutch for safety.

- E. Characteristics:

- 1. Audible alarm that activates as part of a safety device system.
 - 2. Low-voltage yellow warning lights that illuminate when gate is in down position.
 - 3. Low-voltage light on cabinet top that flashes or changes from red to green when barrier gate is operating.
 - 4. Manually operated crank for emergency operation.

2.4 PARKING FACILITY MANAGEMENT SOFTWARE

- A. General: Manufacturer's standard software that is compatible with security-access control system and that provides automatic facility monitoring, supervision, and remote control of parking control equipment from one or more locations.

- B. Operation:

- 1. Collect data for activity reporting.
 - 2. Collect data for access and space control.
 - 3. Notification services.
 - 4. License plate recognition systems.
 - 5. Programmable parking control equipment.

2.5 ANCHORAGES

- A. Anchor Bolts: Galvanized.

- 1. Hot-dip galvanized according to ASTM A153/A153M and ASTM F2329/F2329M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including equipment bases; accurate placement, pattern, and orientation of anchor bolts; critical dimensions; and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical and communication systems to verify actual locations of connections before parking control equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Excavation for Traffic Controllers: Saw cut existing pavement for recessed traffic controllers and hand-excavate recesses to dimensions and depths and at locations as required by traffic controller manufacturer's written instructions and as indicated on Drawings.

3.3 INSTALLATION, GENERAL

- A. Install parking control equipment as required for complete and integrated installation.
 - 1. Rough-in electrical connections.

3.4 INSTALLATION OF AUTOMATIC BARRIER GATES

- A. Anchor cabinets to concrete bases with anchor bolts or expansion anchors.
 - 1. Install barrier gates according to UL 325.

3.5 INSTALLATION OF ELECTRICAL

- A. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Perform the following tests and inspections alongside an Owner elected representative with the assistance of a factory-authorized service representative:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Parking control equipment will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.7 ADJUSTING

- A. Adjust parking control equipment to function smoothly, and lubricate as recommended by manufacturer.

- B. Confirm that locks engage accurately and securely without forcing or binding.
- C. After completing installation of exposed, factory-finished parking control equipment, inspect exposed finishes and repair damaged finishes.

3.8 MAINTENANCE SERVICE

- A. Maintenance Service Description: Beginning at Substantial Completion, maintenance service shall include 12months' full maintenance by manufacturer's authorized service representative. Include repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper parking control equipment operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.9 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.
- B. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.
 - 1. Upgrade Notice: At least 30 days to allow Owner to schedule and access the system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain parking control equipment.

END OF SECTION 11 12 00

SECTION 12 24 13
ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Manually operated, single-roller shades (WC1).
 - 2. Motor-operated, single-roller shades (WC3).
 - 3. Motor-operated, double-roller shades (WC2).

1.3 RELATED REQUIREMENTS:

- A. Section 01 81 13 "Sustainable Design Requirements."
- B. Section 07 92 00 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.4 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified, 10 inches (250 mm) long.
- D. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of shadeband material.
- C. Product Test Reports: For each type of shadeband material, for tests performed by a qualified testing agency.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Roller Shades: Full-size units from the same dye lots as installed equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: 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. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from

ROLLER WINDOW SHADES

12 24 13 - 2

Fontana City Hall – Phase II

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

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain roller shades from single source from single manufacturer.

2.2 MANUFACTURERS

- A. Basis of Design Manufacturer: MechoShade Systems, Inc., Long Island City, NY, tel: (718) 729-2020; web: www.mechoshade.com.
- B. Subject to compliance with requirements, provide the named products, or comparable products by one of the following manufacturers.
 - 1. Lutron Electronics Co., Inc., Coopersburg, PA, tel: (888) 588-7661, web: www.lutron.com/shadingsolutions.
 - 2. Draper Shade & Screen Co., Inc. Spiceland, IN (800) 238-7999, or (765) 987-7999.
 - 3. Nysan Shading Systems Ltd. – Calgary, AB Canada T2A 5K4 (403)-204-8675.
 - 4. Skyco Shading Systems, Inc. Santa Ana, CA (714) 708-3038.

2.3 MANUALLY OPERATED, SINGLE-ROLLER SHADES

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 - 1. Bead Chains: Stainless steel.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Clip, jamb mount .
 - 2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10 lb (4.5 kg) or for shades as recommended by manufacturer, whichever criterion is more stringent.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

ROLLER WINDOW SHADES

12 24 13 - 3

Fontana City Hall – Phase II

E. Shadebands:

1. Shadeband Material: Light-filtering fabric or light-blocking fabric.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Color and Finish: As selected by Architect from manufacturer's full range.

F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 4 inches (102 mm).
2. Endcap Covers: To cover exposed endcaps.
3. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 6 inches (152 mm).
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
4. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
5. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
6. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
7. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.4 MOTOR-OPERATED, SINGLE-ROLLER SHADES

- A. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Electric Motor: Manufacturer's standard tubular, enclosed in rollers.
 - a. Basis of Design Product: Electroshade iQ2 DC as manufactured by Mechoshade.
 - b. Maximum Total Shade Width: As required to operate roller shades indicated.
 - c. Maximum Shade Drop: As required to operate roller shades indicated.
 - d. Maximum Weight Capacity: As required to operate roller shades indicated.

3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:
 - a. Maintained-Contact Functions:
 - 1) Open: Automatically open controlled shade(s) to fully open position.
 - 2) Close: Automatically close controlled shade(s) to fully closed position.
 - b. Momentary-Contact Functions:
 - 1) Raise: Raise controlled shade(s) only while rocker is pressed.
 - 2) Lower: Lower controlled shade(s) only while rocker is pressed.
 - c. Preset Functions: For selection of predetermined shade positions.
 - d. Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
 - e. Color: As selected by Architect from manufacturer's full range.
4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
5. Limit Switches: Adjustable switches, interlocked with motor controls and set to stop shade movement automatically at fully raised and fully lowered positions.
6. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
 - b. Capable of interface with multiroom control system.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shades for service.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. Shadebands:
 1. Shadeband Material: Light-filtering fabric.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Color and Finish: As indicated on Drawings.
- F. Installation Accessories:
 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 4 inches (102 mm).

2. Endcap Covers: To cover exposed endcaps.
3. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 6 inches (152 mm).
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.
4. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
5. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
6. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
7. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.5 MOTOR-OPERATED, DOUBLE-ROLLER SHADES

- A. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
 1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Electric Motor: Manufacturer's standard tubular, enclosed in rollers.
 - a. Basis of Design Product: Electroshade iQ2 DC as manufactured by Mechoshade.
 - b. Maximum Total Shade Width: As required to operate roller shades indicated.
 - c. Maximum Shade Drop: As required to operate roller shades indicated.
 - d. Maximum Weight Capacity: As required to operate roller shades indicated.
 3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:
 - a. Maintained-Contact Functions:
 - 1) Open: Automatically open controlled shade(s) to fully open position.
 - 2) Close: Automatically close controlled shade(s) to fully closed position.
 - b. Momentary-Contact Functions:
 - 1) Raise: Raise controlled shade(s) only while rocker is pressed.
 - 2) Lower: Lower controlled shade(s) only while rocker is pressed.
 - c. Preset Functions: For selection of predetermined shade positions.
 - d. Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
 - e. Color: As selected by Architect from manufacturer's full range.

4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
 5. Limit Switches: Adjustable switches, interlocked with motor controls and set to stop shade movement automatically at fully raised and fully lowered positions.
 6. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.
 - b. Capable of interface with multiroom control system.
 - c. Capable of accepting input from building automation control system.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shades for service.
- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- E. Inside Shadebands:
1. Shadeband Material: Light-filtering fabric.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Color and Finish: As selected by Architect from manufacturer's full range.
- F. Outside Shadebands:
1. Shadeband Material: Light-blocking fabric.
 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
 - a. Color and Finish: As selected by Architect from manufacturer's full range.
- G. Installation Accessories:
1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 4 inches (102 mm).
 2. Endcap Covers: To cover exposed endcaps.
 3. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
 - a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than 6 inches (152 mm).
 - b. Provide pocket with lip at lower edge to support acoustical ceiling panel.

4. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recesses or pockets and for snap-in attachment to wall clip without fasteners.
5. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
6. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
7. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.6 NETWORK MOTOR CONTROLS

- A. Provide a network motor control system that provides shade control as indicated. System shall include equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, as necessary for a complete operating system, unless component is specifically indicated to be excluded,
- B. Provide components and connections necessary to interface with other systems as indicated.
- C. Digital Network Controls: Controls shall be capable of the following:
 1. Identify intelligent shade motors and devices over network without separate interface. Capable of reprogrammed control without requiring wiring modifications.
 2. Assign shade motors to shade groups/sub-groups.
 3. Store programmable open and close limits and minimum of three intermediate preset stop positions for each shade.
 4. Align adjacent shades within accuracy of plus/minus 0.25 inch. Provide 10-year non-volatile power failure memory for system configuration settings.

2.7 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Material provided shall be from same dye lots.
- C. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 1. Source: Roller shade manufacturer.
 2. Fabric/Color/Open Percentage: As indicated on Drawings.
- D. Light-Blocking Fabric: Opaque fabric, stain and fade resistant.
 1. Source: Roller shade manufacturer.
 2. Fabric/Color/Open Percentage: As indicated on Drawings.

2.8 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
 - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
 - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
 - 2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches (51 mm) to interior face of glass. Allow clearances for window operation hardware.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.
- C. Roller Shade Locations: As indicated on Drawings.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 12 24 13

SECTION 12 36 61
SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Solid surface material countertops (SS1, SS2, SS3, SS4, SS5).
 - 2. Accessories.

- B. Related Requirements:

- 1. Section 05 50 00 "Metal Fabrications" for cantilever supports.
 - 2. Division 22 for plumbing fixtures and accessories.

1.3 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.
- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of countertop material.

- B. Shop Drawings:

- 1. Plans, sections, details, edge and backsplash profiles, and attachment to other work.
 - 2. Locations and details of joints.
 - 3. Locations, quantity, and type of supports/brackets.
 - 4. Direction of directional pattern, if any.
 - 5. Locations and sizes of cutouts and holes for items installed in countertop.
 - 6. Apply AWI's Quality Certification Program label to Shop Drawings.

- C. Samples for Initial Selection: For each type of material exposed to view.

- D. Samples for Verification:

1. Countertop material, 10 inches x 10 inches square.
2. One full-size countertop, with front edge and backsplash, 10 by 10 inches (203 by 254 mm), of construction and in configuration specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Indicate locations and sizes of cutouts and holes for items installed in countertops or backsplashes.
- B. Qualification Statements: For fabricator.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include product data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of countertops.

1.8 MOCKUPS

- A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and execution.
 1. Build mockup of typical countertop as indicated on Drawings.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.10 FIELD CONDITIONS

- A. Field Measurements: Where countertops are indicated to fit to other construction, verify dimensions of countertops by field measurements after base cabinets are installed but before

countertop fabrication is complete and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

1.11 WARRANTY

- A. Warranty for Solid Surfacing: Manufacturer agrees to provide 15-year limited warranty for the solid surfaces against any manufacturing defects from the day of substantial completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Quality Standard: Unless otherwise indicated, comply with ANSI/AWI 1236 for grades of simulated stone countertops indicated for construction, finishes, installation, and other requirements.
 - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grade specified.

2.2 SOLID SURFACE MATERIAL COUNTERTOPS

- A. Solid Surface Countertop Type (SS1, SS2, SS3, SS4 and SS5):
 - 1. Grade: As indicated on Drawings.
- B. Basis of Design Manufacturer: LX Hausys, web: www.lxhausys.com
- C. Alternative Manufacturers: Subject to compliance with requirements, provide an alternate product from one of the following manufacturers:
 - 1. Caesarstone, web: www.caesarstoneus.com
 - 2. Wilsonart engineered surfaces, web: www.wilsonart.com
- D. Basis-of-Design Product (SS1): HI-MACS series, as manufactured by LX Hausys.
 - 1. Physical Properties:
 - a. Color: Strato Wind
 - b. Size: As per manufacturers standard.
 - c. Thickness: 1/2 inch
 - d. Location: As indicated on finish material matrix.
- E. Basis-of-Design Product (SS2, SS3, SS4 and SS5): Viatera-Quartz series, as manufactured by LX Hausys.
 - 1. Physical Properties:
 - a. Color: As indicated on Drawings.
 - b. Size: As per manufacturers standard.
 - c. Thickness: 1/2 inch

SIMULATED STONE COUNTERTOPS

12 36 61 - 3

Fontana City Hall – Phase II

- d. Location: As indicated on finish material matrix.

2.3 FABRICATION

- A. Fabricate countertops in sizes and shapes required to comply with requirements indicated.
- B. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate with loose backsplashes for field assembly.
 - 2. Install integral sink bowls in countertops in the shop.
- C. Joints:
 - 1. Fabricate countertops in sections for joining in field, with joints at locations indicated.
 - a. Joint Locations: Not within 18 inches (450 mm) of a sink or cooktop and not where a countertop section less than 36 inches (900 mm) long would result, unless unavoidable.
- D. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill countertops in shop for grommets, plumbing fittings, undercounter soap dispensers, and similar items.

2.4 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Coordinate conditions required by Work of this Section with requirements in other Sections in which substrates are specified.
- B. Examine substrates to receive countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.
- B. Examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.3 INSTALLATION OF COUNTERTOPS

- A. Grade: Install countertops to comply with specified grade.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Countertop Installation:
 - 1. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 3. Anchor wall cleating necessary for proper setting for countertops not supported by casework.
 - 4. Install countertops level to a tolerance of 1/8 inch in 8 ft. (3.2 mm in 2.4 m), 1/4 inch (6.4 mm) maximum. Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.
 - 5. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 6. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
 - 7. Secure countertops to subtops with adhesive according to manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 8. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - a. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
 - 9. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
 - 10. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.
 - 11. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls. Comply with Section 07 92 00 "Joint Sealants."

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semi-exposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 12 36 61

SECTION 12 48 16
ENTRANCE FLOOR GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Recessed interior floor grilles and frames.

1.3 COORDINATION

- A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance floor grilles and frames.
- B. Shop Drawings:
 - 1. Items penetrating floor grilles and frames.
 - 2. Divisions between grille sections.
 - 3. Perimeter floor moldings.
- C. Samples: For the following products, in manufacturer's standard sizes:
 - 1. Floor Grille: Assembled section of floor grille.
 - 2. Frame Members: Sample of each type and color.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For floor grilles and frames to include in maintenance manuals.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.7 FIELD CONDITIONS

- A. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: C-S Group, web: www.c-sgroup.com
- B. Alternative Manufacturers: Subject to compliance with requirements, provide an equivalent product from one of the following manufacturers:
 - 1. Ronick matting system, web: www.ronick.com.
 - 2. JL Industries, a part of Activar Group web: www.activarcpg.com
 - 3. Balco, A CSW industrial company, web: www.balcousa.com
- C. Single Source Limitation: Provide entrance floor grilles from the same manufacturer to the greatest extent possible.

2.2 ENTRANCE FLOOR GRILLES, GENERAL

- A. Structural Performance: Provide floor grilles and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform floor load of 300 lbf/sq. ft. (14.36 kN/sq. m).
 - 2. Wheel load of 500 lb per wheel.
- B. Accessibility Standard: Comply with applicable provisions in the DOJ's "2010 ADA Standards for Accessible Design" and California Building Codes.
- C. Slip resistance in accordance with ASTM D2047-96.
- D. Coefficient of Friction: Minimum 0.60 for accessible routes.

2.3 FLOOR GRILLES

- A. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs (if any) and other components needed to produce a complete installation.
- B. Basis of Design Product: G6 Gridline as manufactured by C-S Group.
- C. Stainless Steel Floor Grille: Type 304.
 - 1. Surface Treads: 0.090 by 0.150 inch (2.28 by 3.81 mm) electronically welded wire with 0.145 inch (3.68 mm) wide openings between wires.
 - 2. Support Rods: Spaced 1 inch (25.4 mm) o.c., welded to each wire.
 - 3. Grating: 5/8 inches (15.97 mm) deep.
 - 4. Stainless Steel Finish: As indicated on Drawings.
 - 5. Grille Size: As indicated.

D. Lockdown: Hidden lock down.

1. Material: Type 304 stainless steel.
2. Size: 1-1/4 inch X 1-1/4 inch X 1/8 inch.

2.4 FRAMES

- A. Provide manufacturer's standard frames of size and style for grille type, for permanent recessed installation in subfloor, complete with installation anchorages and accessories. Unless otherwise indicated, fabricate frame of same material and finish as grilles.

2.5 SUPPORT SYSTEM

- A. Provide manufacturer's special deep-pit frame and support extrusion system with intermediate support beams, sized and spaced as recommended by manufacturer for indicated spans and equipped with vinyl support cushions.

2.6 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B, with A60 (ZF180) zinc-iron-alloy (galvannealed) coating or with G60 (Z180) mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A924/A924M.
- B. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.
- C. Stainless Steel Flat Bars: ASTM A666, Type 304.
- D. Stainless Steel Angles: ASTM A276 or ASTM A479/A479M, Type 304.

2.7 FABRICATION

- A. Shop fabricate floor grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.
- B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- C. Coat surface of aluminum in contact with cementitious materials with manufacturer's standard protective coating.

2.8 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: ASTM A480/A480M No. 4.

C. Mill finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of floor grilles and frames.
- B. Examine roughing-in for drainage piping systems to verify actual locations of piping connections before floor grille and frame and drain pan installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install recessed floor grilles and frames to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer.
- B. Set floor-grille tops at height for most effective cleaning action.

3.3 CLEANING AND PROTECTION

- A. Clean the tread surface and recessed well to reduce the effects of accumulated soiling.
- B. After completing frame installations, provide temporary filler of plywood or fiberboard in floor-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12 48 16

SECTION 12 61 00
FIXED AUDIENCE SEATING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fixed audience seating.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data:

1. Fixed audience seating.

B. Product Data Submittals: For each product.

1. Include construction details, material descriptions, dimensions of components, and finishes for fixed audience seating.

C. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Seating Layout: Show seating layout, aisle widths, aisle-end alignment or stepping, row-lettering and chair-numbering scheme, chair widths, and chair spacing in each row.

D. Samples for Initial Selection: For each type of exposed color, finish, texture, and pattern indicated.

1. Include Samples of accessories involving color and finish selection.

E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Chair Unit: Full-size unit of each type and combination of finishes. Include end aisle lighting.
2. Upholstery Fabric: Full width by 36-inch- (914-mm-) long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.
3. Exposed Fasteners: Full-size units of each type.
4. Full-size samples of chair units, if approved, will be returned to Contractor for use in Project.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of fixed audience seating.
- B. Material Certificates: For each type of flame-retardant treatment of upholstery fabric.
- C. Field quality-control reports.
- D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fixed audience seating to include in operation and maintenance manuals.
 - 1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
 - a. Methods for maintaining upholstery fabric.
 - b. Precautions for cleaning materials and methods that could be detrimental to seating finishes and performance.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Chair Seats and Backs: 5 percent of quantity installed for each type and size of chair seat and back.
 - 2. Fabric: 5 percent on the bolt of quantity installed for each type.
 - 3. Chair Seat Hinges: 5 percent of quantity installed.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of fixed audience seating that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including standards, beams, and pedestals.
 - b. Wear and deterioration of fabric and stitching beyond normal use.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Periods: As follows, from date of Substantial Completion.
 - a. Structural: 10 years.
 - b. Plastic, Wood, and Paint Components: Five years.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of seating required, including accessories and mounting components, from single source from single manufacturer.
 - 1. Upholstery Fabric: Obtain fabric of a single dye lot for each color and pattern of fabric required.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics of Upholstered Chairs:
 - 1. Fabric and Padding:
 - a. Fabric: Class 1 in accordance with DOC CS 191 or 16 CFR 1610, tested in accordance with California Technical Bulletin 117-2000.
 - 2. Upholstery Assembly: Assembly to comply with component-testing requirements of California Technical Bulletin 117-2013.
 - 3. Full-Scale Fire Test: Comply with California Technical Bulletin 133.
- B. Strength and Durability Performance: Chairs and components to pass testing in accordance with BIFMA X5.4.

2.3 FIXED AUDIENCE SEATING

- A. Fixed Audience Seating as indicated on Drawings.
- B. Chair Mounting Standards: As indicated on Drawings, attached of the following material:
 - 1. Steel: One-piece, heavy-tube or reinforced sheet with welded mounting plate and welded connections for seat pivots, backs, armrests, and end panels.
 - 2. Cast Metal: One-piece castings with integral mounting points and attachment anchoring points for seat pivots, backs, and armrests.
 - 3. Molded Plastic: One-piece, solid injection-molded plastic with integral reinforcing ribs for attachment and anchoring points for seat pivots, backs, and armrests.
- C. Chair Mounting Beam: Steel horizontal beam mounted as indicated on Drawings-attached steel support pedestals spaced at intervals of 2 to 2-1/2 chair widths.
- D. Chair Mounting Pedestal: Floor-attached pedestal, manufacturer's standard as indicated on Drawings.
- E. End Panels: As indicated on Drawings.
 - 1. Cast-Metal Design: As selected by Architect from Manufacturer's full range.
 - 2. Decorative Insert: As indicated on Drawings.
 - 3. Style: As indicated on Drawings.
- F. Fabric Upholstered Chairs:

1. Back:
 - a. Padding Thickness: As indicated on Drawings.
 - b. Outer Back Surface: As indicated on Drawings.
 - c. Top Corners: As indicated on Drawings.
 - d. Upholstery Options: As indicated on Drawings.
 2. Seat: As indicated on Drawings and as follows:
 - a. Top Padding Thickness: Minimum as indicated on Drawings, at front and rear edges.
 - b. Seat Bottom: Minimum as indicated on Drawings.
- G. Plastic Chairs: As indicated on Drawings-wall molded plastic and as follows:
1. Back: As indicated on Drawings.
 2. Seat: As indicated on Drawings.
 3. Upholstered Inserts: Padding and fabric covering over 1/8-inch (3-mm) plywood or MDF backing board, recessed as indicated on Drawings, into plastic surface, centered, and attached with hidden, vandal-resistant fasteners.
- H. Formed Hardwood-Veneer Chairs: Hardwood-veneer-faced, formed plywood backs and seats, with fasteners as indicated on Drawings.
1. Back Top Corners: As indicated on Drawings.
- I. Chair Width: As indicated on Drawings.
- J. Back Height: As indicated on Drawings.
- K. Back Pitch: As indicated on Drawings.
1. Back Angle: As indicated on Drawings.
 2. Chair Back Hinges: Self-lubricating type with noiseless mechanism that raises back to vertical position when chair is unoccupied.
- L. Chair Seat Hinges: Self-lubricating, with noiseless positive internal stops cushioned with rubber or neoprene, and requiring no maintenance.
- M. Accessible Seating:
1. Provide chair for each wheelchair space unless otherwise indicated.
 2. Provide chairs with folding armrest on aisle side in locations indicated, but not less than 5 percent of aisle seats, dispersed through the audience seating area. Identify these seats with a sign or marker.
- N. Row-Letter and Chair-Number Plates:
1. Material: As indicated on Drawings with black embossed characters.
 2. Location: As indicated on Drawings.
 3. Attachment: As indicated on Drawings.
- O. Accessibility-Logo Plates: As indicated on Drawings.
1. Material: As indicated on Drawings with black embossed characters.

2. Location: As indicated on Drawings.
3. Attachment: As indicated on Drawings.

2.4 MATERIALS AND FINISHES

- A. MDF (Medium-Density Fiberboard): ANSI A208.2, Grade MD.
- B. Concealed Plywood: HPVA HP-1 hardwood plywood or DOC PS 1 softwood plywood as standard with manufacturer.
- C. Exposed Plywood: HPVA HP-1, Face Grade A, hardwood-veneer core with color-matched hardwood-veneer faces.
- D. Hardwood Lumber and Veneer Faces: **[American black walnut] [Red oak] [Teak] [Birch] [Cherry] [Maple] <Insert wood species>** selected to be free of visible defects.
 1. Stain and Finish: **[Manufacturer's standard, transparent, UV-resistant, protective finish] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert stain and finish>**.
- E. Plastic Laminate: ISO 4586-3, manufacturer's standard grade.
 1. Color and Pattern: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and pattern>**.
- F. Molded Plastic: High-density polyethylene or polypropylene, blow or injection molded, with surface that is mar and dent resistant.
 1. Provide with UV inhibitors to retard fading.
 2. Color and Texture: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and texture>**.
- G. Fabric: Manufacturer's standard **[100 percent nylon] [100 percent polyolefin] <Insert fiber>** with flame-retardant treatment if required to meet performance requirements.
 1. Weight: **[12 oz./linear yd. (0.37 kg/linear m)] [16 oz./linear yd. (0.50 kg/linear m)] [18 oz./linear yd. (0.56 kg/linear m)] [20 oz./linear yd. (0.62 kg/linear m)] <Insert weight>**.
 2. Color and Pattern: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and pattern>**.
- H. Upholstery Padding: Flexible, cellular, molded or slab polyurethane foam.
 1. Pounding-Fatigue Performance: Grade AP (heavy-duty use) for seats and Grade BP (normal duty use) for backs; in accordance with ASTM D3453.
- I. Metal Finish: Finish exposed metal parts with manufacturer's standard **[polyurethane] [baked-on] [minimum 1.5-mil- (0.04-mm-) thick, polyester baked-on powder] [minimum 1.5-mil- (0.04-mm-) thick, epoxy baked-on powder] [minimum 70 percent by weight, PVDF fluoropolymer resin baked-on powder] <Insert requirement>** coating.

1. Color: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color>.**
- J. Floor Attachments: Fabricate to conform to floor slope so that standards and pedestals are plumb and chairs are maintained at same angular relationship to vertical throughout Project.
- K. For beam-mounted chairs[**and tables**] in curved patterns, curve the beam uniformly to the various radii required for the rows.
- L. Upholstery: Fabricate fabric-covered cushions with molded padding beneath fabric and with fabric covering free of welts, creases, stretch lines, and wrinkles. For each upholstered component, install pile and pattern run in a consistent direction.
- M. Upholstered Chairs: Fabricate as follows:
 1. Two-Part Upholstered Back: Padded cushion glued to a curved **[steel] [plywood] [or] [molded-plastic]** inner panel and covered with easily replaceable fabric; with curved **[steel] [or] [molded-plastic]** outer back shell that fully encloses upholstery edges.
 2. Two-Part, Steel-Pan Seats: Upper part, an upholstered cushion with molded padding over no fewer than **[five] <Insert number>** serpentine springs attached to reinforced steel frame, with weight-distributing and abrasion-resistant sheeting separating padding from springs, and removable for reupholstering without removing steel pan from chair. Lower part, a steel pan, reinforced at stress points and completely enclosing hinges and self-rising mechanism.
 3. Two-Part, Molded-Plastic Seats: Upper part, an upholstered cushion with formed padding over a five-ply plywood panel[**with fabric cover conforming to shape of cushion to conceal inner seat structure and hinge mechanism**]. Lower part, a molded-plastic shell.
 4. One-Part Seats: Double-wall plastic shells **[fitted with a padded upholstered cushion and covered with easily replaceable fabric] [padded and fully upholstered]**.
- N. Double-Wall, Molded-Plastic Chairs: Contoured seat and back fabricated of double-wall, blow-molded plastic; both sides of seat and back components are finished surfaces. Reinforce plastic with interior steel plates at attachment points.
- O. Single-Wall, Molded-Plastic Chairs: Contoured plastic shell with smoothly rolled edges and reinforcing ribs on underside of shell. Fabricate for attachment of chair to support with self-threading, corrosion-resistant screws.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine floors, risers, and other adjacent work and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Verify that electrical connections are properly located.
- C. Verify that HVAC air-distribution locations are correct.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install seating in locations indicated and fasten to substrates in accordance with manufacturer's written installation instructions.
 - 1. Install seating with each chair capable of complying with performance requirements without failure or other conditions that might impair the chair's usefulness.
 - 2. Install standards and pedestals plumb.
 - 3. Install seating so moving components operate smoothly and quietly.

3.3 ADJUSTING

- A. Adjust chair backs so that they are at required angles and aligned with each other in uniform rows.
- B. Adjust hardware and moving parts to function smoothly so they operate easily. Lubricate bearings and sliding parts as recommended in writing by manufacturer.
- C. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.
- D. Replace damaged and malfunctioning components that cannot be acceptably repaired.
- E. Replace upholstery fabric damaged during installation or work of other trades.

END OF SECTION 12 61 00

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SECTION 14 21 24
MACHINE ROOM-LESS TRACTION ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Machine-room-less electric traction elevators.
2. Non-proprietary, microprocessor-based control systems with diagnostic and adjusting capability.

B. Related Requirements:

1. Section 01 81 13 "Sustainable Design Requirements."
2. Section 03 30 00 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
3. Section 05 12 00 "Structural Steel Framing" for the following:
 - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - b. Divider beams.
 - c. Hoist beams.
 - d. Structural-steel shapes for subsills.
4. Section 05 50 00 "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Divider beams.
 - c. Hoist beams.
 - d. Structural-steel shapes for subsills.
 - e. Pit ladders.
5. Division 22 for sump pumps, sumps, and sump covers in elevator pits.
6. Section 28 31 11 "Addressable Fire-Alarm Systems" for smoke detectors in elevator lobbies to initiate emergency recall operation, for heat detectors in shafts and machine rooms to disconnect power from elevator equipment before or on sprinkler activation,] and for connection to elevator controllers.

1.3 REFERENCES

- A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

- B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."
- C. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.
- D. Structural Engineering Institute of the American Society of Civil Engineers (SEI / ASCE):
 - 1. ASCE / SEI 7 - Minimum Design Loads for Buildings and Other Structures.

1.4 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
- B. Service Elevator: A passenger elevator that is also used to carry freight.

1.5 ACTION SUBMITTALS

- A. Product Data:
 - 1. Machine-room-less electric traction elevators.
- B. Product Data Submittals: For each product.
 - 1. Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
 - 2. Include Product Data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- C. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Include large-scale layout of car-control station and standby power operation control panel.
 - 3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- D. Samples for Initial Selection: For each type of exposed finish involving color selection.
- E. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch- (75-mm-) square Samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Delegated Design Engineer.
- B. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

MACHINE ROOM-LESS TRACTION ELEVATORS

14 21 24 - 2

Fontana City Hall – Phase II

2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway and pit layout and dimensions, as indicated on Drawings, and electrical service including standby power generator, as shown, and specified, are adequate for elevator system being provided.
- D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
1. Submit manufacturer's or Installer's standard operation and maintenance manual, in accordance with ASME A17.1/CSA B44 including diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Provide non-proprietary information and wiring diagrams with a Table of Contents and corresponding locator tabs.
- C. Manuals shall provide necessary information to thoroughly maintain, diagnose, adjust, and order parts for all equipment. All information must be submitted to the University's Representative within 30 days prior to the acceptance of the elevator installation. Acceptance will be delayed until all specified information is received, reviewed, and approved by the University's Representative. The information shall include, but not limited to the following:
1. Supporting mechanical and software manuals with appropriate diagnostic means for the necessary maintenance, adjustment and diagnostic functions of the group dispatch, car control and motion control systems. The diagnostic means, which shall be the property of the University, may be a hand held "smart" tool or may be integrated into the control system. If a hand-held tool is provided, it shall be programmed for the specified elevator system only. If periodic reprogramming of the tool is required, this service shall be provided by the Elevator Company, at no additional cost to the University, for the lifetime of the equipment.
 2. Complete wiring diagrams of "as-installed" elevator circuits with index of location and function of all components.
 3. Complete lubricating instructions and frequency charts, including recommended grade of lubricants.
 4. Supply of all parts as recommended by manufacturer for all replaceable mechanical or solid-state components. The manufacturer shall provide the University's Facilities Management with a copy of the complete recommended spare parts list.
- D. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- E. Continuing Maintenance Proposal:
1. Submit a continuing maintenance proposal from Installer to University, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

MACHINE ROOM-LESS TRACTION ELEVATORS

14 21 24 - 3

Fontana City Hall – Phase II

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer, capable of assuming engineering responsibility and performing Work of this section.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations that are similar to those indicated for this Project in material, design, and extent.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.10 COORDINATION

- A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of work specified in other Sections that relates to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways and pits.

1.11 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined in accordance with CBC and ASCE/SEI 7 and shall comply with elevator seismic requirements in ASME A17.1/CSA B44.
1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified."
 2. Project Seismic Design Category: As indicated on Structural Drawings
 3. Elevator Component Importance Factor: As indicated on Structural Drawings.
 4. Design earthquake spectral response acceleration short period (Sds) for Project is As indicated on Structural Drawings.
 5. Provide earthquake equipment required by ASME A17.1/CSA B44.
 6. Provide seismic switch required by ASCE/SEI 7.

2.2 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems, and as required for complete system.
- B. Elevator Description: Machine Room-less AC Gearless traction elevator.
1. Rated Load:
 - a. Elevators designated as Passenger: 3500 lb
 2. Freight Loading Class for Service Elevator(s): Class A.
 3. Rated Speed: 150 fpm (**0.75 m/s**) minimum.
 4. Operation System: Single automatic.
 1. Machine Location: Inside hoistway, mounted on guiderails
 2. Controller Location: Remote location inside secured closet and control room
 3. Auxiliary Operations:
 - a. Standby power operation.
 - b. Standby-powered lowering.
 - c. Battery-powered automatic evacuation.
 - d. Earthquake Emergency Operation: Comply with requirements in ASME A17.1/CSA B44 as required by seismic design category and component importance factor.
 - e. Automatic dispatching of loaded car.
 - f. Nuisance-call cancel.
 - g. Automatic operation of lights and ventilation fans.
 4. Car Enclosures:
 - a. Inside Width: As indicated on Drawings.
 - b. Inside Depth: As indicated on Drawings.
 - c. Inside Height: As indicated on Drawings
 - d. Front Walls (Return Panels): Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - e. Car Fixtures: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - f. Side and Rear Wall Panels: Textured stainless steel.
 - g. Reveals: Black.
 - h. Door Faces (Interior): Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - i. Door Sills: Aluminum, mill finish.
 - j. Ceiling: Satin stainless steel, ASTM A480/A480M, No. 4 finish.

MACHINE ROOM-LESS TRACTION ELEVATORS

14 21 24 - 5

Fontana City Hall – Phase II

- k. Handrails: 1-1/2 inches **(38 mm)** flat satin stainless steel, at rear of car.
 - l. Floor prepared to receive flooring specified in Division 09.
- 5. Hoistway Entrances:
 - a. Width: As required by elevator selected and in compliance with all applicable codes.
 - b. Height: As required by elevator selected and in compliance with all applicable codes.
 - c. Type: Single-speed side sliding.
 - d. Frames: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - e. Doors and Transoms: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - f. Sills: Aluminum, mill finish.
- 6. Hall Fixtures: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
- 7. Additional Requirements:
 - a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - b. Provide hooks for protective pads in all cars and one complete set(s) of full-height protective pads per building.

2.3 MACHINE ROOM-LESS ELECTRIC TRACTION ELEVATORS

- A. Basis-of-Design Product: Evolution 200 as manufactured by TK Elevator; www.tkelevator.com
 - 1. Subject to compliance with requirements, provide named product or an equivalent product by one of the following:
 - a. Kone Inc.; www.kone.com
 - b. Mitsubishi Electric US, Inc.; www.mitsubishielevator.com.
- B. Source Limitations: Obtain elevators from single manufacturer.
 - 1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.4 TRACTION SYSTEMS

- A. Elevator Machines: Permanent magnet, variable-voltage, variable-frequency, ac-type hoisting machines and solid-state power converters.
- B. Buffers, Car, and Counterweight: Polyurethane buffer.
- C. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.
- D. Machine Beams: Provide steel framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Section 05 50 00 "Metal Fabrications" for materials and fabrication.
- E. Car Frame and Platform: Welded-steel units.

MACHINE ROOM-LESS TRACTION ELEVATORS

14 21 24 - 6

Fontana City Hall – Phase II

- F. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

- A. Provide microprocessor operation systems as required to provide type of operation indicated.
 - 1. Controller shall be non-proprietary, meaning that the controller system shall permit diagnostic, adjustment, maintenance and reporting functions for the complete elevator so that maintenance of the elevator may be performed by the University representatives instead of the elevator manufacturer.
 - 2. Controller may be "on-board" or accessed via hand held tools provided at no cost to the University. All required maintenance access and operation codes shall be provided to the University.
- B. Program door operating sequence to comply with specified door open/floor wait criteria. Provide independently adjustable door open times.
 - 1. Program doors to remain open for minimum 5 seconds on arrival at floor in response to car-initiated selection in compliance with CBC.
- C. Program hall call notification time in compliance with CBC, with a minimum of 5 seconds to start of close function.
 - 1. Program doors to remain open for minimum 5 seconds on arrival at floor in response to car-initiated selection in compliance with CBC.
- D. Auxiliary Operations:
 - 1. Single-Car Battery-Powered Automatic Evacuation: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it moves to the next floor above or below, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
 - 2. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors begin closing.
 - 3. Nuisance-Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls can be adjusted.
 - 4. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after five minutes and are re-energized before car doors open.

2.6 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams causes doors to stop and reopen.
- B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer sounds and doors begins to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

- A. Provide enameled or powder-coated steel car enclosures to receive removable steel-framed car enclosures with nonremovable wall panels, with removable car roof, access doors, power door operators, and ventilation.
 - 1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.
- B. Materials and Finishes: Manufacturer's standards, but not less than the following:
 - 1. Subfloor:
 - a. Exterior, underlayment grade plywood, not less than 5/8-inch (15.9-mm) nominal thickness.
 - 2. Floor Finish:
 - a. Specified in Section 09 65 19 "Resilient Tile Flooring."
 - 3. Stainless Steel Wall Panels: Flush, formed-metal construction; fabricated from stainless steel sheet.
 - 4. Fabricate car with recesses and cutouts for signal equipment.
 - 5. Fabricate car door frame integrally with front wall of car.
 - 6. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
 - 7. Sight Guards: Provide sight guards on car doors.
 - 8. Sills: Extruded or machined metal, with grooved surface, 1/4 inch (6.4 mm) thick.
 - 9. Ceiling: Metal flush panels, with LED downlights in the center of each panel. Align ceiling panel joints with joints between wall panels.
 - 10. Light Fixture Efficiency: Not less than 35 lumens/W.
 - 11. Ventilation Fan Efficiency: Not less than 3.0 cfm/W (1.4 L/s per W).

2.8 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile to accommodate hoistway wall construction.
 - 1. Where gypsum board wall construction is indicated, frames to be self-supporting with reinforced head sections.
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies to comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible in accordance with NFPA 252 or UL 10B.
 - 1. Fire-Protection Rating: 2 hours with 30-minute temperature rise of 450 deg F (**250 deg C**).
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
 - 1. Stainless Steel Frames: Formed from stainless steel sheet.
 - 2. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches (76 mm) high, on both jambs of hoistway door frames.

MACHINE ROOM-LESS TRACTION ELEVATORS

14 21 24 - 8

Fontana City Hall – Phase II

3. Stainless Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from stainless steel sheet.
4. Sight Guards: Provide sight guards on doors matching door edges.
5. Sills: Extruded or machined metal, with grooved surface, 1/4 inch (6.4 mm) thick.
6. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

2.9 SIGNAL EQUIPMENT

- A. Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Provide buttons and lighted elements illuminated with LEDs.
- B. Car-Control Stations: Provide manufacturer's standard recessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
 1. Mark buttons and switches for required use or function. Use both tactile symbols and Braille in compliance with CBC Chapter 11B.
 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- C. Emergency Communication System: Two-way voice communication system, with visible text signal and audible modes, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
 1. Allow elevator occupants to select text-based or audible mode and include live interactive two-way communication in each mode.
 2. System shall remain operational when the elevator is operational.
- D. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 27.
- E. Car Position Indicator: Provide CBC compliant illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
- F. Hall Push-Button Stations: Provide one hall push-button station at each landing.
 1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 2. Equip units with buttons for calling elevator and for indicating desired direction of travel.
 3. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 27.
- G. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide the following:
 1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
 1. Size: Minimum of 2-1/2 inches high by 2-1/2 inches wide and visible from the proximity of the hall call button.

- H. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - 1. At manufacturer's option, audible signals may be placed on cars.
- I. Hall Position Indicators: Provide illuminated, digital-display-type position indicators, located above hoistway entrance at ground floor. Provide units with flat faceplate and with body of unit recessed in wall.
 - 1. Integrate ground-floor hall lanterns with hall position indicators.
- J. Car and Landing Illumination: Provide minimum 5-foot candles illumination at the car controls threshold and the landing when the car and landing doors are open.
- K. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, commercial steel, Type B, exposed, matte finish.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, commercial steel, Type B, pickled.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304.
- D. Textured Stainless Steel Sheet: ASTM A240/A240M, Type 304 with embossed texture rolled into exposed surface.
 - 1. Product: Subject to compliance with requirements, provide RigidTex finish as selected by Architect.
 - 2. Metal surface is satin polished after texturing.
- E. Stainless Steel Bars: ASTM A276/A276M, Type 304.
- F. Stainless Steel Tubing: ASTM A554, Grade MT 304.
- G. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Examine hoistways, hoistway openings, and pits as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF MACHINE ROOM-LESS ELECTRIC TRACTION ELEVATORS

- A. Comply with manufacturer's written instructions.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- F. Leveling Tolerance: 1/8 inch (3 mm), up or down, regardless of load and travel direction.
- G. Clearance between the car platform sill and the edge of the hoistway landing shall be no greater than 1-1/4 inches.
- H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- I. Locate hall signal equipment for elevators as follows unless otherwise indicated:
 - 1. Place hall lanterns either above each hoistway entrance.
 - 2. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Operating Test: As required by State Elevator Inspector and the California Elevator Code, load elevator to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.
- C. Advise University, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.4 PROTECTION

- A. Temporary Use: Not permitted by the University.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train University's maintenance personnel to operate, adjust, and maintain elevator(s).
- B. Check operation of each elevator with University's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.
 - 1. Demonstration and training shall be on site for a duration of a minimum of 4 hours and a maximum of 6 hours.

END OF SECTION 14 21 24