

DLR Group

Architecture
Engineering
Planning
Interiors

Compton Community College District Instructional Building #1

**1111 East Artesia Boulevard
Compton, California 90221
DLR Group Project No. 75-15238-00**

Project Manual – Volume 1

DSA Submittal

July 31, 2017

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SECTION 000107
SEALS PAGE

IDENTIFICATION STAMP
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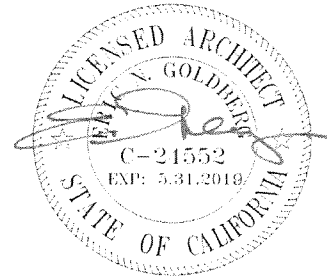
PART 1

1.01 DESIGN PROFESSIONALS OF RECORD

APP3 117612

ACME FLS *EB* SS *HN*
Date 08-10-2017

- A. Architect: DLR Group.
1. Eric N. Goldberg
 2. C 24552
 3. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.



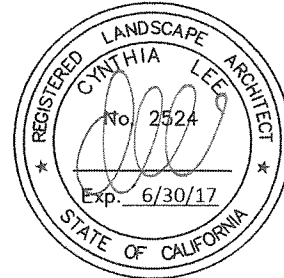
- B. Civil Engineer: Brandow & Johnston, Inc
1. Orlando Moreno, PE
 2. C 65405
 3. Responsible for Sections 015723, 024113, and Divisions 31, 32 and 33 except where indicated as prepared by other design professionals of record.

Orlando Moreno

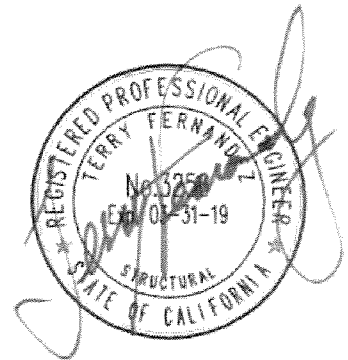


FOR BRANDOW & JOHNSTON, INC

- C. Landscape Architect: Landshapes.
1. Cynthia Lee
 2. 2524
 3. Responsible for Sections 320190, 328000, and 329000.



- D. Structural Engineer: MHP.
1. Terry Fernandez
 2. 3256
 3. Responsible for Sections 033000, 051200, 053100, and 054000.



DLR GROUP
Project NO. 75-15238-00
8/31/16

Compton Community College District
Instructional Building #1
50% Construction Documents

- E. Plumbing Engineer: DLR Group.
 - 1. Tanase Cocea
 - 2. M 34223
 - 3. Responsible for Division 22



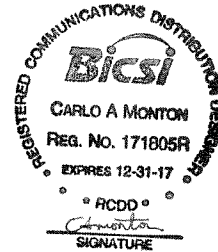
- F. HVAC Engineer: DLR Group.
 - 1. Tanase Cocea
 - 2. M 34223
 - 3. Responsible for Division 23



- G. Electrical Engineer: DLR Group.
 - 1. Zoheir Guemmat
 - 2. E 19110
 - 3. Responsible for Division 26



- H. Communications: Plan Net.
 - 1. Carlo A Monton
 - 2. 171805R
 - 3. Responsible for Division 27



- I. Fire Protection: AV Fire Protection Engineering, Inc.
 - 1. Vicky Avitan
 - 2. FP 1494
 - 3. Responsible for Division 21



END OF DOCUMENT

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APPL NO. 03-17612 DATE 4-13-18
REVISION A



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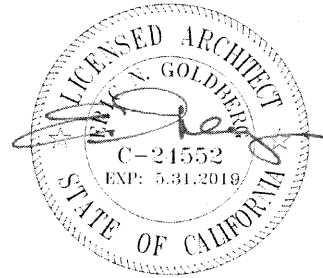
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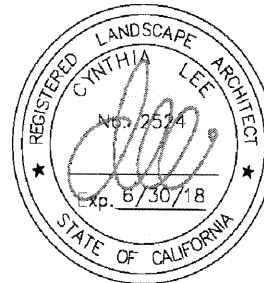
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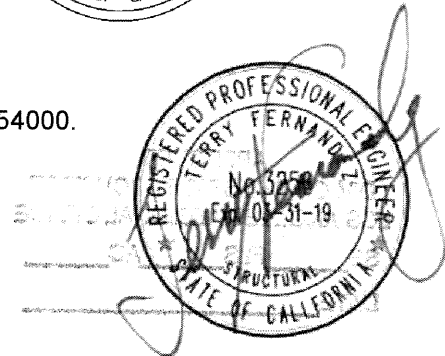


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11/03/17

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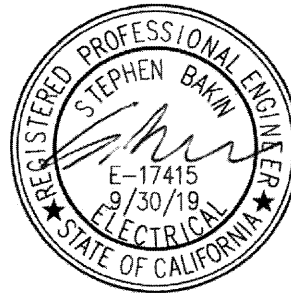
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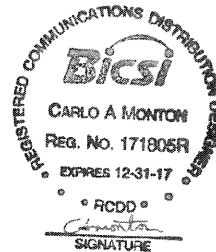
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DATE 5/25/2018

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FOR REVISION (C)

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END OF DOCUMENT

PROJECT MANUAL INCLUDING SPECIFICATIONS
FOR

Compton Community College District
Instructional Building #1

DOCUMENT 000110
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PART 1 GENERAL

1.01 SUMMARY

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

- A. And: Conjunction indicating that items in series are to be taken jointly. It may also mean plus or in addition to preceding items in the series.
- B. Approved: Where used in conjunction with Architect's response or action, meaning will be held to limitations of Architect's responsibilities and duties as specified in General and Supplementary Conditions. In no case will Architect's approval be interpreted as release of Contractor from responsibilities to fulfill requirements of Contract Documents.
- C. Directed, Requested: Terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by Architect," "requested by Architect," and similar phrases. However, no such implied meaning shall be interpreted to extend Architect's responsibility into area of construction supervision.
- D. Finish: The manner or method of completion. The final appearance of a surface, including texture, smoothness, sheen, and color, after finishing operations have been performed. Finishing operations include preparation of substrate and application, curing, and protection of specified finish materials.
- E. Furnish: To supply, deliver, unload, and inspect for damage.
- F. Indicated: Refers to graphic representations, notes, or schedules on Drawings, or other paragraphs or Schedules in Specifications, and similar requirements in Contract Documents. Terms such as "shown," "noted," "scheduled," and "specified" are used to help reader locate the reference. Location is not limited
- G. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- H. Installer: Entity (person or firm) engaged to perform a particular unit of Work at Project site, including installation, erection, application, repair, patching, and similar required operations. Such entities must be experienced in operations they are engaged to perform.
- I. Mold Growth Products: Any organic cellular based product capable of fostering growth of mold. Examples include:
 - 1. Wood based products.
 - 2. Paper based products including paper faced products such as gypsum board and gypsum sheathing.
 - 3. Insulation products.
 - 4. Resins, binders, and adhesives.
 - 5. Wall coverings and carpet backings.

- J. Or: Used to introduce any of the possibilities in a series. Items in the series are not required to be taken jointly. It does not mean that individual items in the series are optional requirements.
- K. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- L. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.
- M. Provide: To furnish and install, complete and ready for operations and use for purpose intended.
- N. Regulations: Includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within construction industry that control performance of the Work.
- O. Similar: Interpreted in its general sense and not as meaning identical. Elements defined as "similar" shall be coordinated in relationship to their location and connection with other parts of the Work.
- P. Supply: Same as Furnish.
- Q. True To Line, Plumb, Level, and Flat: Install Work within following tolerances, except where indicated otherwise:
 - 1. True to line: Allowed deviation from straight line within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 3/8 inch in lengths over 20 feet.
 - 2. Level: Allowed deviation from horizontal plane within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 1/2 inch in lengths over 20 feet.
 - 3. Plumb: Allowed deviation from vertical plane within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 1/2 inch in lengths over 20 feet.
 - 4. Flat: Allowed deviation from flat plane in any planar direction within plus or minus 1/16 inch in one foot; plus or minus 1/8 inch in 10 feet; plus or minus 1/4 inch in 20 feet; and plus or minus 3/8 inch in lengths over 20 feet.
 - 5. Tolerances are not accumulative.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 014216

SECTION 014450 - BUILDING ENVELOPE DESIGN REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Design requirements and testing for exterior walls.

1.02 DEFINITIONS

- A. General: Definitions included in this Section supersede definitions appearing in reference documents.
- B. Water Leakage:
 - 1. Condensation occurring during water infiltration tests is acceptable.
 - 2. Water infiltration is acceptable only if following conditions are satisfied:
 - a. Water is contained and drained to exterior.
 - b. Water will not cause damage to adjacent materials or finishes.
 - c. There is no wetting of interior surface that would be visible to building occupants.
 - d. There would be no staining or other damage to any part of completed building or furnishings.
- C. Positive Pressure: Effect of wind blowing against wall for testing; inward acting pressure on system.
- D. Negative Pressure: Effect of suction on lee side of building. For test, outward acting pressure on system.

1.03 SYSTEM REQUIREMENTS

- A. Description of System: Exterior wall system, complete with glazed aluminum curtain wall, storefronts, glass, glazing, air barriers, shims, sealants, and anchorage devices required to secure entire exterior envelope to building structural system and related appurtenances as necessary to provide complete and weathertight external envelope.
- B. Acceptability of exterior glazing systems is dependent upon successful test performances.
- C. General:
 - 1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
 - 2. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
 - 3. Provide concealed fastening wherever possible.
 - 4. Coordinate shop drawings and installation of exterior wall to resolve conflicts.
 - 5. Allow for installation tolerances, expansion and contraction of adjacent materials, and sealant manufacturer's recommended joint design.
 - 6. Assemblies shall be free from rattles, wind whistles, and noise due to thermal and structural movement and wind pressure.
 - 7. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening, or fracturing connection between units and building structure or between units themselves.

8. Do not assume glass, sealants, and interior finishes contribute to framing member strength, stiffness, or lateral stability.
 9. System shall drain to exterior face of wall; water entering system and condensation occurring within system by drain holes and gutters of adequate size to evacuate water without infiltration to interior.
 10. Provide components exposed to view uniform color and profile appearance.
 11. Do not design system to exceed sealant manufacturer's recommended performance criteria.
- D. Structural Requirements:
1. Provide exterior envelope components engineered by registered professional engineers licensed to practice structural engineering in jurisdiction where Project is located where specified in individual specification sections.
 2. Anticipated building movement criteria:
 - a. Building Drift = $AT/400$ at 10 year wind load
 - b. Vertical deflection of structure above and below = $1/2$ inch..
 3. Snow Load: 30 PSF for ground snow load; drifting per code. (30 PSF Uniform Minimum)
 4. Wind Loading: Engineer typical exterior envelope to withstand positive and negative wind load acting normal to plane of walls as required by governing building code requirements using:
 - a. Basic wind speed: 90 mph.
 - b. Exposure: BC.
 - c. Importance factor: 1.15.
 5. Engineer corners and parapet areas of exterior envelope to withstand upgraded wind requirements stipulated in ANSI A58.1, ASCE 7.
- E. Thermal Requirements:
1. Thermal movement:
 - a. Provide for expansion and contraction due to structural movement and temperature changes without detriment to appearance or performance.
 - b. Design for assumed temperature changes regardless of surface areas exposed to exterior and interior.
 - c. Design exterior envelope to withstand movement within itself, between wall assembly and structure in deflection, warpage and racking without breakage of air or water seals.
 - d. Provide joint movement capable of reacting to material temperature range of 180 degrees F.
 2. Assume entire cross section has uniform temperature.
 3. For thermal design other than joint movement, design winter surface temperature shall be 99 percent dry bulb winter temperature from ASHRAE handbook.
- F. Seismic Requirements
1. Design for seismic loads and movement in accordance with applicable codes and following requirements.
 2. At any floor, assume that maximum seismic displacement for floor will occur while floor immediately above and below remain in undisplaced condition.
 3. Seismic displacements up to design seismic drift, no failure or gross permanent distortion of anchors, frames, glass, stone or panels will be allowed.
 - a. Glazing gaskets may not disengage.

- b. Weather seals may not fail.
- 4. Provide two times design seismic drift displacement or 3/4 inch, whichever is greater, no failure or gross permanent distortion of anchors, frames, glass, stone, or panel will be allowed.
 - a. Glazing gaskets may disengage.
 - b. Weather seals may fail.
- 5. Engineer exterior envelope to accommodate seismic movements as established by Local Governing Code, Importance Factor 1.25.

1.04 EXTERIOR GLAZING REQUIREMENTS

- A. Exterior Window Performance: Previously tested and successfully passed following:
 - 1. Air Infiltration of Fixed Units: Tested not to exceed 0.06 cubic foot/minute square foot in accordance with ASTM E283, at pressure differential of 6.24 PSF.
 - 2. Water Penetration Under Static Pressure: In accordance with ASTM E331; air pressure 20 percent design wind load; 10 PSF minimum, no uncontrolled water penetration allowed.
 - 3. Water Penetration Under Dynamic Pressure: In accordance with AAMA 501.1; air pressure 20 percent design wind load; 10 PSF minimum, no uncontrolled water penetration allowed.
 - 4. Structural Test Under Uniform Static Pressure: Provide testing in accordance with ASTM E330.
 - a. Deflection under Uniform Loading: Limit deflection of aluminum members not to exceed L/175 or maximum 3/4 inch for spans less than 13'-6". Limit deflection to L/240 plus 1/4 inch for spans equal to or greater than 13'-6".
 - b. No glass breakage allowed.
 - c. Anchor movement not to exceed 1/8 inch.

1.05 SUBMITTALS

- A. Provide submittals in accordance with Section 013000 - Administrative Requirements.
- B. Provide test reports on accordance with Section 014000 - Quality Requirements.
- C. Mock-up Shop Drawings: Provide in accordance with Section 014000 - Quality Requirements.

1.06 FIELD TESTING

- A. Field Air and Water Infiltration Test:
 - 1. General:
 - a. Test chamber size:
 - 1) Storefront: One story by three panels, minimum.
 - 2) Test first two bays of glazing systems and masonry installed on building.
 - b. Ensure test specimen includes typical joint conditions, joints between fixed vision glass panels and spandrel glass, corner joints and butt joints where framing members are connected, and other critical joints and connections.
 - c. Provide necessary precautions to protect public, observers, and testing personnel from injury due to possibility of breaking glass.
 - d. Perform air infiltration test then water infiltration test.
 - e. Joints between test specimen and opening into which it is mounted are not part of test.

- f. If test is not successful, determine areas of excess infiltration or water leakage. Perform remedial work and retest to determine compliance with specified requirements.
 2. Air infiltration test:
 - a. Perform test in compliance with AAMA 503 and ASTM E783.
 - b. Provide positive air pressure differential of 6.24 lbf/ft² to test infiltration.
 - c. Maximum allowable rate of air infiltration is 0.06 cfm/ft² of wall area.
 - d. Accurately determine chamber leakage; do not estimate.
 3. Water Infiltration Test:
 - a. Perform test in compliance with ASTM E2837, AAMA 503 and ASTM E1105.
 - b. Create positive static air pressure differential of 8 lbf/ft².
 - c. No uncontrolled water leakage will be allowed.
- B. Contractor Hose Test of Installed Glazing Systems:
1. Perform field check for water leakage on actual building conforming to test requirements of AAMA 501.2.
 2. No water leakage will be permitted, as defined in this Section.
 3. Areas to be tested and number of tests will be determined by Owner; Provide tests at 15%, 50%, and 85% of glazing system installation.
 4. Test area: Three separate locations; minimum 15'-0" wide by 2 stories high.
 5. Provide scaffold, hose, and water supply to perform tests, plus repeat unsuccessful tests after remedial work.
 6. Ensure remedial measures maintain standards of quality and durability of original design. Remedial measures are subject to approval of Architect.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 014450

SECTION 015713 - TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 REFERENCE STANDARDS

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.
- B. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity; 1999a (Reapproved 2014).
- C. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2011.
- D. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.
- E. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2012.
- F. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2002 (Reapproved 2009).
- G. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.

1.03 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Also comply with all more stringent requirements of Erosion and Sedimentation Control Manual of the State in which the Project is located.
- C. Also comply with all more stringent requirements of State of California Erosion and Sedimentation Control Manual.
- D. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.

- E. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
 - 1. Obtain and pay for permits and provide security required by authority having jurisdiction.
 - 2. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- F. Provide to Owner a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.
- G. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- H. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
 - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
 - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.
- I. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
 - 1. Control movement of sediment and soil from temporary stockpiles of soil.
 - 2. Prevent development of ruts due to equipment and vehicular traffic.
 - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- J. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
 - 1. Prevent windblown soil from leaving the project site.
 - 2. Prevent tracking of mud onto public roads outside site.
 - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
 - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- K. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
 - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- L. Open Water: Prevent standing water that could become stagnant.
- M. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
 - 1. Submit within 2 weeks after Notice to Proceed.
 - 2. Include:
 - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
 - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
 - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
 - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
 - e. Other information required by law.
 - f. Format required by law is acceptable, provided any additional information specified is also included.
 - 3. ~~Obtain the approval of the Plan by authorities having jurisdiction.~~
 - 4. ~~Obtain the approval of the Plan by Owner.~~
- C. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance, repair, and corrective action required and accomplished. Include date-stamped photographs of conditions with each inspection report.
- D. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bales: Air dry, rectangular straw bales.
 - 1. Cross Section: 14 by 18 inches (350 by 450 mm), minimum.
 - 2. Bindings: Wire or string, around long dimension.
- B. Bale Stakes: One of the following, minimum 3 feet (1 m) long:
 - 1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot (1.98 kg per linear m).
 - 2. Wood, 2 by 2 inches (50 by 50 mm) in cross section.
- C. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
 - 1. Average Opening Size: 30 U.S. Std. Sieve (0.600 mm), maximum, when tested in accordance with ASTM D4751.
 - 2. Permittivity: 0.05 sec^{-1} , minimum, when tested in accordance with ASTM D4491.
 - 3. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.

4. Tensile Strength: 100 lb-f (450 N), minimum, in cross-machine direction; 124 lb-f (550 N), minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
 5. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
 6. Tear Strength: 55 lb-f (245 N), minimum, when tested in accordance with ASTM D4533.
 7. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- D. Silt Fence Posts: One of the following, minimum 5 feet (1500 mm) long:
1. Steel U- or T-section, with minimum mass of 1.33 lb per linear foot (1.98 kg per linear m).

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

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

3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. See Drawings for scope and extent of required erosion and sediment control measures.
- C. Construction Entrances: Traffic-bearing aggregate surface.
 1. Width: As required; 20 feet (7 m), minimum.
 2. Length: 50 feet (16 m), minimum.
 3. Provide at each construction entrance from public right-of-way.
 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- D. Linear Sediment Barriers: Made of silt fences.
 1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
 - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
 2. Space sediment barriers with the following maximum slope length upslope from barrier:
 - a. Slope of Less Than 2 Percent: 100 feet (30 m).
 - b. Slope Between 2 and 5 Percent: 75 feet (23 m).
 - c. Slope Between 5 and 10 Percent: 50 feet (15 m).
 - d. Slope Between 10 and 20 Percent: 25 feet (7.5 m).
 - e. Slope Over 20 Percent: 15 feet (4.5 m).

3.04 INSTALLATION

- A. General: Install temporary erosion and sediment controls as indicated on Drawings.

- B. Traffic-Bearing Aggregate Surface:
 - 1. Excavate minimum of 6 inches (150 mm).
 - 2. Place geotextile fabric full width and length, with minimum 12 inch (300 mm) overlap at joints.
 - 3. Place and compact at least 6 inches (150 mm) of 1.5 to 3.5 inch (40 to 90 mm) diameter stone.

- C. Silt Fences:
 - 1. Store and handle fabric in accordance with ASTM D4873.
 - 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch (405 mm) high barriers with minimum 36 inch (905 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 4 inches (100 mm) in ground.
 - 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch (710 mm) high barriers, minimum 48 inch (1220 mm) long posts spaced at 6 feet (1830 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
 - 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet (6 m), use nominal 32 inch (810 mm) high barriers with woven wire reinforcement and steel posts spaced at 4 feet (1220 mm) maximum, with fabric embedded at least 6 inches (150 mm) in ground.
 - 5. Install with top of fabric at nominal height and embedment as specified.
 - 6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with extra post.
 - 7. Fasten fabric to steel posts using wire, nylon cord, or integral pockets.
 - 8. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches (300 mm) high with post spacing not more than 4 feet (1220 mm).

- D. Straw Bale Rows:
 - 1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
 - 2. Install bales so that bindings are not in contact with the ground.
 - 3. Embed bales at least 4 inches (100 mm) in the ground.
 - 4. Anchor bales with at least two stakes per bale, driven at least 18 inches (450 mm) into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
 - 5. Fill gaps between ends of bales with loose straw wedged tightly.
 - 6. Place soil excavated for trench against bales on the upslope side of the row, compacted.

3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Silt Fences:
 - 1. Promptly replace fabric that deteriorates unless need for fence has passed.

2. Remove silt deposits that exceed one-third of the height of the fence.
 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
 2. Remove silt deposits that exceed one-half of the height of the bales.
 3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- E. Clean out temporary sediment control structures weekly and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.
- 3.06 CLEAN UP
- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.
 - B. Clean out temporary sediment control structures that are to remain as permanent measures.
 - C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION 015713

SECTION 01 57 23 – TEMPORARY STORM WATER POLLUTION CONTROL

PART I - GENERAL

1.1 SECTION INCLUDES

- A. Installation of Storm Water Pollution Prevention Plan (SWPPP) measures as per plans and specifications for the purpose of preventing the discharge of pollutants from the construction site into the receiving waters.
- B. Compliance with local, state and federal regulations.

1.2 REFERENCES

- A. California Storm Water Best Management Practice Handbook for Construction Activity (BMP Handbook).

1.3 SUBMITTAL REQUIREMENTS

- A. Site specific Storm Water Pollution Prevention Plan outlining the complete guidelines per Local State and Federal Regulations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Use materials of a class, grade and type needed to meet the performance described in the BMP Handbook.

PART 3 - EXECUTION

3.1 PREPARATION AND APPROVAL

- A. Use as a guide the BMP Handbook, latest edition, published by the Storm Water Quality Task Force.

3.2 IMPLEMENTATION

- A. Install perimeter controls prior to starting other construction work at the site.
- B. Contain on-site storm water at the jobsite. Do not drain on-site water directly into the storm drain.
- C. At the end of Construction Contract:
 - 1. Remove all materials used in the management of Storm Water Runoff.

3.3 MONITORING

- A. Conduct examination of storm water pollution prevention controls monthly, as well as before and after each storm. Prepare and maintain, at the jobsite, a log of each inspection using Site Monitoring Report forms.

3.4 LIABILITIES AND PENALTIES

- A. Review of the SWPPP and inspection log by the District shall not relieve the Contractor from liabilities arising from non-compliance of storm water pollution regulations.
- B. Payment of penalties for non-compliance by the Contractor shall be the sole responsibility of the Contractor and will not be reimbursed by the District.

3.5 CHANGE OF INFORMATION

- A. Submit to the District a completed NOI for change of information (Construction Site Information and Material Handling/Management Practices).

END OF SECTION

SECTION 015721 - INDOOR AIR QUALITY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Construction procedures to promote adequate indoor air quality after construction.
- B. Building flush-out after construction and before occupancy.
- C. Procedures for testing baseline IAQ. Baseline IAQ requirements specify maximum indoor pollutant concentrations for acceptance of the facility.
- D. Requirements for Independent Materials Testing of specific materials anticipated to have measurable impact on IAQ.
- E. Testing indoor air quality before commencement of construction; existing building areas only.
- F. Testing indoor air quality after completion of construction.

1.02 PROJECT GOALS

- A. Dust and Airborne Particulates: Prevent deposit of dust and other particulates in HVAC ducts and equipment.
 - 1. Cleaning of ductwork is not contemplated under this Contract.
 - 2. Bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
 - 3. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
 - 4. Establish condition of existing ducts and equipment prior to start of alterations.
- B. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
 - 1. Furnish products meeting the specifications.
 - 2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.
- C. Ventilation: HVAC system has been designed to achieve the minimum requirements for ventilation specified in ASHRAE 62.1.

1.03 RELATED REQUIREMENTS

- A. Section 014000 - Quality Requirements: Testing and inspection services.
- B. Division 23 - Mechanical: HVAC filters, testing HVAC systems for proper air flow rates, adjustment of dampers and registers, and settings for equipment, cleaning air ducts, equipment, and terminal units.

1.04 REFERENCE STANDARDS

- A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size; 2012, with 2015 amendments.
- B. ASHRAE Std 62.1 - Laboratory Method of Testing to Determine the Sound Power in a Duct; 2013.

- C. ASHRAE Std 129 - Measuring Air-Change Effectiveness; 1997 (Reaffirmed 2002).
- D. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers; California Department of Public Health; v1.1, 2010.
- E. CAL (EESR) - California Energy Efficiency Standards Residential Alternative Calculation Method (ACM) Approval Manual; 2005.
- F. SMACNA (OCC) - IAQ Guidelines for Occupied Buildings Under Construction; 2007.

1.05 DEFINITIONS

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of dust fumes, vapors, or gasses.
- C. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- D. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- E. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare: unfavorably alter ecological balances: or degrade the utility of the environment for aesthetic, cultural, or historical purpose.
- F. Hazardous Materials: Any material that regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
 - 1. Hazardous materials include: pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the international Agency for Research on Cancer (IARC).
 - 2. Do NOT submit MSDS sheets to Architect as construction submittals.
- G. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of the space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.
- H. Interior final finishes: materials and products will be exposed at interior, occupied spaces: including flooring, wallcovering, finish carpentry, and ceilings.
- I. Packaged dry products: materials and products that are installed in dry form and are delivered to the site in manufacture's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- J. Particulates: Dust, dirt, and other airborne solid matter.

- K. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, and special coatings.
- L. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.

1.06 ADMINSTRATIVE REQUIREMENTS

- A. Preconstruction Meeting
 - 1. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner and Architect to discuss the proposed IAQ Management Plan and to develop mutual understanding relative to details of environmental protection.

1.07 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Sustainability Submittals: Submit all submittals required in this Section in accordance with procedures specified in Section 018114.
- C. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA (OCC) as a guide.
 - 1. Submit not less than 10 days before the Preconstruction meeting.
 - 2. Identify potential sources of odor and dust.
 - 3. Identify construction activities likely to produce odor or dust.
 - 4. Identify areas of project potentially affected, especially occupied areas.
 - 5. Evaluate potential problems by severity and describe methods of control.
 - 6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
 - 7. Describe cleaning and dust control procedures.
 - 8. Describe coordination with commissioning procedures.
- D. Baseline Indoor Air Quality (IAQ) Test Reports.
- E. Independent Materials Testing Reports. Submit for the following products:
 - 1. Emissions:
 - a. Fireproofing ;material on appropriate substrate.
 - b. Ceiling tile.
 - c. Resilient flooring.
 - d. Carpet including adhesive and concrete flooring.
 - e. Interior paint on appropriate substrate, including any primer coat.
 - f. Wall covering.
 - 2. Lethal Toxic Potency.
 - a. Ceiling tile.
 - b. Resilient flooring.
 - c. Carpet including adhesive and concrete flooring
 - d. Wall covering.
 - e. Office equipment.
 - 3. Microbial Growth:
 - a. Fireproofing material on appropriate substrate.

- b. Ceiling tile.
 - c. Wall covering.
- F. Product Data: Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
- G. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.
- H. Duct and Terminal Unit Inspection Report.
- I. Product Data: Provide manufacturer's performance data for MERV 8 filtration media used during the construction period.
- J. Air Contaminant Test Plan: Identify:
 - 1. Testing agency qualifications.
 - 2. Locations and scheduling of air sampling.
 - 3. Test procedures, in detail.
 - 4. Test instruments and apparatus.
 - 5. Sampling methods.
- K. Air Contaminant Test Reports: Show:
 - 1. Location where each sample was taken, and time.
 - 2. Test values for each air sample; average the values of each set of 3.
 - 3. HVAC operating conditions.
 - 4. Certification of test equipment calibration.
 - 5. Other conditions or discrepancies that might have influenced results.
- L. Building Flush-out Reports: Identify:
 - 1. Recorded dates of flush-out procedure.
 - 2. Outdoor air delivery rates.
 - 3. Indoor temperature and relative humidity readings at a consistent time each day of the flush-out procedure.
 - 4. Building occupancy conditions.
- M. Ventilation Effectiveness Test Plan: Identify:
 - 1. Testing agency qualifications.
 - 2. Description of test spaces, including locations of air sampling.
 - 3. Test procedures, in detail; state whether tracer gas decay or step-up will be used.
 - 4. Test instruments and apparatus; identify tracer gas to be used.
 - 5. Sampling methods.
- N. Ventilation Effectiveness Test Reports: Show:
 - 1. Include preliminary tests of instruments and apparatus and of test spaces.
 - 2. Calculation of ventilation effectiveness, E.
 - 3. Location where each sample was taken, and time.
 - 4. Test values for each air sample.
 - 5. HVAC operating conditions.
 - 6. Other information specified in ASHRAE Std 129.
 - 7. Other conditions or discrepancies that might have influenced results.
- O. Documentation Photograph Requirements: Specified in Section 013000.

1.08 QUALITY ASSURANCE

- A. Testing and Inspection Agency Qualifications: Independent testing agency having minimum of 5 years experience in performing the types of testing specified.

1.09 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT PLAN

- A. Develop, submit and implement Construction Indoor Air Quality (IAQ) Management Plan meeting SMACNA IAQ Guidelines for Occupied Buildings under Construction. Sample Construction Indoor Air Quality Management Plan is attached as Exhibit 1 to end of this section.
- B. Construction Indoor Air Quality Management Plan to describe in detail measures specific to this project to be taken during construction to promote adequate indoor air quality upon completion.
 - 1. HVAC Protection: Describe steps to protect ductwork and HVAC equipment from dust and water damage.
 - 2. Source Control: Identify sources of VOCs and appropriate measures to mitigate their impacts.
 - 3. Pathway Interruption: Manipulate air paths to reduce contaminants of finished spaces.
 - 4. Housekeeping: Describe cleaning and dust control procedures.
 - 5. Quality Assurance and IAQ Monitoring: Describe steps to ensure compliance by Contractor and subcontractors.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Low VOC Materials: See Section 018113.
- B. Temporary Air Filters Used During Construction: MERV of 8, minimum, when tested in accordance with ASHRAE 52.2.

PART 3 EXECUTION

3.01 CONSTRUCTION PROCEDURES

- A. Prevent the absorption of moisture and humidity by adsorptive materials by:
 - 1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
 - 2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
 - 3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Do not permit smoking or consumption of food and drink within the building at any time. Further, do not permit smoking within 25 feet (8 m) of entrances, operable windows, intake louvers, and similar building openings.
- C. Begin construction ventilation when building is substantially enclosed.
- D. If extremely dusty or dirty work must be conducted inside the building, shut down HVAC systems for the duration; remove dust and dirt completely before restarting systems.

- E. When working in a portion of an occupied building, prevent movement of air from construction area to occupied area.
- F. HVAC equipment and ductwork may not be used for ventilation during construction:
 - 1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.
 - 2. Exhaust directly to outside.
 - 3. Seal HVAC air inlets and outlets immediately after duct installation.
- G. Do not store construction materials or waste in mechanical or electrical rooms.
- H. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
 - 1. Inspect duct intakes, return air grilles, and terminal units for dust.
 - 2. Clean tops of doors and frames.
 - 3. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
 - 4. Remove intake filters last, after cleaning is complete.
- I. Do not perform dusty or dirty work after starting use of return air ducts without intake filters.
- J. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures, including the following:
 - 1. HVAC Protection:
 - a. Use temporary heaters whenever feasible.
 - b. Seal all duct and equipment openings with plastic during the construction period.
 - c. Seal all duct and equipment openings with plastic during transportation, delivery, installation, and the remainder of the construction period.
 - d. If permanently installed air handlers are used during construction, filtration media with a Minimum Efficiency Reporting Value (MERV) 8, as determined by ASHRAE 52.2, shall be used over each return air grille. Replace all filtration media immediately prior to occupancy.
 - e. Conduct periodic inspections during construction. If ducts become contaminated due to inadequate protection, clean ducts professionally.
 - f. Promptly repair all leaks in ducts and air handlers.
 - g. Do not use mechanical rooms to store construction waste materials. Keep mechanical rooms clean at all times.
 - 2. Source Control:
 - a. For Contractor information, all paints, carpet, adhesives, and sealants are specified as low-VOC and non-toxic. Use of materials that fail to meet specified VOC levels are prohibited for use in the interior of the building.
 - b. Recover, isolate and ventilate containers housing toxic materials.
 - c. Avoid exhaust fumes from idling vehicles and gasoline fueled tools.
 - d. Use electric or natural gas alternative for gasoline and diesel equipment where possible and practical.
 - e. Cycle equipment off when not being used or needed.
 - f. Pollution sources may be exhausted to the outside with portable fan system. Care should be taken to ensure exhaust does not re-circulate back into the building.

- g. Containers of wet products should be kept closed as much as possible. Waste materials, which can release odor or dust, should be covered or sealed.
- h. Smoking will not be permitted in indoor Project locations.
- 3. Pathway Interruption:
 - a. During construction, isolate areas of work to prevent contamination of clean or finished spaces. Utilize dust curtains or temporary enclosures to prevent dust from migrating to other areas when applicable.
 - b. Ventilate using 100 percent outside air to exhaust contaminated air directly to the outside during installation of VOC emitting materials.
 - c. Use pressure differentials or barriers between work and clean areas to prevent contaminated air from entering clean areas.
 - d. Relocate pollutant sources (paints, sealers, adhesives, caulking, cleaners, etc.) as far away as possible from supply ducts, areas occupied by workers and absorbing materials when feasible. Absorbing materials include drywall, insulation, carpet, ceiling tile, etc. Supply and exhaust systems may have to be shut down or isolated during such activities.
- 4. Housekeeping:
 - a. Protect building materials from weather and store in a clean area prior to unpacking for installation.
 - b. Clean all coils, air filters, and fans before performing testing and balancing procedures.
 - c. Institute cleaning activities designed to control contaminants in building spaces before occupancy.
 - d. Suppress dust with wetting agents or sweeping compounds. Use an efficient and effective dust collecting method such as a damp cloth, wet mop, vacuum with particulate filters or wet scrubber.
 - e. Remove accumulations of water inside the building. Protect porous materials such as insulation and ceiling tile from exposure to moisture. Materials with evidence of moisture damage, including stains, are not acceptable, including both stored and installed materials; immediately remove from site and properly dispose.
- 5. Final Cleaning:
 - a. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains, and foreign substances; polish transparent and glossy surfaces.
 - b. Clean equipment and fixtures to sanitary condition.
 - c. Vacuum carpeted and soft surfaces with high efficiency particulate arrestor (HEPA) vacuum.
 - d. Comply with cleaning requirements specified in Section 017000.
- 6. Scheduling:
 - a. Complete applications of wet and odorous materials such as VOC in paints, sealants, and coatings before installing absorbing materials such as ceiling tiles, carpets, insulation, gypsum products, and fabric-covered furnishings.
 - b. Avoid exposure of all interior materials to moisture.
 - c. Protect stored on-site or installed absorptive materials from moisture damage.
 - d. If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period, install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.

- e. Replace all filtration media with filter media having a MERV 13 according to ASHRAE 52.2 immediately prior to occupancy.

3.02 CLOSEOUT PROCEDURE - GENERAL

- A. Contractor's Option: Either full continuous flush-out or satisfactory air contaminant testing is required, not both.

3.03 BUILDING FLUSH-OUT

- A. Perform building flush-out before occupancy.
- B. Do not start flush-out until:
 - 1. All construction is complete.
 - 2. HVAC systems have been tested, adjusted, and balanced for proper operation.
 - 3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
 - 4. New HVAC filtration media have been installed.
 - a. Install new MERV 13 filtration media prior to beginning of flush-out procedure.
- C. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot (4500 cubic meters per square meter) of floor area has been supplied.
 - 1. Flush-out must be documented for a total of 48 hours, non-consecutive.
 - 2. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
 - 3. Maintain interior temperature of at least 60 degrees F (15 degrees C) and interior relative humidity no higher than 60 percent.
 - 4. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
 - 5. If interior spaces must be occupied prior to completion of the flush-out, supply a minimum of 25 percent of the total air volume prior to occupancy, and:
 - a. Begin ventilation at least three hours prior to daily occupancy.
 - b. Continue ventilation during all occupied periods.
 - c. Provide minimum outside air volume of 0.30 cfm per square foot (0.0015 cu m/s/sq m) or design minimum outside air rate, whichever is greater.
- D. If occupancy is desired prior to completion of flush out, the space may be occupied following delivery of a minimum of 3500 cubic feet of outdoor air per square foot of floor area. Once space is occupied, it shall be ventilated at a minimum rate of 0.30 cubic feet per minute per square feet of outside air or the design minimum outside air rate determined by LEED IEQ Prerequisite 1, whichever is greater. During each day of the flush out period, ventilation shall begin a minimum of three hours prior to occupancy and continue during occupancy. These conditions shall be maintained until a total of 14,000 cubic feet of outdoor air has been delivered to the space.
- E. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

3.04 AIR CONTAMINANT TESTING

- A.

- B. Perform air contaminant testing before starting construction, as base line for evaluation of post-construction testing.
- C. Perform air contaminant testing before occupancy.
- D. Do not start air contaminant testing until:
 - 1. All construction is complete, including interior finishes.
 - 2. HVAC systems have been tested, adjusted, and balanced for proper operation.
 - 3. New HVAC filtration media have been installed.
- E. Indoor Air Samples: Collect from spaces representative of occupied areas:
 - 1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
 - 2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet (2300 square meters); take samples from areas having the least ventilation and those having the greatest presumed source strength.
 - 3. Collect samples from height from 36 inches (915 mm) to 72 inches (1830 mm) above floor.
 - 4. Collect samples from same locations on 3 consecutive days during normal business hours; average the results of each set of 3 samples.
- F. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.
 - 1. Record outside air levels of formaldehyde and TVOC contaminants
- G. Analyze air samples and submit report.
- H. Air Contaminant Concentration Limits:
 - 1. Formaldehyde: Not more than 27 parts per billion.
 - 2. PM10 Particulates: Not more than 50 micrograms per cubic meter.
 - 3. PM2.5 Particulates: Not more than 15 micrograms per cubic meter.
 - 4. Ozone: Not more than 0.075 parts per million.
 - 5. Total Volatile Organic Compounds (TVOCs): Not more than 500 micrograms per cubic meter.
 - 6. Carbon Monoxide: Not more than 9 parts per million and not more than 2 parts per million higher than outdoor air.
 - 7. Regulated Pollutants: Not more than allowable by NAAQS.
- I. Test Reports: Prepare test reports showing the results and location of each test, a summary of the HVAC operating conditions, a listing of any discrepancies and recommendations for corrective actions, if required.
 - 1. Include certification of test equipment calibration with each test report.
 - 2. If a test fails the standard, the Contractor is responsible to ventilate the building with 100 percent outside air until the building passes both air quality test and duct inspections. Retesting shall be performed at no additional expense to the Owner

3.05 INDEPENDENT MATERIALS TESTING

- A. Emissions: Indicate type and rate of emissions in a 24 hour period at 35 degrees Centigrade and 50 percent relative humidity per unit of product. Indicate type and rate of emissions under fire condition.
 - 1. Small Scale Chamber: Test and report emissions from products and materials indicated in accordance with ASTM D5116.
 - 2. Full Scale Chamber: Test and report emissions from products and materials indicated in accordance with ASTM D6670.
- B. Lethal Toxic Potency: Test for lethal toxic potency of smoke produced from the materials and products indicated under fire conditions in accordance with ASTM E1678.
 - 1. Report results in accordance with Section 13 of ASTM E1678.
- C. Support of Microbial Growth; Test and report in accordance with ASTM D6329. Indicate susceptibility of product or material to colonization and amplification of microorganisms. Identify microorganisms and conditions of testing.
 - 1. Normal conditions: Perform testing at 35 degrees Centigrade and 50 percent relative humidity.
 - 2. Extreme conditions: Perform worst case scenarios screening tests by providing an atmosphere where environmental conditions may be favorable for microbial growth.

END OF SECTION 015721

SECTION 01 74 19 – CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 – GENERAL

1.1 DESCRIPTION

- A. The purpose is to promote waste reduction (source reduction) and recycling practices to the maximum extent reasonably possible for construction and demolition projects.
 - 1. State law requires jurisdictions to achieve a 50% diversion goal. El Camino Community College Compton Center is a significant generator of waste during construction and demolition projects and should participate in reducing and recycling waste.
 - 2. The Contractor's completion of required documentation and submittal of disposal and diversion reporting form will allow El Camino Community College Compton Center to track and calculate the diversion rate.

1.2 REFERENCES

- A. The California Integrated Waste Management Act of 1989 (AB 939).
- B. California Code of Regulations Title 14, Section 18700 et seq.
- C. Definitions:
 - 1. "Recycle" or "recycling" means the process of collecting, sorting, cleansing, treating, and reconstituting materials that would otherwise become solid waste, and returning them to the economic mainstream in the form of raw material for new, reused, or reconstituted products which meet the quality standards necessary to be used in the marketplace. "Recycling" does not include transformation, as defined in California Public Resources Code Section 40201.
 - 2. "Source reduction" means any action which causes a net reduction in the generation of solid waste. "Source reduction" includes, but is not limited to, reducing the use of nonrecyclable materials, replacing disposable materials and products with reusable materials and products, reducing packaging, reducing the amount of yard wastes generated, establishing garbage rate structures with incentives to reduce the amount of wastes that generators produce, and increasing the efficiency of the use of paper, cardboard, glass, metal, plastic, and other materials. "Source reduction" does not include steps taken after the material becomes solid waste or actions which would impact air or water resources in lieu of land, including, but not limited to, transformation.
 - 3. "Transformation Facility" means a facility whose principal function is to convert, combust, or otherwise process solid waste by incineration, pyrolysis, destructive distillation, or gasification, or to chemically or biologically process solid wastes, for the purpose of volume reduction, synthetic fuel production, or energy recovery. Transformation Facility does not include a composting facility.

1.3 RELATED DOCUMENTS

- A. Waste Disposal and Diversion Reporting Form (attached)

El Camino Community College Compton Center

WASTE DISPOSAL AND DIVERSION REPORTING FORM

Date: _____

Property Address: _____ 1111 E. Artesia Blvd., Compton, CA 90221 _____

Facility Contact and Telephone: _____

Contractor Name: _____

Contractor Contact: _____ Contractor Telephone: _____

Description of Project: _____

Approximate Dollar Value of Construction/Demolition: _____

Approximate Square Footage of Project: _____

Demolition Schedule: _____

Construction Schedule: _____

Name of Hauler(s): _____ Telephone: _____

Please check waste reduction activities that are practiced at this project site:

- | | |
|--|---|
| <input type="checkbox"/> Use of Prefabricated Components | <input type="checkbox"/> Reduced Packaging |
| <input type="checkbox"/> Reuse of Materials Onsite | <input type="checkbox"/> Other (describe) _____ |
| <input type="checkbox"/> Accurate Material Estimates | _____ |

Conversion Factors for Selected Loose Materials

Concrete	2370 lbs/cu yd	1.18 tons/cu yd	0.84 cu yd/ton
Asphalt	1940 lbs/cu yd	0.97 ton/cu yd	1.03 cu yds/ton
Brick	2430 lbs/cu yd	1.21 tons/cu yd	0.82 cu yd/ton
Dirt	2660 lbs/cu yd	1.33 tons/cu yd	0.75 cu yd/ton
Wood	400 lbs/cu yd	0.20 ton/cu yd	5.00 cu yds/ton
Gypsum wallboard	500 lbs/cu yd	0.25 ton/cu yd	4.00 cu yds/ton
Cardboard	100 lbs/cu yd	0.05 ton/cu yd	20.0 cu yds/ton

WASTE MATERIAL DISPOSITION SUMMARIES

Fill out the tables below. The unit of measurement is “tons.” Use the conversion factors provided below. If a different conversion number is used, please provide. If tonnage information is not available, estimates can be provided in “cubic yards.”

Part I. DEMOLITION MATERIALS (tons)					
Material Type	Disposed in Class III Landfill	Taken to Inert Fills	Other Disposal (describe)	Reduced, Recycled or Salvaged	How Diverted? (e.g., reused as aggregate, etc.)
Concrete					
Asphalt					
Dirt					
Wood					
Metals					
Mixed Waste					
Other (describe)					
Total Tons	A =	B =	C =	D =	

Demolition Materials Diversion Rate: $D/(A+B+C+D) =$ _____

Additional Notes/Comments:

Part II. CONSTRUCTION MATERIALS (tons)

Material Type	Disposed in Landfill	Taken to Inert Fills	Other Disposal (describe)	Reduced, Recycled or Salvaged	How Diverted? (e.g., reused as aggregate, etc.)
Concrete					
Asphalt					
Dirt					
Wood					
Metals					
Mixed Waste					
Other (describe)					
Total Tons	A =	B =	C =	D =	

Construction Materials Diversion Rate: $D/(A+B+C+D) =$ _____

Additional Notes/Comments:

Disposal Facilities

Name of disposal facilities (e.g., landfill or inert facility name) materials are taken to:

Facility Name _____
Total Tons

Facility Name _____
Total Tons

Facility Name _____
Total Tons

.....
Recycling Facilities

Name of the recycling facilities or recycler (materials given or sold to):

Recycler/Recycling Facility Name _____
Total Tons

Recycler/Recycling Facility Name _____
Total Tons

Recycler/Recycling Facility Name _____
Total Tons

.....
Transformation Facilities

Name of the transformation facility:

Transformation Facility Name _____
Total Tons

.....
To the best of my knowledge, the above estimates are an accurate representation of the disposition of the construction and demolition materials generated on-site at the construction job. I understand that El Camino College may audit disposal and recycling documentation related to this survey.

Print Name

Signature

Additional Notes/Comments:

1.4 SUBMITTALS

- A. Submit the Waste Disposal and Diversion Reporting Form to the Project Manager on a monthly basis, payment application processing pre-requisite.
 - 1. Contractor shall provide weigh tickets and/or other documentation to support the reported tonnages and destinations.
 - 2. Contractor must maintain records for a minimum of three (3) years.

PART 2 – PRODUCTS NOT USED**PART 3 – EXECUTION****3.1 WASTE REDUCTION AND RECYCLING DIVERSION PROGRAM IMPLEMENTATION**

- A. Contractor shall implement “source reduction” (waste reduction/prevention) and recycling practices that divert waste from landfill disposal. Practices such as deconstruction, on-site crushing and reuse of concrete/asphalt as base material, salvage of fixtures, and recovering recyclable materials should be implemented.
- B. Contractor shall make arrangements with the waste hauler for providing source separated bins so that the Contractor can keep recyclable materials separated to a level that a recycling facility can accept them.
- C. Contractor shall take materials to a Transformation Facility whenever feasible and cost effective. Each transformation will only accept limited waste streams. The Contractor is responsible to determining if its specific waste stream is accepted by each facility.
- D. On a monthly basis, Contractor shall complete and submit the Waste Disposal and Diversion Reporting Form along with the weigh ticket or similar supporting documentation.

END OF SECTION

SECTION 018114 - SUSTAINABLE DESIGN REQUIREMENTS - CAL-GREEN

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes general requirements and procedures for achieving the most environmentally conscious Work possible within the limits of the construction schedule, contract sum, and available materials, equipment, and products for compliance with the 2013 California Green Building Standards Code (Effective January 1, 2014) and requirements of local Authorities Having Jurisdiction.
 - 1. The more stringent requirement shall apply.
- B. The General Contractor and subcontractors have an essential role; general requirements and procedures are the responsibility of the General Contractor to implement and document. Full cooperation of the General Contractor and subcontractors is essential to addressing the checklist items for application and review.
- C. Chapter 5 Nonresidential Mandatory Measures needed to comply with CAL-Green minimum standards are dependent on material selections. Compliance with mandatory measures should be used as one underlying criterion to evaluate substitution requests.
- D. Additional mandatory measures (not dependent on material selections) needed to comply with CAL-Green are dependent on the Architect's design and other aspects of the project that are not part of the Work of the Contract.
- E. The General Contractor should be familiar with CAL-Green requirements and provide the necessary information and instruction to all subcontractors. Copies of the following referenced standards and materials should be kept on-site:
 - 1. The 2013 California Green Building Standards Code (Effective, January 1, 2014).
- F. Related Requirements:
 - 1. Section 015721 - Indoor Air Quality Controls.
 - 2. Section 017419 - Construction Waste Management and Disposal.
 - 3. Section 019000 - General Commissioning Requirements.

1.02 DEFINITIONS

- A. Agrifiber Products: Agrifiber products include wheatboard, strawboard, panel substrates and door cores, not including furniture, fixtures and equipment (FF&E) not considered base building elements.
- B. Building Commissioning: A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.
- C. Composite Wood Products: A systematic quality assurance process that spans the entire design and construction process, including verifying and documenting that building systems and components are planned, designed, installed, tested, operated and maintained to meet the owner's project requirements.
- D. MERV: Filter minimum efficiency reporting value, based on ASHRAE 52.2-2007.

- E. Product-Weighted MIR (PWMIR): The sum of all weighted-MIR for all ingredients in a product subject to this article. The PWMIR is the total product reactivity expressed to hundredths of a gram of ozone formed per gram of product (excluding container and packaging).
- F. Reactive Organic Compound: Any compound that has the potential, once emitted, to contribute to ozone formation in the troposphere.
- G. VOC: A volatile organic compound (VOC) broadly defined as a chemical compound based on carbon chains or rings with vapor pressures greater than 0.1 millimeters of mercury at room temperature. These compounds typically contain hydrogen and may contain oxygen, nitrogen and other elements. See CCR Title 17, Section 94508(a).
 - 1. Where specific regulations are cited from different agencies such as South Coast Air Quality Management District (SCAQMD), California Air Resources Board (ARB or CARB), etc., the VOC definition included in that specific regulation is the one that prevails for the specific measure in question.

1.03 REFERENCES

- A. American National Standards Institute (ANSI); 1899 L Street, NW, 11th Floor, Washington, DC 20036. Tel: (202)293-8020. Fax: (202)293-9287. <http://ansi.org>.
 - 1. NSF/ANSI 140.
- B. ASHRAE; 1791 Tullie Circle, N.E., Atlanta, GA 30329. Tel: (404)636-8400. Fax: (404)321-5478. www.ashrae.org.
 - 1. ASHRAE 52.1-1999.
 - 2. ASHRAE 52.1-1992.
- C. American Society for Testing and Materials (ASTM); 100 Bar Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. Tel: (877)909-2786. www.astm.org.
 - 1. ASTM Standard E 1918.
 - 2. ASTM Standard C 1549.
- D. California Air Resources Board (CARB); 1001 I Street, Sacramento, CA 95814. Tel: (800)242-4450. Fax: (916)445-5025. www.arb.ca.gov.
 - 1. Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.).
- E. California Code of Regulations (CCR), Office of Administrative Law; 300 Capitol Mall, Suite 1250, Sacramento, CA 95814. Tel: (916)323-6225. Fax: (916)323-6826. www.oal.ca.gov/ccr.htm.
- F. California Building Standards Commission (CBSC); 2525 Natomas Park Drive, Suite 130, Sacramento, CA 95833. Tel: (916)263-0916. Fax: (916)263-0569. www.bsc.ca.gov.
 - 1. California Building Standards Code (Title 24, California Code of Regulations), 2013 Triennial Edition (current code).
 - a. Part 2 – California Building Code.
 - b. Part 3 – California Electrical Code.
 - c. Part 4 – California Energy Code.
 - d. Part 5 – California Plumbing Code.
 - e. Part 11 – California Green Building Standards Code.
- G. California Department of Public Health (CDPH). Tel: (916)558-1784. www.cdph.ca.gov.

1. CDPH Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (CDPH Standard Method V1.1 or specification 01350).
- H. The Carpet and Rug Institute (CRI); 100 South Hamilton Street, Dalton, GA 30720. Tel: (706)278-3176. Fax: (706)278-8835. www.carpet-rug.org.
 1. CRI Green Label Plus Program.
- I. California Collaborative for High Performance Schools (CA-CHPS); 520 9th Street, Suite 100, Sacramento, CA 95814. Tel: (415)957-9888. Fax: (916)688-6886. www.chps.net.
 1. CA-CHPS Criteria Interpretation for EQ 2.2 dated July 2012.
 2. Department of Resources Recycling and Recovery (CalRecycle); 1001 I Street—P.O. Box 4025, Sacramento, CA 95812-4025. Tel: (916)322-4027. www.calrecycle.ca.gov.
- J. Resilient Floor Covering Institute (RFCI); 115 Broad Street, Suite 201, La Grange, GA 30240. www.rfci.com.
- K. South Coast Air Quality Management District (SCAQMD); 21865 Copley Drive, Diamond Bar, CA 91765. Tel: (909)396-2000.
 1. SCAQMD Rule 1168 VOC limits.
- L. WaterSense, U.S. Environmental Protection Agency, Office of Wastewater Management (4204M), 1200 Pennsylvania Avenue, NW, Washington, DC 20460. Tel: (866)987-7367. www.epa.gov/watersense.

1.04 SUBMITTAL PROCEDURES

- A. General: Additional Sustainable Design submittal requirements are included in other sections of the Specifications.
- B. Sustainable Design submittal requirements are in addition to other submittals. If a 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 mandatory and voluntary measures.
- C. CAL-Green Action Plans: Provide preliminary submittals within 30 calendar days of construction start indicating how the following requirements will be met.
 1. Stormwater pollution prevention plan (SWPPP) complying with Sections 4.106.2 and 5.106.1 (amended per 99.05.106.1, 99.05.106.1.1, and 99.05.106.1.2).
 2. Construction waste management plan complying with Sections 4.408.1 and 5.408.1.1, and Specification Section 01 74 19 Construction Waste Management.
 3. Indoor air quality (IAQ) plan during construction complying with Sections 5.504.1.3, 4.504.1, 5.504.3, 5.504.7 (amended per 99.05.504.7), and Specification Section 01 81 19 Indoor Air Quality Requirements.
 4. CAL-Green Report Schedule – Provide schedule for submitting progress reports for stormwater pollution prevention, construction waste management, and indoor air quality during construction.
- D. CAL-Green Reports: Reports shall be submitted to the Architect and Sustainability Consultant at no more than 90-day intervals.
 1. Stormwater pollution prevention plan (SWPPP) inspection demonstrating compliance with Sections 4.106.2 and 5.106.1 (amended per 99.05.106.1, 99.05.106.1.1), and 99.05.106.1.2). Include date-stamped photos over the course of site work activities to

document the prevention of pollution of stormwater runoff from construction activities through local ordinance or best management practices.

2. Construction waste reduction progress reports demonstrating compliance with Sections 4.408.1, 5.408.1.1 through 5.408.1.3, and Specification Section 01 74 19 Construction Waste Management. Recycle and/or salvage for reuse a minimum 50 percent of nonhazardous construction and demolition waste.
3. Excavated soil and land clearing debris reports demonstrating compliance with Section 5.408.3 and Specification Section 01 74 19 Construction Waste Management. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled.
4. Indoor air quality (IAQ) during construction progress reports demonstrating compliance with Sections 5.504.1.3, 4.504.1, 5.504.3, 5.504.7 (amended per 99.05.504.7), and Specification Section 01 81 19 Indoor Air Quality Requirements.
 - a. The permanent HVAC system shall only be used during construction if necessary to condition the building within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy.
 - b. At the time of rough installation and during storage on the construction site until final startup of heating, cooling, and ventilating equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust, water and debris which may enter the system.
 - c. Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows within the building as already prohibited by other laws or regulations.
5. Summary of product data collected for all low-emitting materials, adhesives and sealants complying with Sections 4.504.2.1 and 5.504.4.1, paints and coatings complying with Sections 4.504.2.2 and 5.504.4.3, aerosol paints and coatings complying with Sections 4.504.2.3 and 5.504.4.3.1, carpet systems complying with Sections 4.504.3 and 5.504.4.4, resilient flooring systems complying with Sections 4.504.4 and 5.504.4.6, and composite wood products complying with Sections 4.504.5 and 5.504.4.5.

E. CAL-Green Documentation and Verification

1. Mandatory measure, Sections 4.106.2 and 5.106.1 (amended per 99.05.106.1, 99.05.106.1.1) Stormwater pollution prevention plan.
 - a. Storm Water Pollution Prevention Plan (SWPPP).
 - b. Construction Documentation: Date-stamped photos, which show implemented measures and any corrective action that was taken.
2. Mandatory measure, Sections 4.408.1 and 5.408.1 Construction waste management.
 - a. Identify construction waste materials to be diverted from disposal by r
 - b. Determine if construction waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
 - c. Identify diversion facilities where collected construction waste material will be taken.
 - d. Specify that the amount of construction waste materials diverted shall be calculated by weight or volume, but not by both.
3. Mandatory measure, Section 5.408.3 Excavated soil and land clearing debris.

- a. Identify excavated soil and land clearing debris to be diverted from disposal by reuse or recycling.
 - b. Determine if excavated soil and land clearing debris will be sorted on-site.
 - c. Identify reuse or recycling facilities where collected excavated soil and land clearing debris will be taken.
4. Mandatory measure, Sections 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - a. The VOC Content Verification Checklist, LADBS Form GRN 2, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specifications showing VOC content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 5. Mandatory measure, Sections 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - a. The VOC Content Verification Checklist, LADBS Form GRN 2, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specification showing VOC content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 6. Mandatory measure, Sections 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - a. The VOC Content Verification Checklist, LADBS Form GRN 2, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specification showing VOC content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 7. Mandatory measure, Sections 4.504.3 and 5.504.4.4 Carpet systems.
 - a. The manufacturer's specification showing testing and product requirements for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 8. Mandatory measure, Sections 4.504.3.1 and 5.504.4.4.1 Carpet cushion.
 - a. The manufacturer's specification showing testing and product requirements for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 9. Mandatory measure, Sections 4.504.3.2 and 5.504.4.4.2 Carpet adhesive.
 - a. The manufacturer's specification showing testing and product requirements for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 10. Mandatory measure, Sections 4.504.4 and 5.504.4.6 Resilient flooring systems.
 - a. The manufacturer's specification showing pollution emissions for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 11. Mandatory measure, Sections 4.504.5 and 5.504.4.5 Composite wood products.
 - a. The formaldehyde Emissions Verification Checklist, LADBS Form GRN 3, shall be completed and verified prior to final inspection approval.
 - b. The manufacturer's specification showing formaldehyde content for all applicable products shall be readily available at the jobsite and be provided to the field inspector for verification.
 - c. Chain of custody certificates.
 - d. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, et seq).

- e. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.
- f. Other methods acceptable to the enforcing agency.

1.05 QUALITY ASSURANCE

- A. Sustainable Design Requirements Conference: Conduct conference at the Project site. Review methods and procedures related to sustainable design requirements.

PART 2 PRODUCTS

2.01 SITE MATERIALS

- A. Mandatory measure, Sections 4.106.7 and 5.106.11 (amended per 99.04.106.7 and 99.05.106.11) Hardscape alternatives. If using light colored material as a strategy to reduce nonroof heat islands for 25% of site hardscape:
 - 1. Use light colored materials with an initial solar reflectance value of at least .30 as determined in accordance with the American Society for Testing and Materials (ASTM) Standards E 1918 or C 1549; or
 - 2. Use an open-grid pavement system or pervious or permeable pavement system.

2.02 INDOOR PLUMBING FIXTURES

- A. Mandatory measure, Sections 5.303.2 Water reduction, 4.303.1 (amended per 99.04.303.1.2) and 5.303.3 (amended per 05.303.3.2) Water conserving plumbing fixtures and fittings, 4.303.1.3.2 and 5.303.3.3.2 Multiple showerheads serving one shower, and 5.303.4 (amended per 99.05.303.4) Wastewater reduction.
 - 1. Plumbing fixtures shall meet the maximum flow rate values shown in Table 5.303.2.3.
 - 2. Table 5.303.2.3 **WATER REDUCTION FIXTURE FLOW RATES**

a. FIXTURE TYPE	MAXIMUM FLOW RATE
1) Kitchen faucets	1.8 gpm @ 60 psi
2) Wash fountains	1.8 rim space (in.)/20 gpm @ 60 psi
3) Metering faucets	0.20 gallons/cycle
4) Metering faucets for wash fountains	0.20 rim space (in.)/20 gpm @ 60 psi
 - 3. Water closets: The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.
 - 4. Urinals: The effective flush volume of urinals shall not exceed 0.125 gallons per flush.
 - 5. Single showerheads: Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.
 - 6. Multiple showerheads serving one shower: When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

7. Residential lavatory faucets: The maximum flow rate of residential lavatory faucets shall not exceed 1.5 gallons per minute at 60 psi. The minimum flow rate of residential lavatory faucets shall not be less than 0.8 gallons per minute at 20 psi.
8. Lavatory faucets in common and public use areas: The maximum flow rate of lavatory faucets installed in common and public use areas (outside of dwellings or sleeping units) in residential buildings shall not exceed 0.5 gallons per minute at 60 psi.
9. Metering faucets: Metering faucets when installed in residential buildings shall not deliver more than 0.25 gallons per cycle.
10. Kitchen faucets: The maximum flow rate of kitchen faucets shall not exceed 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above maximum flow rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

2.03 FINISH MATERIAL POLLUTANT CONTROL

- A. Mandatory measure, Sections 4.504.2.1 and 5.504.4.1 Adhesives and sealants: Adhesives, sealants, and caulks used on the Project shall meet the requirements of the following standards:
1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable or SCAQMD Rule 1168 VOC limits, as shown in Tables 4.504.1, 4.504.2, 5.504.4.1 and 5.504.4.2. Such products also shall comply with Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene and trichloroethylene), except for aerosol products as specified in subsection 2, below.

B. Tables 4.504.1 and 5.504.4.1 **ADHESIVE VOC LIMIT**

1. (Less Water and Less Exempt Compounds in Grams Per Liter)
2. Architectural Applications

	Current VOC Limit
a. Indoor carpet adhesives	50
b. Carpet pad adhesives	50
c. Outdoor carpet adhesives	150
d. Wood flooring adhesives	100
e. Rubber floor adhesives	60
f. Subfloor adhesives	50
g. Ceramic tile adhesives	65
h. VCT and asphalt tile adhesives	50
i. Drywall and panel adhesives	50
j. Cove base adhesives	50
k. Multipurpose construction adhesives	70
l. Structural glazing adhesives	100
m. Single-ply roof membrane adhesives	250
n. Other adhesives not specifically listed	50
3. Specialty Applications

a. PVC welding	510
b. CPVC welding	490
c. ABS welding	325
d. Plastic cement welding	250
e. Adhesive primer for plastic	550
f. Contact adhesive	80

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|----|-----------------------------------|-----|
| g. | Special purpose contact adhesive | 250 |
| h. | Structural wood membrane adhesive | 140 |
| i. | Top and trim adhesive | 250 |
| 4. | Substrate Specific Applications | |
| a. | Metal to metal | 30 |
| b. | Plastic foams | 50 |
| c. | Porous material (except wood) | 50 |
| d. | Wood | 30 |
| e. | Fiberglass | 80 |
- C. Tables 4.504.2 and 5.504.4.2 **SEALANT VOC LIMIT**
1. (Less Water and Less Exempt Compounds in Grams Per Liter)
 2. Sealants Current VOC Limit

a.	Architectural	250
b.	Marine deck	760
c.	Nonmembrane roof	300
d.	Roadway	250
e.	Single-ply roof membrane	450
f.	Other	420
 3. Sealant Primers

a.	Architectural	
1)	Nonporous	250
2)	Porous	775
b.	Modified bituminous	500
c.	Marine deck	760
d.	Other	750
 4. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.
- D. Mandatory measure, Sections 4.504.2.2 and 5.504.4.3 Paints and coatings: Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Tables 4.504.3 and 5.504.4.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Tables 4.504.3 and 5.504.4.3, shall be determined by classifying the coating as a Flat, Nonflat or Nonflat-High Gloss coating, based on its gloss, as defined in Subsections 4.21, 4.36 and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat, or Nonflat-High Gloss VOC limit in Tables 4.504.3 and 5.504.4.3 shall apply.
- E. Tables 4.504.3 and 5.504.4.3 **VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS**
1. (Grams of VOC Per Liter of Coating, Less Water and Less Exempt Compounds)
 2. Coating Category Current Limit

a.	Flat coatings	50
b.	Nonflat coatings	100
c.	Nonflat high gloss coatings	150
 3. Specialty Coatings

a.	Aluminum roof coatings	400
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b.	Basement specialty coatings	400	
c.	Bituminous roof coatings	50	
d.	Bituminous roof primers	350	
e.	Bond breakers	350	
f.	Concrete curing compounds	350	
g.	Concrete/masonry sealers	100	
h.	Driveway sealers	50	
i.	Dry fog coatings	150	
j.	Faux finishing coatings	350	
k.	Fire resistive coatings	350	
l.	Floor coatings	100	
m.	Form-release compounds	250	
n.	Graphic arts coatings (sign paints)	500	
o.	High-temperature coatings	420	
p.	Industrial maintenance coatings	250	
q.	Low solids coatings	120	
r.	Magnesite cement coatings	450	
s.	Mastic texture coatings	100	
t.	Metallic pigmented coatings	500	
u.	Multicolor coatings	250	
v.	Pretreatment wash primers	420	
w.	Primers, sealers and undercoaters	100	
x.	Reactive penetrating sealers	350	
y.	Recycled coatings	250	
z.	Roof coatings	50	
aa.	Rust preventative coatings	250	
ab.	Shellacs		
	1) Clear	730	
	2) Opaque	550	
ac.	Specialty primers, sealers and undercoaters		350
ad.	Stains	250	
ae.	Stone consolidates	450	
af.	Swimming pool coatings	340	
ag.	Traffic marking coatings	100	
ah.	Tub and tile refinishing coatings	420	
ai.	Waterproofing membranes	250	
aj.	Wood coatings	275	
ak.	Wood preservatives	350	
al.	Zinc-rich primers	340	

- F. Mandatory measure, Sections 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings: Aerosol paints and coatings shall meet PWMIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of California Code of Regulations, Title 17, commencing with Section 94520.
- G. Mandatory measure, Sections 4.504.3 and 5.504.4.4 Carpet systems: All new carpet installed in the building interior shall meet the testing and product requirements of one of the following:

1. Carpet and Rug Institute's Green Label Plus Program.
 2. California Department of Public Health's Specification 01350.
 3. NSF/ANSI 140 at the Gold level.
 4. Scientific Certifications Systems Indoor Advantage™ Gold.
- H. Mandatory measure, Sections 4.504.3.2 and 5.504.4.4.2 Carpet adhesive: All carpet adhesive shall meet the requirements of Tables 4.504.1 and 5.504.4.1.
- I. Mandatory measure, Sections 4.504.4 and 5.504.4.6 Resilient flooring systems: 80% of the total area receiving resilient flooring shall comply with one or more of the following:
1. VOC emission limits defined in CHPS High Performance Products Database.
 2. Products compliance with the CHPS criteria certified under the Greenguard Children & Schools program.
 3. Certification under the Resilient Floor Covering Institute (RCFI) FloorScore program.
 4. Meet the California Department of Public Health's Specification 01350.
 5. Verification of compliance - Documentation shall be provided verifying that resilient flooring materials meet the pollutant emissions limits.
- J. Mandatory measure, Sections 4.504.5 and 5.504.4.5 Composite wood products: New hardwood plywood, particle board, and medium density fiberboard composite wood products used in the interior or exterior of the building shall meet the formaldehyde limits listed in Tables 4.504.5 and 5.504.4.5.
- K. Tables 4.504.5 5.504.4.5 **FORMALDEHYDE LIMITS**
- | | |
|--|---------------|
| 1. (Maximum Formaldehyde Emissions in Parts per Million) | |
| 2. Product | Current Limit |
| 3. Hardwood plywood veneer core | 0.05 |
| 4. Hardwood plywood composite core | 0.05 |
| 5. Particle board | 0.09 |
| 6. Medium density fiberboard | 0.11 |
| 7. Thin medium density fiberboard | 0.13 |
- L. Mandatory measure, Section 5.504.3 Filters: An air filter with a Minimum Efficiency Reporting Value (MERV) of 8 or higher shall be installed in the mechanical system for outside and return air prior to occupancy.
1. Exceptions:
 2. An ASHRAE 10-percent to 15-percent efficiency filter shall be permitted for an HVAC unit meeting the 2013 California Energy Code having 60,000 Btu/h or less capacity per fan coil, if the energy use of the air delivery system is 0.4 w/cfm or less at design air flow.
 3. Existing mechanical equipment.

PART 3 EXECUTION

3.01 CONSTRUCTION WASTE MANAGEMENT

- A. Mandatory measure, Sections 4.408.1 and 5.408.1 Construction waste management, comply with Specification Section 01 74 19 Construction Waste Management.

3.02 COMMISSIONING

- A. Mandatory measure, Sections 5.410.2 (amended per 99.05.410.2.5.1) Commissioning, comply with Specification Section 01 91 13 General Commissioning Requirements.

3.03 INDOOR AIR QUALITY (IAQ) DURING CONSTRUCTION

- A. Mandatory measures, Sections 5.504.1.3, 4.504.1, 5.504.3, 5.504.7 (amended per 99.05.504.7), comply with Specification Section 01 81 19 Indoor Air Quality Requirements.

END OF SECTION 018114

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 024100 - DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building demolition .

1.02 RELATED REQUIREMENTS

- A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- D. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- E. Section 018114 - Sustainable Design Requirements - CAL-Green.

1.03 DEFINITIONS

- A. Demolish (Demo): Dismantle a defined component of existing construction, remove it from the Site, and dispose of it either as specified or in lawful manner.
- B. Dispose: Remove from the Project Site in lawful manner.
- C. Reinstall: Install a removed component of existing construction into new construction as indicated.
- D. Remove: Dismantle a defined component of existing construction in a manner which protects and preserves the component for future use/installation; definition includes lawful disposal, unless otherwise specifically indicated to be reinstalled, salvaged, or other described action.
- E. Salvage: Remove in a manner preserving the existing condition and integrity of the component, set aside, store and protect for future reinstallation.

1.04 REFERENCE STANDARDS

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

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Predemolition 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.
- B. Coordination: Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

1.06 SUBMITTALS

- A. Site Plan: Showing:
1. Vegetation to be protected.
 2. Areas for temporary construction and field offices.
 3. Areas for temporary and permanent placement of removed materials.
- 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. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
 2. Identify demolition firm and submit qualifications.
 3. Include a summary of safety procedures.
- D. 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.
- E. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- F. Predemolition Photographs or Video: Submit before Work begins.
- G. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- H. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.
- I. Inventory: Submit a list of items that have been removed and salvaged.
- J. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- K. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of five years of documented experience.

1.08 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. 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.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. 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.

PART 2 PRODUCTS

2.01 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/ASSE A10.6 and NFPA 241.

PART 3 EXECUTION

3.01 SCOPE

- A. Remove the entire building designated on Drawings.
- B. Remove other items indicated, for salvage, relocation, and recycling.
- C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Division 31..

3.02 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. 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.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs 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.

3.03 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Comply with applicable requirements of NFPA 241.
 - 3. Use of explosives is not permitted.
 - 4. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 5. Provide, erect, and maintain temporary barriers and security devices.
 - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 8. Do not close or obstruct roadways or sidewalks without permit.
 - 9. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Protect existing structures and other elements that are not to be removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.
- E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

- F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- G. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- H. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.04 EXISTING UTILITIES

- A. Protect existing utilities to remain from damage.
- B. Do not disrupt public utilities without permit from authority having jurisdiction.
- C. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- D. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- E. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- F. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- G. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.
- H. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.05 PREPARATION

- A. 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.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.

3.06 DEBRIS AND WASTE REMOVAL

- A. Remove debris and trash from site.
- B. Do not allow demolished materials to accumulate on-site.
- C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- D. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- E. Leave site in clean condition, ready for subsequent work.
- F. Clean up spillage and wind-blown debris from public and private lands.

3.07 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 024100

SECTION 024113 - SITE DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Demolition and removal of site improvements and all other related contiguous improvements as required. Refer to Demolition Plan Sheet C301 for items and location.
 - 2. Demolition, dismantling, cutting and alterations as indicated, specified, and required for completion of the Contract; for new construction, modernization and rehabilitation projects, as applicable. Includes items such as the following:
 - a. Protecting existing work to remain.
 - b. Salvageable items to be retained.
 - c. Cleaning soiled materials that are to remain.
 - d. Disconnecting and capping utilities.
 - e. Removing debris and equipment.
 - f. Removal of items indicated on drawings.
- B. Demolition of Existing Building Foundations
 - 1. Demolition and removal of all existing building foundations, footings, slabs, retaining walls, etc. shall be carried in a careful and orderly manner, and according to all applicable codes and regulations for demolition of structures, safety of adjacent structures, dust control and disposal of materials.
 - 2. Sprinkle Work with water to minimize dust. Provide hoses and water connections for that purpose.
- C. Demolition and Removal of Pavements
 - 1. Markup all existing utilities on site.
 - 2. Sawcut all Concrete Pavements, as indicated on Drawings.
 - 3. Remove all indicated pavements, walkways, curb and gutter, concrete ditches, landscape areas, etc.
 - 4. Protect all manhole and valve covers, lids, vaults and other site fixtures, marked to remain.
- D. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 01 for "Section 013233- Photographic Documentation", "Section 015000- Temporary Facilities and Controls" as applicable.
 - 2. Division 02 for "Section 024116- Structure Demolition" and "Section 024119- Selective Demolition" as applicable.
 - 3. Division 31 for "Section 312000- Earthwork" as applicable.

1.3 DEFINITION

- A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged, or to remain the owners's property.
- B. Asbestos-Containing Materials (ACMs) and other hazardous materials: As identified in the Report, remove asbestos-containing materials (ASMs) and other identified hazardous materials.
- C. Remove and Reinstall: Remove items indicated; clean, service, and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.
- D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

1.4 MATERIALS OWNERSHIP

- A. Except for items or materials indicated to be reused, salvaged, or otherwise indicated to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.
- B. Historical items indicated remain the Owner's property. Carefully remove and salvage each item in a manner to prevent damage and deliver promptly to the Owner.
- C. Historical items, archeological or paleontological findings, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, commemorative benches, antiques, and other items of interest or value to the Owner, which may be encountered during demolition, remain the Owner's property. If such items are encountered, all project operations shall cease in the area of discovery immediately. The Owner shall secure the services of an archeological consultant to assess the resources, and determine a course of action.
 - 1. Cooperate with Owner's archaeological consultant or historical adviser. Mitigated Negative Declaration (MND) for related requirements.
- D. Human Remains: In the event that human remains are discovered, there shall be no disposition of such human remains, other than in accordance with the procedures and requirements set forth in the California Health and Safety Code and Public Resources Code. All project operations shall cease in the area of discovery immediately. In conjunction with the Owner, the Code provisions require immediate notification of the County Coroner and the Native American Heritage Commission.
 - 1. Cooperate with the County Coroner, the Native American Heritage Commission representative and other related officials. Refer to the Mitigated Negative Declaration (MND) for related requirements.

1.5 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections, for information only, unless otherwise indicated.
- B. Proposed dust-control measures.
- C. Proposed noise-control measures.
- D. Schedule of demolition activities indicating the following:
 - 1. Detailed sequence of demolition and removal work, with starting and ending dates for each activity.
 - 2. Dates for shutoff, capping, and continuation of utility services.
 - 3. Coordinate the schedules with the Construction Project Manager, CPM.
- E. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by demolition operations.
- F. Record drawings at Project closeout according to Division 01 Section "Project Record Documents".
 - 1. Identify including depth and accurately locate capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition Work similar to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA & SCAQMD notification regulations before starting demolition. Observe applicable Best Practices and implementation of the Storm Water Pollution Prevention Plan (SWPPP). Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Pre-demolition Conference: Conduct conference at Project site to comply with pre-installation conference requirements of Division 01 Section "Project Meetings."

1.7 PROJECT CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical. Bidders shall make themselves fully aware of the existing conditions within the site. Scope limits scheduled for demolition and items/areas to remain protected in supplement to the Bid Drawings and Documents.
- B. If conditions are encountered that vary from those indicated on plan, notify the Architect for instructions prior to proceeding.
- C. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from owner.

- D. Contractor to obtain all necessary encroachment and excavation permits from the local jurisdiction of authority for demolition of existing improvements in public right-of-way.

1.8 SCHEDULING

- A. Arrange demolition schedule so as not to violate city construction ordinances.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Requirements for satisfactory soil materials are specified in Division 31 Section "Earthwork". Refer to the Geotechnical Investigation Report, dated December 21, 2015, prepared by Heider Inspection Group, for site soil requirements
 1. Obtain approved borrow soil materials off-site when sufficient satisfactory soil materials are not available on-site. Import materials must be tested and approved at the source prior to delivery to the site.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped. Test lines as required.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. Survey existing conditions of the improvements such as light standards and trees to determine the best method(s) for removal so as not to cause potential damage to persons and property during the course of removal.
- E. Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

3.2 UTILITY SERVICES

- A. Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
 1. Do not interrupt existing utilities serving occupied or operating facilities on or off the property, except when authorized in writing by Owner and authorities having

jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.

- a. Provide not less than 72 hours' notice to Owner if shutdown of service is required during changeover.
 - b. Coordinate scheduling of campus' utility shut downs through Lendlease.
- B. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services serving structures to be demolished.
1. Arrange to shut off indicated utilities with utility companies.
- C. Utility Requirements: Refer to Division 21, 22, 23 and 33 Sections, as well as the Contract Drawings, for shutting off, disconnecting, removing, and sealing or capping utility services. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.3 PREPARATION

- A. Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.
- B. Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- C. Conduct demolition operations to prevent injury to people and damage to adjacent buildings and facilities to remain. Ensure safe passage of people around demolition area.
- D. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
- E. Protect existing site improvements, appurtenances, and landscaping to remain.
 1. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.

3.4 CUTTING EXISTING CONCRETE

- A. Cutting of existing concrete shall be done by experienced workers familiar with the requirements and space necessary for placing concrete. Perform concrete cutting with concrete cutting wheels and hand chisels. Take care not to damage concrete that is intended to remain.
- B. Extent of cutting of concrete shall be as indicated on drawings and in accordance with standard plans for public works construction plan no. 132-1. Replace concrete that is removed in excess of amount indicated or required.

- C. Prior to cutting or coring concrete, determine locations of hidden utilities and take necessary measures to protect them from damage.
- D. If an existing pavement joint or cracked area is within two feet outside of a designated sawcut line shown on the Drawings, removal and resurfacing shall be to that joint, and/or shall include the crack or cracked area, unless otherwise approved by Architect.

3.5 EXPLOSIVES

- A. Explosives: Use of explosives will not be permitted.

3.6 POLLUTION CONTROLS

- A. Use water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply with governing environmental protection regulations.
 - 1. Do not create hazardous or objectionable conditions, such as ice, flooding, and pollution, when using water.
- B. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level.
- C. Clean adjacent buildings and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before start of demolition.

3.7 DEMOLITION

- A. Demolition: Demolish improvements completely and remove from the site. Use methods required to complete Work within limitations of governing regulations and as follows:
- B. Below-Grade Construction: Demolish foundation walls and other below-grade construction, as follows:
 - 1. Completely remove below-grade construction, including foundation walls and footings.
 - 2. Break up and remove below-grade concrete slabs, unless indicated to remain.
- C. Filling Below-Grade Areas: Completely fill below-grade areas and voids resulting from demolition of buildings and pavements with soil materials according to requirements specified in Division 31 Section "Earthwork."
- D. Damages: Promptly repair damages to adjacent facilities caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION

DLR GROUP
Project NO. 75-15238-00
07/31/17

Compton Community College District
Instructional Building #1
DSA Submittal

SECTION 031513 - WATERSTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Waterstops

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Forms and accessories for formwork.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Structural Concrete; American Concrete Institute International; 2010.
- B. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2011.
- C. COE CRD-C 513 - COE Specifications for Rubber Waterstops; Corps of Engineers; 1974.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of waterstops with size, location and installation of underground service utilities.
 - 2. Coordinate the installation of waterstops with formwork.
 - 3. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this Section.
 - 1. Convene under general provisions of Section 017000.
 - 2. Required Attendance: Contractor's quality control supervisor or superintendent, Architect, structural engineer, Owner's independent testing agency, all affected trades including reinforcing subcontractor and concrete supplier, waterproofing manufacturer, and 3rd party inspector.
 - 3. Discuss construction document requirements, required clarifications to construction documents, construction schedule, coordination of affected trades, construction contraction and isolation joints, joint-filler strips, submittal requirements, approved submittals, and required inspections.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on all specified manufactured products showing compliance with specified requirements and installation instructions.
 - 1. Product data for components and for system.
 - 2. Property specifications for waterstop materials.
- C. Shop Drawings: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.06 QUALITY ASSURANCE

- A. Perform work of this Section in accordance with ACI 117, ACI 301 and ACI 318.
- B. Single Source Responsibility: Furnish materials from one manufacturer.
- C. Installer Qualifications: A qualified installer who employs on Project personnel qualified as acceptable to manufacturer with experience on at least five projects of similar nature in past five years, and who is an Approved Applicator as determined by waterstop manufacturer.
- D. Manufacturer Qualifications: A firm experienced in manufacturing Products specified in this Section with minimum ten years experience.
- E. Testing and Inspection:
 - 1. Completed Systems: Authority Having Jurisdiction will inspect completed installation and confirm installation is in conformance with manufacturer's installation requirements and Contract Documents, and will result in a properly functioning system with no leaks.
 - 2. Independent inspection service to verify and approve substrate prior to installation; monitor waterstop material installation compliance with the project contract documents and manufacturer's published literature and site specific details. Independent Inspection Firm shall be an approved company participating with the waterstop manufacturer's Certified Inspection Program. Inspection service shall produce reports and digital photographs documenting each inspection. Reports shall be made available to the Contractor, waterstop installer, waterstop material manufacturer, and Architect. Inspections should include substrate examination, beginning of waterproofing installation, periodic intervals, seam welding and final inspection prior to concrete or backfill placement against the waterproofing.
 - 3. Post-Installation Observation: Inspect membrane following the installation of waterstop and structural reinforcing, but prior to the placement of concrete and other superimposed materials. Repair any damage or unacceptable conditions prior to placement of concrete and other superimposed materials.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.08 FIELD CONDITIONS

- A. Environmental Requirements: Comply with more restrictive of following or manufacturer's written requirements under which products can be installed.

1.09 SEQUENCING

- A. Place delivery system as concrete installation proceeds, in accordance with manufacturer's instruction.

1.10 WARRANTY

- A. Special Warranty: Prepare and submit in accordance with Section 017000. Warrant installation as watertight for period of 15 years.

PART 2 PRODUCTS

2.01 BONDING AND JOINTING PRODUCTS

- A. Bonding Agent: Multipurpose UV stable single component polyether moisture cure sealant / adhesive.
- B. Waterstops WTP-05: Rubber, complying with COE CRD-C 513.
 - 1. Basis of Design
 - a. Grace Construction Products; DeNeef Swellseal 2010.
- C. Sealant and Primer: As specified in Section 079200 - Joint Sealants.
- D. Provide wire ties and fasteners as required.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Verify that forms are clean and free of rust before applying release agent.
- B. Remove all fins, projections, and other detrimental irregularities on surfaces to receive waterproofing systems; comply with waterproofing system manufacturer's requirements for surface preparation.

3.03 WATERSTOP INSTALLATION

- A. Self-Expanding Strip Waterstops:
 - 1. Install same day or within 24 hours of concrete pour.
 - 2. Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.
 - 3. Butt end joints together per manufacturer's instructions. Do not overlap, miter cut changes in direction.
 - 4. Support and protect from displacement by concrete placement and subsequent construction.

3.04 FIELD QUALITY CONTROL

- A. Authority Having Jurisdiction will inspect completed installation.
 - 1. Comply with instructions provided by manufacturer's field representative for installation of waterproofing systems, whether or not specifically included in manufacturer's printed installation instructions and specifications, to ensure that installations will comply with all system manufacturer's requirements to provide specified warranty, and to ensure that waterproofing systems will perform according to manufacturer's published performance characteristics and specifications.

END OF SECTION 031513

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Concrete toppings.

- B. Related Sections:
 - 1. Section 033300 "Architectural Concrete" for general building applications of specially finished formed concrete.
 - 2. Section 033500 "Concrete Finishing"
 - 3. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
 - 4. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.2 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.

1.3 ACTION SUBMITTALS

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

- B. Design Mixtures: Concrete mixture design submittals shall be stamped and signed by the licensed engineer responsible for the mix design. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Mixing water for later addition at the Project site not permitted.

- C. 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.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

E. Samples: For waterstops and vapor retarder.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer, and testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
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 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.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- 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," Sections 1 through 5. and Sections 1 through 5 and Section 7, "Lightweight 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.
- G. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
1. Build panel approximately 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- H. Preinstallation Conference: Conduct conference at Project site.
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete subcontractor.

- d. Special concrete finish subcontractor.
- 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Wire: ASTM A 82/A 82M, as indicated.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, well-graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 1 inch nominal and well-graded.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Lightweight Aggregate: ASTM C 330, 1/2-inch nominal maximum aggregate size.
- E. Water: ASTM C 94/C 94M.

2.5 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 requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fortifiber Building Systems Group; Moistop Ultra 15.
 - b. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
 - c. Insulation Solutions, Inc.; Viper VaporCheck 16.
 - d. Meadows, W. R., Inc.; Perminator 15 mil.
 - e. Raven Industries Inc.; Vapor Block 15.
 - f. Reef Industries, Inc.; Griffolyn 15 mil Green.
 - g. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding

those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: As indicated.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, As indicated per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. 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, and as follows:
 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.8 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch 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 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.

4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: 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 C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
1. Contractor to use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Ground Granulated Blast-Furnace Slag: 50 percent.
 4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength:
 - a. 4,000 psi Mat Slab
 - b. 3,000 psi All Other .
 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 3. Slump Limit: 4".
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
- B. Foundation Walls: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3,000 psi.
 2. Maximum Water-Cementitious Materials Ratio: 0.50.
 3. Slump Limit: 4".
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
- C. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3,000 psi.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd..
 3. Slump Limit: 4".
 4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.
- D. Concrete Toppings: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi.
 2. Minimum Cementitious Materials Content: 520 lb/cu. yd.
 3. Slump Limit: 4".
 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

2.11 FABRICATING REINFORCEMENT

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

2.12 CONCRETE MIXING

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

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely

braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder per manufacturer requirements before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in 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.

- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. 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.
- D. 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. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to 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.
- C. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Screed, tamp, and trowel finish concrete surfaces.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3.10 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.11 CONCRETE SURFACE REPAIRS

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

- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 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 in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. 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 will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as

original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. 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.

3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections: Refer to structural drawings and DSA Form-103 for testing and inspections to be performed.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide 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.
 3. Slump: ASTM C 143/C 143M; 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. Perform additional tests when concrete consistency appears to change.
 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.

6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. 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.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. 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.
13. Additional Tests: 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. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION

DLR GROUP
PROJECT NO. 75-15238-00
07/31/2017

Compton Community College District
Instructional Building #1
DSA Submittal

SECTION 033300 - ARCHITECTURALLY EXPOSED CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Requirements for architecturally exposed cast-in-place concrete, which supplement structural cast-in-place concrete general requirements.
- C. Concrete: As indicated on Drawings.
- D. Concrete reinforcement.
- E. Concrete curing.

1.02 REFERENCE STANDARDS

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; American Concrete Institute International; 1991 (Reapproved 2002).
- B. ACI 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International; 2010.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete; American Concrete Institute International; 2000.
- D. ACI 305R - Hot Weather Concreting; American Concrete Institute International; 2010.
- E. ACI 306R - Cold Weather Concreting; American Concrete Institute International; 2010.
- F. ACI 308R - Guide to Curing Concrete; American Concrete Institute International; 2001 (Reapproved 2008).
- G. ACI 309R - Guide for Consolidation of Concrete; 2005.
- H. ACI 318 - Building Code Requirements for Structural Concrete and Commentary; American Concrete Institute International; 2008.
- I. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.
- J. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2012.
- K. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2010b.
- L. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a.
- M. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2011.
- N. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete; 2010.
- O. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.

- P. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 1999 (Reapproved 2008).

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this Section.
 - 1. Convene under general provisions of Section 017000.
 - 2. Required Attendance: Contractor's quality control supervisor or superintendent, Architect, structural engineer, and all affected trades including reinforcing subcontractor and concrete supplier.
 - 3. Discuss construction document requirements, required clarifications to construction documents, coordination of affected trades, and specific aesthetic concerns of Architect for architecturally exposed cast-in-place concrete.

1.04 SUBMITTALS

- A. Refer to Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Shop Drawings: Submit shop drawings for formwork and accessories, including the following:
 - 1. Wall elevations showing layout of form panels, locations of joints between form panels, and layout of reveals and other architectural features.
 - 2. Locations of form ties, details of form tie holes, and locations of any formwork items and features that will be visible on final architecturally exposed cast-in-place concrete surfaces.
- D. Verification Samples: Submit sample chips of specified colors indicating pigment numbers and required dosage rates, for subsequent comparison to installed concrete.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 2. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 3. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.
 - 4. Section A5.405.5: Provide documentation that cement and concrete used are made with recycled content and/or alternative energy.

1.06 QUALITY ASSURANCE

- A. Perform work of this Section in accordance with ACI 301 and ACI 318.

- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

1.07 MOCK-UP

- A. Mockups
 - 1. Comply with general mock-up requirements specified in Section 014000.
 - 2. Mock-up: Construct and erect mock-up panel for architecturally exposed cast-in-place concrete surfaces indicated to receive special treatment or finish as result of formwork.
 - a. ~~Panel Size: As directed by Architect.~~
 - b. Mockup shall be a minimum of 36" W and include the following as minimums: one vertical reveal, (4) tie-rod holes, a horizontal cold joint over concrete curb, all similar to 1/A7.22.1
 - c. Number of Panels: 2.
 - d. Locate where directed.
 - e. Mock-up may not remain as part of the Work.
- B. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Form Ties: Factory-fabricated, internally disconnecting ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish ties with tapered tie cone spreaders that, when removed, will leave holes 1 inch (25 mm) in diameter, 1 inch (25 mm) deep, on concrete surface.
 - 2. Furnish internally disconnecting ties that will leave no metal closer than 1-1/2 inches (38 mm) from the architectural concrete surface.
 - 3. Furnish glass-fiber-reinforced plastic ties, not less than 1/2 inch (13 mm) in diameter, of color selected by Architect from manufacturer's full range.
 - 4. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.02 REINFORCEMENT

- A. Refer to Structural Drawings for requirements.

2.03 CONCRETE MATERIALS

- A. Refer to Structural Drawings for concrete mix design and general structural requirements.
- B. Color Additive: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979.
 - 1. Concentration: Base dosage rates on weight of Portland cement, fly ash, silica fume, and other cementitious materials but not aggregate or sand.
 - 2. Basis of Design Manufacturers:
 - a. Davis Colors; Powder Pigments: www.daviscolors.com.
 - b. Other Acceptable Manufacturers:
 - 1) Butterfield Color: www.butterfieldcolor.com.

- 2) Lambert Corporation: www.lambertusa.com.
 - 3) Solomon Colors: www.solomoncolors.com.
 - 4) Prior approved equal.
- c. Concrete AC-1 Color: 677 Outback.

C. Water: Clean and not detrimental to concrete.

2.04 CHEMICAL ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

1. Use of calcium chloride is not permitted.

B. Use of admixtures will not relax cold weather placement requirements.

C. Admixtures:

1. Air Entrainment Admixture: ASTM C260.
2. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

2.05 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redisersable acrylic latex, complying with ASTM C1059 Type II.

1. Products:

- a. W.R. Meadows, Inc.; ACRY-LOK: www.wrmeadows.com.

B. Epoxy Bonding System: Complying with ASTM C881/C881M and of Type required for specific application.

2.06 CONCRETE MIX DESIGN - GENERAL

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations, and as approved by structural engineer.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

2.07 CONCRETE MIXES

A. Refer to Structural Drawings for concrete mix design schedule.

B. Normal Weight Structural Concrete:

1. Applications: Concrete site pillars.
2. Compressive Strength: per structural drawings.
3. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
4. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
5. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
6. Water-Cement Ratio: per structural drawings.
7. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
8. Maximum Slump: per structural drawings.
9. Maximum Aggregate Size: per structural drawings.

2.08 MIXING

- A. Colored Concrete: Add pigments in strict accordance with manufacturer's instructions to achieve consistent color from batch to batch.
- B. Transit Mixers: Comply with ASTM C94/C94M.
 - 1. Deliver concrete and discharge entire load within 1-1/2 hours, or before drum has turned 300 revolutions, whichever occurs first, after introduction of mixing water.
 - 2. During cold weather (below 45 degrees F), use heated water and aggregates if necessary to maintain concrete temperature between 60 degrees F and 90 degrees F.
- C. Add water in accordance with ACI 304R, add at one time only, not more than 2 gal/cu yd of concrete, and provided the increase in slump does not exceed one inch.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Remove all fins, projections, and other detrimental irregularities on surfaces to receive waterproofing systems; comply with waterproofing system manufacturer's requirements for surface preparation.
- E. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
 - 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
 - 2. Use latex bonding agent only for non-load-bearing applications.
- F. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.
- G. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

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

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Notify Architect not less than 24 hours prior to commencement of placement operations.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- D. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- F. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand spading, rodding, and tamping according to ACI 309R. Vibration of forms and reinforcing in not permitted.
- G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified in this Section.

3.05 CONCRETE FINISHING

- A. Repair surface defects, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch (6 mm) or more in height.
- C. Architecturally Exposed Concrete Form Finish: Rub down or chip off and smooth fins or other raised areas 1/16 inch (1.6 mm) or more in height. Avoid damage to adjacent surface finish as other imperfections are being removed. Finish repaired surfaces to match adjacent finished surfaces to achieve uniform appearance from a viewing distance of 20 feet or more.
 - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

3.06 EXPOSED-AGGREGATE FINISHES

- A. Abrasive-Blast Finish: Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi (13.8 MPa). Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.

1. Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference sample or mockup.
2. Abrasive Blasting: Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
3. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample or mockup, as follows:
 - a. Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color; with maximum reveal of 1/16 inch (1.5 mm).

3.07 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
 1. Normal Concrete: Not less than 7 days.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
 2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-fog spray, or saturated burlap.
 - a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
 - b. Spraying: Spray water over floor slab areas and maintain wet.
 - c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 3. Final Curing: Begin after initial curing but before surface is dry.
 - a. Moisture-Retaining Sheet: Lap strips not less than 3 inches (75 mm) and seal with waterproof tape or adhesive; secure at edges.
 - b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.08 FIELD QUALITY CONTROL

- A. Refer to Section 033000 - Cast-in-Place Concrete for Field Quality Control Requirements.

3.09 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.
- E. Repair interior and exterior slab and wall cracks, holes, and voids exceeding 1/16 inch wide by grinding crack to 1/8 inch wide and fill with epoxy bonding system. Grind smooth and flush with adjacent surface.

3.10 PROTECTION

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

END OF SECTION 033300

SECTION 033500 - CONCRETE FINISHING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.02 RELATED REQUIREMENTS:

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 033000 - Cast-In-Place Concrete for general building applications of concrete.
- C. Section 033300 - Architecturally Exposed Cast-in-Place Concrete for general building applications of specially finished formed concrete.
- D. Section 033541 - Concrete Sealing for concrete sealers.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review concrete design mixture and examine procedures for ensuring quality of concrete materials and finishes. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Concrete Subcontractor.
 - d. Special concrete finish Subcontractor.
 - 2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.
 - 3. Coordinate curing method with requirements of finish flooring manufactures to ensure no conflicts with floor setting materials.

1.04 SUBMITTALS

- A. Product Data: For each type of product.
- B. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.
- C. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Curing compounds.
 - 2. Floor and slab treatments.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- E. Field quality-control reports.
- F. Minutes of preinstallation conference.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements – CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: Employ Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

1.07 MOCKUPS

- A. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Build panel approximately 200 sq. ft. (18.6 sq. m) for slab-on-grade and 100 sq. ft. (9.3 sq. m) for formed surface in the location indicated or, if not indicated, as directed by Architect.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:
 - 1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 PRODUCTS

2.01 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301 (ACI 301M).
 - 2. ACI 117 (ACI 117M).

2.02 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Products:
 - a. BASF Corporation-Construction Systems; Confilm.
 - b. ChemMasters, Inc; Spray-Film.
 - c. Dayton Superior; AquaFilm J74RTU.
 - d. Euclid Chemical Company (The); an RPM company; Eucobar.
 - e. L&M Construction Chemicals, Inc; E-CON.
 - f. Lambert Corporation; LAMBCO Skin.
 - g. Sika Corporation; Caltexol CIMFILM.
- 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 C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation-Construction Systems; MasterKure CC 160 WB (Pre-2014: Kure-N-Seal WB).
 - b. ChemMasters, Inc; Safe-Cure & Seal 309.
 - c. Dayton Superior; Cure & Seal 309 J18.
 - d. Euclid Chemical Company (The); an RPM company; Euco Diamond Hard.
 - e. L&M Construction Chemicals, Inc; Dress & Seal WB.
 - f. W.R. Meadows, Inc; Vocomp-20.

2.03 REPAIR MATERIALS

- A. Repair Underlayment: 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/C 150M, 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 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

PART 3 EXECUTION

3.01 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view,.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.02 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.
 - 1. Apply scratch finish to surfaces indicated.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated, to receive trowel finish, and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces indicated, exposed to view, and to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
- E. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
 - 1. Slab on Grade:
 - a. Corridor Flooring: Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

- b. Thinset Flooring, Resilient Floor Covering: Specified overall values of flatness, F(F) 35; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17.
 - c. Carpeted floors: Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24, and of levelness, F(L) 15.
 2. Suspended Slabs
 - a. Corridor Flooring: Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.
 - b. Thinset flooring, resilient floor covering: Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15.
 - c. Carpeted floors: Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24, and of levelness, F(L) 15.
 - d. Subfloors Under Concrete Toppings: Specified overall values of flatness, F(F) 20; and of levelness, F(L) 15; with minimum local values of flatness, F(F) 15, and of levelness, F(L) 10.
 - F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- 3.03 CONCRETE PROTECTING AND CURING
- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.
 - B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
 - C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
 - D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
 - E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends

lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer[unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project].
 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
 5. Coordinate curing method with requirements of finish flooring manufactures to ensure no conflicts with floor setting materials.

3.04 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
- B. Defer joint filling until concrete has aged at least 6 month(s). Do not fill joints until construction traffic has permanently ceased.
- C. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- D. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.05 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- 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. Limit cut depth to 3/4 inch

- (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. 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. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include 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.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
- E. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
- F. 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. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- G. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- H. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- I. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.06 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

3.07 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. 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.

END OF SECTION 033500

SECTION 033541 - CONCRETE SEALING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes concrete sealing.
 - 1. Concrete for sealed concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 Cast-in-Place Concrete.
- B. Related Requirements:
 - 1. Section 018114 - Sustainable Design Requirements - CAL-Green.
 - 2. Section 033000 - Cast-in-Place Concrete for concrete not designated as sealed concrete.

1.02 SUBMITTALS

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

1.03 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.

1.04 QUALITY ASSURANCE

- A. Applicator's Qualifications: Company specializing in performing work of this Section with 3 years minimum experience.
- B. ~~Field Samples~~
 - 1. ~~Cast and finish three 4 foot by 4 foot sample panels with dry shake hardener finish for Architect's review of color consistency and workmanship. Provide workmanship and procedures necessary to match Architect approved submittal.~~

1.05 FIELD CONDITIONS

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

1.06 SCHEDULING

- A. Schedule application of products at proper time intervals after concrete finishing and curing operations.
- B. Maintain proper moisture content of concrete before, during, and after application of specified products.

PART 2 PRODUCTS

2.01 LIQUID FLOOR TREATMENTS

- A. Water Based Acrylic Sealing Compounds:
 - 1. ASTM C1315, Type I, Class A, VOC compliant, free of natural or petroleum waxes. Dries clear with satin sheen.

2. Compatible with subsequent coatings and toppings.
 3. VOC Requirement: Less than 100 g/L
 4. Acceptable Products:
 - a. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
 - b. W. R. Meadows; VOCOMP-30.
 - c. Monopole; MonoChem AquaSeal W20.
 - d. Monopole; MonoChem PermaSeal.
- B. Sealers: Only use sealers in the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 on the interior of the building and CAL-Green Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
1. Current requirement refers to the date on which the materials are installed in the building.
 2. SCAQMD Rule #1113 referenced in Section 018114 is current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine conditions and proceed with work in accordance with Section 017000 - Execution and Closeout Requirements.
- B. Verify that damage and defects in concrete surface have been repaired as specified in Section 033000 and accepted by Architect.
- C. Verify that form ties have been broken off below concrete surface and plastic cones, fins and burrs have been removed.
- D. Verify that form tie holes have been patched, unless specifically indicated to be left unfilled.
- E. Verify that surfaces are clean, dry, dust free, and free of efflorescence, oil or other matter detrimental to sealer application.
- F. Verify that joint sealant work in adjoining surfaces is complete prior to applications of sealers. Delay application until sealants have cured.
- G. Ensure concrete has cured for time period required by manufacturer of product to be applied 28 days minimum before application of products.

3.02 PREPARATION

- A. Provide protection as necessary to protect adjacent materials and surfaces from dirt, dust, and other surface or physical damage.
- B. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containment devices.
- C. Maintain control of concrete chips, dust and debris. Collect water to prevent damage to adjacent surfaces.

- D. Remove loose particles, foreign matter, and oil by method which will not affect sealer application.
- E. Prepare surfaces in accordance with manufacturer's directions.

3.03 SEALING

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

3.04 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
- B. Do not apply to concrete that is less than 28 days' old.
- C. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.05 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. 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.

END OF SECTION 033541

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 035400 - CAST UNDERLAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid-applied self-leveling floor underlayment.

1.02 REFERENCE STANDARDS

- A. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- D. ASTM E413 - Classification for Rating Sound Insulation; 2010.

1.03 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the work of this Section.
 - 1. Approved by manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F (41 degrees C).

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable code for combustibility or flame spread requirements.
- B. Conform to basis of design UL Assembly Design specified on Drawings.

1.06 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 014000.
- B. Mock-up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Prepare mock-up in location designated by Architect.
 - 2. Do not proceed with underlayment work until workmanship of mock-up has been approved by Architect.
 - 3. Mock-up may remain as part of the Work.

1.07 FIELD CONDITIONS

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F (10 degrees C) 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Gypsum Underlayment Manufacturer:
 - 1. Maxxon Corporation
 - 2. Other Acceptable Gypsum Underlayment Manufacturer:
 - a. ARDEX Engineered Cements.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. MAPEI Corporation.
 - d. USG: www.usg.com.
 - e. Prior approved equal.

2.02 MATERIALS

- A. Cast Underlayments, General:
 - 1. Conform to applicable code for combustibility or flame spread requirements.
 - 2. Provide certificate of compliance from authority having jurisdiction indicating approval of underlayment materials in the required fire rated assembly.
- B. Gypsum-Based Underlayment: Gypsum based mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following properties:
 - 1. Basis of Design Product:
 - a. Maxxon Corporation; Gyp-Crete 2000.
 - b. Prior approved equal.
 - 2. Compressive Strength: Minimum 2500 psi (17.24 MPa), or as required to comply with basis of design tested assembly requirements; tested per ASTM C472.
 - 3. Density: Maximum 115 lb/cu ft (1842 kg/cu m), or as required to comply with basis of design tested assembly requirements.
 - 4. Final Set Time: 1 to 2 hours, maximum.
 - 5. Thickness: Minimum dimension as indicated on Drawings.
 - 6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- C. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch (3 mm) in size and acceptable to underlayment manufacturer.
- D. Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.
- E. Water: Potable and not detrimental to underlayment mix materials.
- F. Primer: Manufacturer's recommended type.
- G. Joint and Crack Filler: Latex based, as recommended by manufacturer, compatible with substrate and underlayment mix materials.
- H. Sealer: Manufacturer's proprietary overspray material, formulated to seal cured floor surfaces to receive subsequent adhered finishes.
- I. Entangled net sound mat laminated to a point bonded moisture resistant fabric.
 - 1. Sound Control Mat: ASTM E 84; polymer, random geometric patterned core.

- a. Basis of Design Sound Mat: Maxxon Corporation; Acousti-Mat® II Sound Mat.
 - 1) Thickness: 0.25 inches.
 - 2) Density: 13.95 oz. per sq. yd.
- b. Prior approved equal.

2.03 MIXING

- A. Site mix materials in accordance with manufacturer's instructions.
- B. Add aggregate, if recommended or required by manufacturer, for areas where thickness will exceed 1 inch (25 mm). Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
 - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete: Mechanically prepare steel troweled concrete to create a textured surface necessary to achieve the best bond; acceptable methods include bead blasting and scarifying. Do not use acid etching.
- C. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- D. Vacuum clean surfaces.
- E. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- F. Close floor openings.
- G. Install sound reduction mat where tile and other hard-surface floor finishes are indicated in accordance with manufacturer's instructions.

3.03 APPLICATION

- A. Install underlayment in accordance with manufacturer's instructions.
- B. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.

2. Coordinate application of components to provide optimum adhesion to substrate and between coats.
 3. Retain subparagraph below for moving joints in floor. Detail joints on Drawings and revise below to suit Project.
 4. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- C. Pump or pour material onto substrate. Do not retemper or add water.
1. Pump, move, and screed while the material is still highly flowable.
 2. Be careful not to create cold joints.
 3. Wear spiked shoes while working in the wet material to avoid leaving marks.
- D. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft (1:1000).
1. For final thickness over 1-1/2 inches (38 mm), place underlayment in layers. Allow initial layer to harden to the point where the material has lost its evaporative moisture. Immediately prime and begin application of the subsequent layer within 24 hours.
- E. Place after partition installation.
- F. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.
- G. If a fine, feathered edge is desired, steel trowel the edge after initial set, but before it is completely hard.
- H. Sound Reduction Mat: Discontinue mat at intersections with demising walls and similar locations where indicated. Provide continuous perimeter isolation at those intersection locations using same material as specified sound reduction mat. Install perimeter isolation according to sound reduction mat manufacturer's recommendations.

3.04 CURING

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.
- C. Apply sealer to cured flooring surfaces scheduled to receive adhered and glued-down finishes.
- D. Seal damaged floor surfaces, regardless of scheduled finish, in accordance with manufacturer's instructions.

3.05 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field inspection and testing, as specified in Section 014000 - Quality Requirements.
- B. Placed Material: Agency will inspect and test for conformance to specified requirements.

3.06 PROTECTION

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

END OF SECTION 035400

SECTION 040511 - MORTAR AND MASONRY GROUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mortar for masonry.
- B. Grout for masonry.

1.02 RELATED REQUIREMENTS

- A. Section 042001 - Masonry Veneer: Installation of mortar.
- B. Section 081113 - Hollow Metal Doors and Frames: Products and execution for grouting steel door frames installed in masonry.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.
- B. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2010.
- C. ASTM C91/C91M - Standard Specification for Masonry Cement; 2012.
- D. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2015.
- E. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2011.
- F. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2014a.
- I. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Concrete and High Strength Mortar; 2011b.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- K. ASTM C476 - Standard Specification for Grout for Masonry; 2010.
- L. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2012.
- M. ASTM C1019 - Standard Test Method for Sampling and Testing Grout; 2013.

1.04 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the Contract Documents.
 - 1. Maintain one copy of each document on project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.06 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 MORTAR AND GROUT APPLICATIONS

- A. Contractor's Option: Mortar and grout may be made from factory premixed dry materials with addition of water only or ready-mixed.
- B. Mortar Mix Designs: ASTM C270, Property Specification.
 - 1. Exterior Masonry Veneer: Type S.
 - 2. Pointing Mortar for Prefaced or Specially Faced Unit Masonry: One part Portland cement, 1/8 part hydrated lime, and two parts graded (80 mesh) aggregate, proportioned by volume. Add aluminum tristearate, calcium stearate, or ammonium stearate equal to 2 percent of Portland cement by weight.
- C. Grout Mix Designs:
 - 1. Bond Beams and Lintels: 3,000 psi (21 MPa) strength at 28 days; 8-10 inches (200-250 mm) slump; provide premixed type in accordance with ASTM C 94/C 94M.
 - a. Fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less.

2.02 MATERIALS

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type S.
 - 2. Color: Mineral pigments added as required to produce approved color sample.
- B. Portland Cement: ASTM C150/C150M.
 - 1. Type: Type I - Normal.
 - 2. Alkali Content: Not more than 0.60 percent.
 - 3. Color: As indicated on Drawings.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Quicklime: ASTM C5, non-hydraulic type.
- E. Mortar Aggregate: ASTM C144.
- F. Grout Aggregate: ASTM C404.
- G. Water: Clean and potable.

2.03 MORTAR MIXING

- A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
- B. Maintain sand uniformly damp immediately before the mixing process.

- C. Do not use anti-freeze compounds to lower the freezing point of mortar.
- D. If water is lost by evaporation, re-temper only within two hours of mixing.

2.04 GROUT MIXING

- A. Mix grout in accordance with ASTM C94/C94M.
- B. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476 for fine and coarse grout.

2.05 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 014000 - Quality Requirements.
- B. Mortar Mixes: Test mortars prebatched by weight in accordance with ASTM C780 recommendations for preconstruction testing.
 - 1. Test results will be used to establish optimum mortar proportions and establish quality control values for construction testing.
- C. Grout Mixes: Test grout batches in accordance with ASTM C1019 procedures.
 - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.

PART 3 EXECUTION

3.01 PREPARATION

- A. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

3.02 INSTALLATION

- A. Work grout into masonry cores and cavities to eliminate voids.
- B. Do not install grout in lifts greater than 16 inches (400 mm) without consolidating grout by rodding.
- C. Do not displace reinforcement while placing grout.
- D. Remove excess mortar from grout spaces.

3.03 GROUTING

- A. Perform all grouting by means of low-lift technique. Do not employ high-lift grouting.
- B. Low-Lift Grouting:
 - 1. Limit height of pours to 16 inches (400 mm).
 - 2. Limit height of masonry to 16 inches (400 mm) above each pour.
 - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

3.04 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. Test and evaluate mortar in accordance with ASTM C780 procedures.
 - 1. Test with same frequency as specified for masonry units.
- C. Test and evaluate grout in accordance with ASTM C1019 procedures.
 - 1. Test with same frequency as specified for masonry units.
- D. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
- E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

END OF SECTION 040511

SECTION 042001 - MASONRY VENEER

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clay Facing Brick.
- B. Reinforcement and Anchorage.
- C. Flashings.
- D. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 040511 - Mortar and Masonry Grout.
- B. Section 055000 - Metal Fabrications: Loose steel lintels.
- C. Section 076200 - Sheet Metal Flashing and Trim: Through-wall masonry flashings.
- D. Section 079200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ACI 530/530.1/ERTA - Building Code Requirements and Specification for Masonry Structures and Related Commentaries; 2011.
- B. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2015.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement; 2015.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- E. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- F. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made From Clay or Shale); 2014.
- G. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2005.
- H. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- I. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.
- J. BIA Technical Notes No. 7 - Water Penetration Resistance - Design and Detailing; 2005.
- K. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- L. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2005.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.
- C. Samples: Submit four samples of decorative block units to illustrate color, texture, and extremes of color range.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 2. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 3. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.
 - 4. Section A5.405.5: Provide documentation that cement and concrete used are made with recycled content and/or alternative energy.

1.07 QUALITY ASSURANCE

- A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.
 - 1. Maintain one copy of each document on project site.

1.08 MOCK-UP

- A. Construct a masonry wall as a mock-up panel sized 8 feet (2.4 m) long by 6 feet (1.8 m) high; include mortar and accessories and structural backup in mock-up.
- B. Locate where directed.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Handle and store ceramic glazed masonry units in protective cartons or trays. Do not remove from protective packaging until ready for installation.

1.10 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 FACE BRICK

- A. Description: Brick veneer complying with ASTM C216, Grade SW, Type FBX.
- B. Comply with the Following:

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 6000 psi.
2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
4. Size (Actual Dimensions): 3-5/8 inch (92.07 mm) by 2-1/4 inch (57.15 mm) high by 11-5/8 inch (295.27 mm) inches long.
5. Application: Use where brick is exposed, unless otherwise indicated.
6. Shapes: Provide shapes indicated on the Drawings and as follows.
 - a. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - b. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - c. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - d. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
7. Product:
 - a. Endicott Clay Products Co.; Norman.
 - b. Color and texture:
 - 1) BR-1: Medium Ironspot #77 Velour.
 - 2) BR-2: Golden Buff Smooth.
 - 3) BR-3: Manganese Velour.

2.02 MORTAR AND GROUT MATERIALS

- A. Mortar and Grout: As specified in Section 040511.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa) yield strength, deformed billet bars; galvanized.
- B. Joint Reinforcement: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M, W1.7- 9 gage (3.8 mm diameter) wire reinforcement.
- C. Joint Reinforcement: Truss type; stainless steel wire conforming to ASTM A580/A580M Type 304; 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not more than 1 inch (25 mm) and not less than 1/2 inch (13 mm) of mortar coverage on each exposure.
 1. Conform to LARR 24560.
- D. Adjustable Channel-Tee Anchors: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 1. Anchor Channels: 1 by 21/32 inches (25 by 17 mm) with inturned lips roll formed from 22 gage (0.85 mm) pre-galvanized steel strip, pre-punched at 12 inches (305 mm) on center spacings.

2. Connector Section: T-shaped tabs for inserting into anchor channels; formed from 14 gage (1.9 mm) thick, galvanized steel sheet, with central stiffening rib and two tabs for wire reinforcing placement.
3. Continuous Wire: 9 gage, type 304 stainless steel.
4. Fasteners to Metal Studs: No. 10 (4.8 mm) corrosion resistant Tek screws.
5. Product:
 - a. Halfen; Fleming Masonry Anchoring System, City of Los Angeles Research Report RR 24560.
 - b. Prior approved equal.

2.04 FLASHINGS

- A. Metal Flashing Materials: Stainless Steel, as specified in Section 076200.
- B. Prefabricated Metal Flashing: Smooth fabricated 26 ga, 0.0747 inch (1.89 mm) stainless steel (type 304) flashing for thru-wall conditions.
- C. Stainless Steel: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch (0.48 mm) thick; finish 2B to 2D.
- D. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.05 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Cavity Vents: Preformed aluminum vents with sloping louvers.
 1. Manufacturers:
 - a. Blok-Lok Limited; CellVent: www.blok-lok.com.
 - b. CavClear/Archovations, Inc; CavClear Weep Vents: www.cavclear.com
 - c. Hohmann & Barnard, Inc; 342: www.h-b.com.
- C. Drainage Fabric: Polyester mesh.
- D. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 1. Products:
 - a. Advanced Building Products Inc.; Mortar Break.
 - b. CavClear/Archovations, Inc.; CavClear Masonry Mat.
 - c. Heckmann Building Products, Inc.; Weep-Thru Mortar Deflector.
 - d. Hohmann & Barnard, Inc; Mortar Trap.
 - e. Mortar Net USA, Ltd; Mortar Net.
 - f. Wire-Bond; Cavity Net.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 COURSING

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

3.03 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar as work progresses.
- D. Interlock intersections and external corners, except for units laid in stack bond.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

3.04 WEEPS/CAVITY VENTS

- A. Install weeps in veneer walls at 24 inches (600 mm) on center horizontally above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
- B. Install cavity vents in veneer walls at 32 inches (800 mm) on center horizontally below shelf angles and lintels and at top of walls.

3.05 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.

- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.06 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Lap joint reinforcement ends minimum 6 inches (150 mm).
- E. Seismic Reinforcement: Install in accordance with Manufacturer's recommendations.
- F. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

3.07 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up at least 8 inches (203 mm), minimum, to form watertight pan at non-masonry construction.
- B. Extend metal flashings through exterior face of masonry and turn down to form drip.
- C. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

3.08 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joints as indicated on drawings; if not indicated, 3/4 inch (19 mm) wide and deep.
- D. Form expansion joint as detailed on drawings.

3.09 TOLERANCES

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm in 3 m) and 1/2 inch in 20 ft (13 mm in 6 m) or more.
- C. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm in 1 m) and 1/4 inch in 10 ft (6 mm in 3 m); 1/2 inch in 30 ft (13 mm in 9 m).

- E. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).

3.10 CUTTING AND FITTING

- A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.11 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 according to Level B in TMS 402/ACI 530/ASCE 5.
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Inspect placement of units and construction of mortar joints.
 - 3. Inspect placement of reinforcement, connectors and anchors.
 - 4. Inspect type, size, and location of anchors and all other items to be embedded in masonry including details of anchorage of masonry to structural members, frames and other construction.
 - 5. Verify protection of masonry during cold weather (temperature below 40° F) or hot weather (above 90°).
 - 6. Test veneer bond strength.
- C. Testing Prior to Construction: One set of tests.
- D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.

3.12 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.13 PROTECTION

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

END OF SECTION 042001

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 050523 - METAL FASTENINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Methods of fastening metal items together, and of attaching other materials to metal items.
 - 2. Supplementary components and accessories, including washers, nuts, expansion shields, and other items necessary to securely fasten, anchor, or otherwise attach work to adjacent materials or construction.
- B. Products Furnished but not Installed under this Section:
 - 1. Welding electrodes, solder.
 - 2. Mechanical fastenings.
 - 3. Cast-in-place anchors.
 - 4. Post-installed anchors for attaching items to concrete, masonry and steel substrates.
- C. Related Requirements:
 - 1. Section 018114 for sustainable design requirements.
 - 2. Section 051200 for structural steel connections.
 - 3. Additional fastening requirements applicable to a particular work result are specified within the appropriate specification section.

1.02 REFERENCES

- A. Abbreviations and Acronyms:
 - 1. AWS: American Welding Society.
 - 2. HDG: Hot Dip Galvanized.
 - 3. UTS: Unified Thread Standard.
 - 4. UNC: Unified Coarse Thread Series.
 - 5. UNF: Unified Fine Thread Series.
- B. Definitions:
 - 1. Bolt: Means a threaded fastener 1/4 inch or larger in diameter that is designed to be used either with nuts or in tapped holes.
 - 2. Cold-Formed Metal Framing: Means structural metal framing members having a base metal thickness range of between 97 mils (12-gage) and 33 mils (20-gage), and installed in transverse and axial load-bearing applications.
 - 3. Non-Structural Metal Framing: Means light gage metal framing members having a base metal thickness of less than 30 mils (20-gage), and installed in non-load bearing interior construction assemblies supporting plaster or gypsum board.
 - 4. Screw: Means a thread fastener less than 1/4-inch in diameter.
 - a. Thread Cutting/Thread Forming (Hi-Lo) Screw : Means a screw with a tapered shaft that is designed to be used in un-threaded substrates.
 - b. Machine Screw: Means a screw that that is designed to be used either with nuts or in tapped holes.
 - 5. Stud: Means a threaded rod.
 - 6. Threads: Means the Unified Thread Standard thread form and series - along with allowances, tolerances, and designations as follows.

Sizes No. or Inches	Shank Diameter	Threads Per Inch
No. 0	0.60	80
No. 1	0.73	72
No. 2	0.086	64
No. 3	0.099	56
No. 4	0.112	48
No. 5	0.125	44
No. 6	0.138	40
No. 8	0.164	36
No. 10	0.190	32
No. 12	0.216	28
1/4 inch	0.250	28
5/16 inch	0.3125	24
3/8 inch	0.375	24
7/16 inch	0.4375	20
1/2 inch	0.500	20
9/16 inch	0.5625	18
5/8 inch	0.625	18
3/4 inch	0.750	16
7/8 inch	0.875	14
1 inch	1.000	12

1.03 ADMINISTRATIVE REQUIREMENTS

A. Design Requirements:

1. Unless otherwise indicated, or unless exposed fasteners are otherwise unavoidable, provide concealed fasteners for interconnecting components and for attaching and fastening metal work to adjacent construction. Where the use of exposed fasteners is unavoidable, provide flat head cap screws (FHCS type) with screw drive slots filled and finished flush and smooth with adjacent surfaces.
2. Where fasteners are subject to loosening or turning out due to thermal and structural movements, wind loads, vibration, or similar phenomena, provide washers, locknuts, or similar self-locking devices that either maintain tension in the fastener assembly or remain locked even if tension in the assembly is lost.

B. Performance Requirements:

1. Select fastener and accessory material suitable to the type of use and conditions of installation and service indicated, and as required for producing secure attachment to fastened materials indicated, without staining or deterioration of fastened materials, or deterioration of the fastener itself when in contact with fastened materials.
2. Provide fasteners and accessories that are galvanically compatible with fastened materials under conditions of installation and service, as demonstrated by the fastener manufacturer based on testing and field experience. Do not use fastening materials that are corrosive or otherwise incompatible with the materials being fastened.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Welding Materials:

1. **Welding Electrodes:** Select welding rods and bare electrodes in compliance with AWS specifications based upon physical properties of the weld metal, type of coating on the electrode, welding position of the electrode, and type of welding current with which the electrode will be used, as appropriate to metal to be welded and the conditions of installation and service.
2. **Filler Metal:** Provide filler metal and electrode type and alloy recommended by the producer of the metal to be welded or brazed, and as required for strength, corrosion resistance and compatibility with fabricated items under the conditions of installation and service.

B. Fastener Materials:

1. **Carbon Steel Fasteners:**
 - a. **Bare Condition Fasteners:** Uncoated carbon steel fasteners.
 - 1) Screws.
 - 2) Bolts: ASTM A 307, Grade A.
 - 3) Nuts and Flat Washers: ASTM A 563, Grade C3 for
 - b. **Zinc-Coated Fasteners:** Carbon steel fasteners having a corrosion-resistant electrodeposited zinc coating complying with ASTM B 633 requirements for coatings indicated below.
 - 1) **Exposed-in-Service Fasteners:** Minimum thickness class Fe/Zn 25 SC4 (very severe) with Type III finish (colorless trivalent chromate conversion coating) that provides corrosion resistance to white rust minimum at minimum 360 hours of ASTM B117 salt spray test.
 - 2) **Concealed-in-Service Fasteners:** Minimum thickness class Fe/Zn 25 SC2 (moderate) with black Type II finish (colored trivalent chromate conversion coating) that provides corrosion resistance to white rust minimum at minimum 360 hours of ASTM B117 salt spray test.
 - 3) Hexavalent chromium conversion coatings are not permitted.
 - c. **Polymer-Coated Fasteners:** Carbon steel fasteners having baked-on dark blue organic fluoropolymer (Stalgard, Xylan, FluoroKote # 1 or similar) barrier coating that displays no visible sign of surface red rust at minimum 800 hours of ASTM B117 salt spray test.
 - d. **HDG Steel Fasteners:** Carbon steel fasteners with hot dip galvanized coating complying with ASTM A 153 minimum zinc coating weight requirements for Class C materials (for fasteners over 3-8-inch diameter and similar articles; washers 3•16-inch and 19"'.1--inch thick) or Class D materials (for fasteners 3-8-inch diameter and under, rivets, nails and similar articles; washers under 3•16-inch thick) and with ASTM F 2329 (for fasteners that are centrifuged or otherwise handled to remove excess galvanizing bath metal).
2. **Stainless Steel Fasteners:** Austenitic stainless-steel screws, bolts, and studs complying with ASTM F 593 and nuts complying with ASTM F 594 requirements for Alloy Group 1(304 Series), and having no visible sign of surface red rust at minimum 1,000 hours of ASTM B117 salt spray test.

3. Nonferrous Metal Fasteners: Copper, brass, bronze, nickel, aluminum and titanium nuts complying ASTM F 467 and commercial wrought bolts, hex cap screws and studs complying with ASTM F 468; alloy and temper suitable for the intended use as furnished, required, recommended, approved or accepted by the aluminum fastener manufacturer.

2.02 MECHANICAL FASTENING

A. Screw Fasteners:

1. Thread Cutting/Forming Screws:

a. Structural Metal Framing:

- 1) Connecting Cold-Formed Steel Members: Self-drilling tapping screws complying with ASTM C 1513.
- 2) Fastening Gypsum Panel Products and Metal Plaster Bases to Cold Formed Metal Framing: Self-drilling tapping screws complying with ASTM C 954.
- 3) Fastening Cementitious Backing Board and Cement Board to Cold Formed Metal Framing: Self-drilling thread forming (Hi-Lo) tapping screws complying with ASTM C 954.

b. Non-Structural Metal Framing:

- 1) Connecting Lightgage Steel Members: Self-piercing tapping screws complying with ASTM C 1513.
- 2) For Fastening Gypsum Panel Products and Metal Plaster Bases to Lightgage Metal Framing: Self-piercing tapping screws complying with ASTM C 1002, Type S.
- 3) Fastening Cementitious Backing Board and Cement Board to Cold Formed Metal Framing: Self-piercing thread forming (Hi-Lo) tapping screws complying with ASTM C 954.

c. Comply with the Following:

- 1) Fastener Size: Unless otherwise indicated, provide minimum No. 8 UNF fine thread sheet metal screws in lengths as required to penetrate through framing member material with not less than minimum 3 exposed threads, but in no case less than one inch long.
- 2) Fastener Head Type:
 - (a) Provide wafer head screws when fastening other metal framing members and metal plaster bases to metal framing.
 - (b) Provide bugle head screws when fastening gypsum panel products to metal framing.
 - (c) Provide hex washer head screws with bonded sealing washer and EPDM sealing washer assembled when fastening sheet metal, including siding, roofing, flashings and similar items to metal framing. Provide exposed fastener heads with factory- applied coating matching color of prefinished roof or wall panels.
 - (d) Fasteners not scheduled to be overlaid either with gypsum panel products or with other substrate or finish materials may have hex washer, pan, pancake, modified truss or pan framing head type.
- 3) Fastener Drive Type: Phillips drive slot.

B. Bolts and Nuts:

1. Description: Regular bolts with hex-head nuts and flat washers.
2. Comply with the Following:

- a. Fastener Size: Unless otherwise indicated, provide minimum 3/4-10 coarse thread bolts or studs in lengths required to provide a minimum thread engagement equal to the thread diameter, with at least one clear thread plus the thread lead (start) above the nut face, and at least one clear thread plus the thread run out beneath the nut face after tightening. Assume one washer will be used under the rotating part (generally be the nut) and allow for this when selecting the bolt length.
- b. Fastener Head Type: Hexagon-head with both the strength and type of steel used in bolt manufacture indicated on the head of the bolt by a raised mark complying with ASTM bolt designation standards.

2.03 CAST-IN-PLACE ANCHORS

- A. Anchor Bolts: Threaded anchor bolts complying with ASTM A 307 requirements for Grade C fasteners (non-headed anchor bolts, either bent or straight, having properties conforming to Specification A 36, tensile strength of 58 to 80 ksi, and intended for structural anchorage purposes) with hex-head nuts and flat washers complying with ASTM A 563 chemical requirements for Grade A nuts.
- B. Comply with the Following:
 1. Fastener Size: Provide bolt or stud size as required by engineering calculations.
 2. Fastener Coating: Hot-dip galvanize anchors, nuts and washers in compliance with ASTM A 153 minimum zinc coating weight requirements for Class C materials (for fasteners over 3/8 inch diameter and similar articles; washers 3/16 inch and 1/4 inch thick) or Class D materials (for fasteners 3/8 inch diameter and under, rivets, nails and similar articles; washers under 3/16 inch thick).

2.04 POST-INSTALLED ANCHORS

- A. Manufacturers: Design is based on products by Hilti, Inc. Other acceptable sources of comparable products are limited to one of the following.
 1. ITW Ramset/Red Head.
 2. Powers Fasteners.
 3. Or equal.
- B. Adhesive Anchors:
 1. Description: Anchors with capability to sustain without failure, a load equal to 4 times the design load for static loads, and equal to 10 times the design load for dynamic and overhead loads, as determined by testing conducted in compliance with ASTM E 488 by a qualified independent testing agency.
 2. Injection Adhesive Anchors:
 - a. Concrete Substrates: "HIT HY 150 Max" or "HIT RE-500" adhesive injection system and "HIT-ICE" low temperature adhesive injection system used with "HAS-R" threaded rod or "HIT-RTZ anchor rod.
 - b. Solid Masonry Substrates: "HIT HY 20" hybrid adhesive injection system used with "HAS-E Standard" galvanized threaded anchor rod.
 3. Capsule Adhesive Anchors: "HVA Adhesive System" used with "HVU" adhesive capsule and "HAS-R" threaded rod.
- C. Mechanical Anchors:
 1. Description: Anchors with capability to sustain without failure, a load equal to 4 times the design load when installed in concrete and equal to 6 times the design load when

installed in unit masonry, as determined by testing conducted in compliance with ASTM E 488 by a qualified independent testing agency.

2. Screw Type Anchors:
 - a. Permanent Indoor and Temporary Outdoor Fasteners for Concrete: "HUS-H" universal screw anchor.
 - b. Through-Fastening to Concrete: "HCA" reusable coil anchor.
 - c. Fastening into Concrete, CMU, Brick, Masonry or Stone: "KWIK CON- 11" masonry screw anchors.
 3. Expansion Type Anchors:
 - a. Medium Duty Applications: "KWIK-BOLT 3" or "KB-TZ" (especially suited for seismic and cracked concrete applications) expansion anchors.
 - b. Heavy Duty Applications: "HSL 3" expansion anchor.
 4. Drop-In Anchors: Internally-threaded flush mounted expansion anchors for use in concrete.
 - a. Concealed-in-Service Locations: "HDI".
 - b. Exposed-in-Service Locations: "HDI-L".
 - c. Poured Concrete Locations: "HDI-P".
- D. Power-Actuated Fasteners (PAF): Provide powder-actuated, pneumatic or gas- powered direct fastening system for driving fasteners into concrete or steel by one of the post-installed anchor manufacturers indicated above.

2.05 ACCESSORIES

- A. Expansion Shields: Provide die cast zinc alloy or zinc-coated steel single or double expansion shields manufactured for type of screw fastener indicated, specified or selected. Lead or zinc and lead expansion shields are not permitted.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine adjacent construction and supports, supporting structural frame or foundation.
- B. Correct conditions detrimental to the proper and timely completion of this work before proceeding with installation.

3.02 INSTALLATION

- A. General: Fasten work tightly to prevent rattle or vibration except where expansion-contraction tolerances are required.
- B. Post-Installed Anchors: Install fasteners in compliance with their manufacturer's instructions.
 1. Locations and spacing: As indicated.
 2. Edge distance: Minimum 10 nominal bolt diameters when installed in concrete.
 3. Embedment: Install with manufacturer's recommended minimum embedment.
 - a. Embedment length excludes thickness of finish coverings or other overlays.
 - b. When installed through metal deck into concrete slab overhead, embedment shall extend to within a zone between 1-1/2 inches above top flute and 3/4-below top concrete.

4. Recessed Anchors: Do not recess expansion bolts more than 0.25 nominal bolt diameters.
 - a. Abandon over-drilled holes and fill with non-shrink grout.
 - b. Abandon drilled holes and fill with non-shrink grout when hole deviates more than 5 degrees measured from a line normal to the concrete surface.
 - c. Immediately notify Architect if concrete reinforcing bar is encountered during drilling.

END OF SECTION 050523

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Field-installed shear connectors.
3. Grout.

B. Related Requirements:

1. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
2. Section 055000 "Metal Fabrications" for [steel lintels and shelf angles not attached to structural-steel frame] [miscellaneous steel fabrications] [and] [other steel items] not defined as structural steel.
3. Section 099600 "High-Performance Coatings" and Section 099123 "Interior Painting" for surface-preparation and priming requirements.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "(S)", including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
 2. Welded built-up members with plates thicker than 2 inches.
 3. Column base plates thicker than 2 inches.
- 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.

1.3 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 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.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Conference to include discussion regarding Protected Zones.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. 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 slip-critical and high-strength bolted connections.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," 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.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator, and testing agency.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control and special inspection reports.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).
- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1, Endorsement P2, and Endorsement P3 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 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.
- E. Comply with applicable provisions of the following specifications and documents:
 - 1. AISC 303.
 - 2. AISC 341 and AISC 341s1.
 - 3. AISC 360.
 - 4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 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 F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M , S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH, (ASTM A 563M, Class 10S) heavy-hex

carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.
- C. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.
1. Finish: Hot-dip zinc coating
 2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with finish.
- D. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
1. Unheaded Anchor Rods: ASTM F 1554, Grade 36 Configuration: As indicated.
 2. Nuts: ASTM A 563 hex carbon steel.
 3. Plate Washers: ASTM A 36/A 36M carbon steel.
 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
 5. Finish: Plain.
- E. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
1. Nuts: ASTM A 563 hex carbon steel.
 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 4. Finish: Plain
- F. Threaded Rods: ASTM A 36/A 36M.
1. Nuts: ASTM A 563 (ASTM A 563M) hex carbon steel.
 2. Washers: ASTM A 36 carbon steel.
 3. Finish: Plain.

2.3 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Primer: Comply with Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

- C. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel 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, or punch standard bolt holes perpendicular to metal surfaces.

- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to [SSPC-SP 1, "Solvent Cleaning."

- F. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened, Slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 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. Surfaces enclosed in interior construction.
- B. Surface Preparation: Clean 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, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
- C. 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 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.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
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. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.
- E. 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.
 1. Contractor to prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- 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.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and 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 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 shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- 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.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning, using drift pins, or reaming holes. Holes for bolted connections and anchor bolts shall be AISC "Standard" holes limited to

1/16-inch larger in diameter than nominal bolt diameter, unless noted otherwise. Oversized and slotted holes require the approval of the structural engineer of record.

- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened, Slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and 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 AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified 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.
- C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.

- b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
- 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - 2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Cleaning and touchup painting are specified in Section 099600 "High-Performance Coatings" and Section 099123 "Interior Painting."

END OF SECTION

DLR GROUP
PROJECT NO. 75-15238-00
07/31/2017

Compton Community College District
Instructional Building #1
DSA Submittal

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Composite floor deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 035216 "Lightweight Insulating Concrete" for lightweight insulating concrete fill over steel deck.
3. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
4. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
5. Section 099600 "High-Performance Coatings" for repair painting of primed deck and finish painting of deck.
6. Section 099123 "Interior Painting" for repair painting of primed deck and finish painting of deck.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. 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.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.
2. Acoustical roof deck.

D. Evaluation Reports: For steel deck.

E. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

C. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.5 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.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

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."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

- A. 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:
1. ASC Profiles, Inc.; a Blue Scope Steel company.
 2. CMC Joist & Deck.
 3. Consolidated Systems, Inc.; Metal Dek Group.
 4. Epic Metals Corporation.
 5. Nucor Corp.; Vulcraft Group.
 6. Verco Manufacturing Co.
- B. 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 33, G60 (Z180) zinc coating.
 2. Deck Profile: Per structural drawings.
 3. Profile Depth: Per structural drawings.
 4. Design Uncoated-Steel Thickness: Per structural drawings.
 5. Span Condition: Per structural drawings.
 6. Side Laps: Per structural drawings.

2.3 COMPOSITE FLOOR DECK

- A. 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:
1. ASC Profiles, Inc.; a Blue Scope Steel company.
 2. CMC Joist & Deck.
 3. Consolidated Systems, Inc.; Metal Dek Group.
 4. Epic Metals Corporation.
 5. Nucor Corp.; Vulcraft Group.
 6. Verco Manufacturing Co.
- B. 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 33 (230), G60 (Z180) zinc coating.
 2. Profile Depth: Per structural drawings.
 3. Design Uncoated-Steel Thickness: Per structural drawings.
 4. Span Condition: Per structural drawings.

2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- C. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- D. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile per structural plans.
- E. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- F. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- H. Galvanizing Repair Paint: ASTM A 780.

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.
- 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.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- 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.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: Per structural drawings.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated Per structural drawings.
 - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals as indicated on drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. 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.
- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

- F. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified.

3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: Per structural drawings.
 - 2. Weld Spacing: Weld edge ribs of panels at each support. Space additional welds an average of as indicated on drawings.
 - 3. Weld Spacing: Space and locate welds as indicated.
 - 4. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals per structural drawings
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped.
- 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.
- F. Install piercing hanger tabs at 14 inches apart in both directions, within 9 inches of walls at ends, and not more than 12 inches from walls at sides unless otherwise indicated.

3.5 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. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099600 "High-Performance Coatings" and Section 099123 "Interior Painting."
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

DLR GROUP
PROJECT NO. 75-15238-00
07/31/2017

Compton Community College District
Instructional Building #1
DSA Submittal

SECTION 054300 - SLOTTED CHANNEL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Slotted channel framing system.
- B. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Divisions 21, 22, 23, and 26: Items requiring support.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- B. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2010.
- C. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- D. ASTM A325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2009.
- E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2012a.
- F. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 3. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 4. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.

5. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Unistrut Corporation: www.unistrut.com.
 2. Prior approved equal.

2.02 MATERIALS

- A. General: Comply with recycled content product requirements specified in Section 016000.
 1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Slotted Channel Framing: ASTM A1011, Grade 33.
 1. Primary Framing Member Profile: 1-1/4 inch (30 mm); square, with holes on channel legs.
- C. Slotted Channel Fittings: ASTM A1011/A1011M.
- D. Fasteners: As detailed or required for indicated applications; manufacturer's standard fasteners designed specifically for specified system.
- E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- F. Threaded Rod: ASTM A307; threaded full length of rod; minimum 1/2 inch diameter, or as required to suit design requirements.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type II - Organic, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Fit and field assemble items in largest practical sections.
- B. Fabricate items with joints tightly fitted and secured.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of framing components. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FINISHES

- A. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A 123/A 123M requirements. Provide minimum 1.7 oz/sq ft (530 g/sq m) galvanized coating.
- B. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A 123/A 123M requirements.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.
- D. After erection, repair and refinish abrasions.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) in 10 feet, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION 054300

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for masonry shelf angles and connections.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.
3. Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.

B. 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.

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.

- B. Welding certificates.

- C. Product Test Reports: For each listed product, for tests performed 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.
- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. 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."
- D. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 - 1. AllSteel & Gypsum Products, Inc.
 - 2. California Expanded Metal Products Company.

3. ClarkWestern Building Systems, Inc.
4. Consolidated Fabricators Corp.; Building Products Division.
5. Craco Mfg., Inc.
6. Custom Stud Inc.
7. Design Shapes in Steel.
8. Dietrich Metal Framing; a Worthington Industries Company.
9. Formetal Co. Inc. (The).
10. MarinoWARE.
11. Nuconsteel; a Nucor Company.
12. Olmar Supply, Inc.
13. Quail Run Building Materials, Inc.
14. SCAFCO Corporation.
15. Southeastern Stud & Components, Inc.
16. State Building Products, Inc.
17. Steel Construction Systems.
18. Steel Network, Inc. (The).
19. Steel Structural Systems.
20. Steeler, Inc.
21. Super Stud Building Products, Inc.
22. Telling Industries, LLC.
23. United Metal Products, Inc.
24. United Steel Manufacturing.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated on drawings
 2. Flange Width: As indicated on drawings
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated on drawings
 2. Flange Width: As indicated on drawings

2.4 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, punched with enlarged service holes, punched with standard holes, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated on drawings
 2. Flange Width: As indicated on drawings

2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated on drawings
 2. Flange Width: As indicated on drawings

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight 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.

2.7 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/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed 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.

- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. 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: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.9 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 screw penetrating joined members by no fewer than three exposed screw threads.
 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: 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.
 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

- C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. 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, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

- H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- J. Erection Tolerances: 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.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: Per structural drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging as indicated per structural drawings
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on drawings.

- B. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.
- C. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on drawings.
 - 1. Install web stiffeners to transfer axial loads of walls above.
- D. Install bridging at intervals indicated on drawings.
- E. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

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 as required by DSA Form-103.
- 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. Remove and replace work where test results indicate that it does not comply with specified requirements.
- 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 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. 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

DLR GROUP
PROJECT NO. 75-15238-00
07/31/2017

Compton Community College District
Instructional Building #1
DSA Submittal



PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Unistrut Corporation: www.unistrut.com.
 - 2. Prior approved equal.

2.02 MATERIALS

- A. General: Comply with recycled content product requirements specified in Section 016000.
 - 1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Slotted Channel Framing: ASTM A1011, Grade 33.
 - 1. Primary Framing Member Profile: 1-1/4 inch (30 mm); square, with holes on channel legs.
- C. Slotted Channel Fittings: ASTM A1011/A1011M.
- D. Fasteners: As detailed or required for indicated applications; manufacturer's standard fasteners designed specifically for specified system.
- E. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, galvanized to ASTM A153/A153M where connecting galvanized components.
- F. Threaded Rod: ASTM A307; threaded full length of rod; minimum 1/2 inch diameter, or as required to suit design requirements.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type II - Organic, complying with VOC limitations of authorities having jurisdiction.

2.03 FABRICATION

- A. Fit and field assemble items in largest practical sections.
- B. Fabricate items with joints tightly fitted and secured.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of framing components. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FINISHES

- A. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A 123/A 123M requirements. Provide minimum 1.7 oz/sq ft (530 g/sq m) galvanized coating.
- B. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A 123/A 123M requirements.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.
- D. After erection, repair and refinish abrasions.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) in 10 feet, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel items.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 051200 - Structural Steel: Structural steel column anchor bolts.
- C. Section 053000 - Steel Deck: Bearing plates for metal deck bearing, including anchorage.
- D. Section 055100 - Metal Stairs.
- E. Section 099113 - Exterior Painting: Paint finish.
- F. Section 099123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2015.
- B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- E. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- I. ASTM B85/85M - Standard Specification for Aluminum-Alloy Die Castings; 2014.
- J. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- K. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- L. ASTM C230/C230M - Flow Table for Use in Tests of Hydraulic Cement; 2008.

- M. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2011.
- N. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- P. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
- Q. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- R. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements- CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 6. Section A5.405.5: Provide documentation that cement and concrete used are made with recycled content and/or alternative energy.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.07 FIELD CONDITIONS

- A. If possible, design metal fabrications so that they do not have to fit other construction, and delete this article.

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

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. General: Comply with recycled content product requirements specified in Section 018114.
- B. Steel Sections: As indicated on Drawings.
- C. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, exposed or electrolytic zinc-coated, ASTM A 879/A 879M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.
- D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
- G. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and CAL-Green Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 - 1. CAL-Green Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water.
- H. Universal Primer:
 - 1. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
 - 2. Standard: FS TT-P-645.
 - 3. Compatible with finish paint system specified in Sections 099113 and 099123.
 - 4. Acceptable Products:
 - a. Dunn-Edwards Corporation; BRPR00-1 Bloc-Rust Premium, Interior / Exterior, Red Oxide or White, Waterborne Alkyd Rust Preventative Metal Primer. Applied at a dry film thickness of not less than 2.0 mils.
 - b. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310. Applied at a dry film thickness of not less than 3.0 mils.
 - c. Tnemec; Series 115 Uni-Bond DF. Applied at a dry film thickness of not less than 3.0 mils.
- I. Zinc-Rich Primer
 - 1. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance.
 - 2. Maximum Allowable Dry Time: 1 hour to touch; 12 hours to top coat.
 - 3. Pigment Content: Minimum 63% zinc in dry film by weight.
 - 4. Compatible with finish paint system specified in Section 099600.
 - 5. Acceptable Products:
 - a. Tnemec Co.; 94-H2O.

2.02 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Interior Aluminum Components: Type 304 stainless-steel fasteners.
 - 2. Exterior Aluminum Components: Type 316 stainless-steel fasteners.
 - 3. Interior Stainless-Steel Components: Type 304 stainless-steel fasteners.
 - 4. Exterior Stainless-Steel Components: Type 304 stainless-steel fasteners.
 - 5. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
 - 6. Galvanized-Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
 - 7. Dissimilar Metals: Type 304 stainless-steel fasteners.
- 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 .

2.03 FABRICATION

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

2.04 FABRICATED ITEMS

- A. Provide and install items listed in schedule and shown on Drawings with anchorage and attachments necessary for installation.
- B. The following is a list of principal items only. Refer to Drawing details for items not specifically scheduled.
- C. Slotted Channel Framing System: Specified in Section 054300.
- D. Bollards: Nominal 6 inch diameter, standard steel pipe, minimum wall thickness 0.280 inches; concrete filled, crowned cap, as detailed; finish as specified.
 - 1. Exterior Bollards in Slab on Grade: Penetration depth below top of slab to equal detailed height; core hole in slab on grade 2 inches larger than bollard diameter, and fill joint at slab with a non-shrink grout; prime paint finish.

2.05 ACCESSORIES

- A. Non-Shrink Grout: ASTM C1107/C1107M, Grade B; pre-mixed compound consisting of non-metallic aggregate, cement, and manufacturer's specified water reducing and plasticizing agents; non-staining, non-gas-forming, containing no chlorides; plastic consistency as measured according to ASTM C230/C230M; capable of developing minimum compressive strength of 10,000 psi in 28 days.

2.06 ELEVATORS

- A. Hoist Beam: As indicated on Drawings.
 - 1. Finish: Prime.
- B. Sill Support: Provide threshold support
- C. Guide Rail Supports: As indicated on Drawings.
- D. Sump Grating
 - 1. Fabricate from welded or pressure-locked steel bar grating Limit openings in gratings to no more than 1 inch (25 mm) in least dimension.
- E. Provide steel angle supports as indicated on Drawings.

2.07 FINISHES - STEEL

- A. General:
 - 1. Prepare surfaces to be primed in accordance with SSPC-SP6, or as recommended by finish coating manufacturer.
 - 2. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Prime paint steel items, unless otherwise specified.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be imbedded in masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
 - 3. Prime Painting: One coat.
- C. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.08 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on Drawings.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

3.05 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 - Exterior Painting and Section 099123 - Interior Painting.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 055100 - METAL STAIRS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stairs with concrete treads.
- B. Structural steel stair framing and supports.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 033000 - Cast-in-Place Concrete: Concrete fill in stair pans; mesh reinforcement for landings.
- C. Section 055000 - Metal Fabrications.
- D. Section 055213 - Pipe and Tube Railings: Metal handrails for the stairs specified in this section.
- E. Section 099123 - Interior Painting: Paint finish.
- F. Section 099600 - High-Performance Coatings: Paint finish.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling; 2014.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- J. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc; 2011.
- K. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
 - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
- C. Welders' Certificates: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. 5.405.1 Regional materials. Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site, meeting the criteria listed in Section A5.405.1.
 - 5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 6. Section A5.405.5: Provide documentation that cement and concrete used are made with recycled content and/or alternative energy.

1.06 QUALITY ASSURANCE

- A. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- B. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
 - 2. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
 - 3. A company specializing in manufacturing products specified in this Section, with not less than ten years of documented experience.
- C. Certifications:
 - 1. Submit certificates verifying AWS qualifications for each welder employed on Project.
 - 2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
 - 3. ~~Engineering certifications.~~
- D. ~~Certification that fabrication and installation comply with structural requirements listed in this Section~~

- E. 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

2.01 PERFORMANCE REQUIREMENTS

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.
 2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
 3. Structural Design: Provide complete stair and railing assemblies complying with the applicable local code.
 4. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. Component Importance Factor: 1.5.
 5. Dimensions: As indicated on Drawings.
 6. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 7. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 8. Separate dissimilar metals using paint or permanent tape.
 9. Interior stairs shall have the upper approach and lower tread marked by a stripe providing clear visual contrast. Exterior stairs shall have the upper approach and all treads marked by a stripe providing clear visual contrast.
 10. The stripe providing clear visual contrast shall be a minimum of 2 inches wide to a maximum of 4 inches wide placed parallel to, and not more than 1 inch from tile nose of the step or upper approach. The stripe shall extend the full width of the step or upper approach and shall be of material that is at least as slip resistant as the other treads of the stair. A painted stripe shall be acceptable. Grooves shall not be used to satisfy this requirement.
 11. The radius of curvature at the leading edge of the tread shall be no greater than 1/2 inch. Nosings that project beyond risers shall have the underside of the leading edge curved or beveled. The maximum angle for a riser to slope under the tread shall be 30 degrees from vertical. Nosings shall extend 1-1/4 inches maximum over the tread below.
 12. Treads shall be 11 inches deep minimum. Risers shall be 7 inches high maximum and 4 inches high minimum. All steps on a flight of stairs shall have uniform riser heights and uniform tread depths. Open risers are not permitted.
- B. Metal Jointing and Finish Quality Levels:
1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
 - a. Welded Joints: Continuously welded and ground smooth and flush.
 - b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
 - c. Exposed Edges and Corners: Eased to small uniform radius.

- d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.02 METAL STAIRS WITH CONCRETE TREADS

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Treads: Metal pan with field-installed concrete fill.
 - 1. Concrete Depth: 1-1/2 inches (38 mm), minimum.
 - 2. Tread Pan Material: Steel sheet.
 - 3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch (1.9 mm) minimum.
 - 4. Pan Anchorage to Stringers: Continuously welded, from top or bottom.
 - 5. Concrete Reinforcement: Welded wire mesh.
 - 6. Concrete Finish: Steel troweled.
- C. Risers:
 - 1. Material: Perforated steel, 16 gage, 1/2 inch round perforation on 11/16 inch staggered centers.
 - 2. Riser/Nosing Profile: Vertical riser with underside of nosing sloped up from bottom of tread pan at not less than 60 degrees from horizontal, with rounded top of nosing of minimum radius.
 - 3. Nosing Depth: Not more than 1-1/2 inch (38 mm) overhang.
 - 4. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch (12 mm) wide.
- D. Stringers: Steel tube.
 - 1. Stringer Depth: As indicated on drawings, minimum.
 - 2. End Closure: Sheet steel of same thickness as risers welded across ends.
- E. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- F. Finish: Shop- or factory-prime painted.
- G. Interior Stairs Finish: Shop- or factory-prime painted.
- H. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

2.03 MATERIALS

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.
- C. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
 - 1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
 - 2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

- D. Concrete Fill: Portland cement Type I, 3000 psi (20 MPa) 28 day strength, 2 to 3 inch (50 to 75 mm) slump.
- E. Concrete Reinforcement: Mesh type as detailed, galvanized.

2.04 ABRASIVE NOSINGS

- A. Provide materials obtained from only one manufacturer for nosings.
- B. Extruded Units: Aluminum units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Location: Metal stairs with concrete fill.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Safety Tread Co., Inc.; Type 24.
 - b. Balco, Inc.; H-255.
 - c. Wooster Products Inc.; Spectra WP-24.
 - d. Prior approved equal.
 - 3. Provide ribbed units, with abrasive filler strips projecting 1/16 inch above aluminum extrusion.
 - a. Provide solid-abrasive-type units without ribs.
 - b. Comply with State of California Title 24 Safety Strip requirements for the visually impaired.
 - c. Fabrication: Provide manufacturer's standard integral anchors for embedding units in concrete.
 - 1) Stair Nosing Lengths: One piece, stair width between railings.
 - 2) Concrete Pan Construction: Apply black asphaltic coating to concealed bottoms, sides, and edges.
- C. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- D. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.05 FASTENERS

- A. General: 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.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
 - 1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be galvanized.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), 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 F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.06 ACCESSORIES

- A. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- B. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and CAL-Green Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 1. CAL-Green Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
- C. Universal Primer:
 1. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
 2. Standard: FS TT-P-645.
 3. Compatible with finish paint system specified in Sections 099113 and 099123.
 4. Acceptable Products:
 - a. Dunn-Edwards Corporation; BRPR00-1 Bloc-Rust Premium, Interior / Exterior, Red Oxide or White, Waterborne Alkyd Rust Preventative Metal Primer.
 - b. Sherwin-Williams; S-W Pro Industrial ProCryl Universal Acrylic Primer, B66W310.
 - c. Tnemec; Series 115 Uni-Bond DF.
- D. Zinc-Rich Primer
 1. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance. Similar to galvanizing.
 2. Maximum Allowable Dry Time: 1 hour to touch; 12 hours to top coat.
 3. Pigment Content: Minimum 63% zinc in dry film by weight.
 4. Compatible with finish paint system specified in 099600.
 5. Acceptable Products:
 - a. Tnemec Co.; 94-H2O.

2.07 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
 1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.
 2. Number of Coats: One.
 3. Interior Stairs: Universal primer.
 4. Exterior Stairs: Zinc-rich primer.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on Drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

3.05 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.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

END OF SECTION 055100

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Free-standing railings and guardrails.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 055100 - Metal Stairs: Attachment plates for handrails specified in this section.
- C. Section 099123 - Interior Painting: Paint finish.
- D. Section 099600 - High-Performance Coatings: Paint finish.

1.03 REFERENCE STANDARDS

- A. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2013.
- B. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.

1.06 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.08 FIELD CONDITIONS

- A. If possible, design railings so that they do not have to fit other construction, and delete this article.
- B. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot (1095 N/m) applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See Drawings for configurations and heights.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
 - 2. For anchorage to stud walls, provide backing plates, for bolting anchors.
 - 3. Posts: Provide adjustable flanged brackets.
- G. Top of gripping surfaces of handrails shall be 34 inches minimum and 38 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces. Handrails shall be at a consistent height above such surfaces.
- H. Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-1/2 inches minimum. Handrail may be located in a recess if the recess is 3 inches maximum deep and 18 inches minimum clear above the top of the handrail.
- I. Handrail gripping surfaces shall be continuous along their length and shall not be
 - 1. obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20 percent of their length. Where provided, horizontal projections shall occur 1-1/2 inches minimum below the bottom of the handrail gripping surfaces .
- J. Handrail gripping surfaces with a circular cross section shall have an outside diameter of 1-1/2 inches minimum and 2 inches maximum.

- K. Handrail gripping surfaces with a non-circular cross section shall have an outside dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-sectional dimension of 2-1/4 inches maximum.
- L. Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive elements and shall have rounded edges.
- M. Handrails shall not rotate within their fittings.
- N. Handrail gripping surfaces shall extend beyond and in the same direction of stair flights and ramp runs in accordance with CBC Section 118-505.10. Such extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
- O. A 2 inch minimum high curb or a barrier shall be provided to prevent the passage of a 4 inch diameter sphere rolling off the sides of a ramp surface. Such a curb or a barrier shall be continuous and uninterrupted along the length of a ramp. CBC Section 11B-405.9.2.
- P. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

2.02 STEEL RAILING SYSTEM

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than required in Section 018114.
- B. Steel Tube: ASTM A500/A500M, Grade B cold-formed structural tubing.
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

2.03 FASTENERS

- A. General: Provide the following:
 - 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
 - 2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
 - 3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), 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 F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.04 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and CAL-Green Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 1. CAL-Green Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water.
- C. Zinc-Rich Primer
 1. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance.
 2. Maximum Allowable Dry Time: 1 hour to touch; 12 hours to top coat.
 3. Pigment Content: Minimum 63% zinc in dry film by weight.
 4. Compatible with finish paint system specified in 099600.
 5. Acceptable Products:
 - a. Tnemec Co.; 94-H2O.
 - b. Prior approved equal.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.05 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured.
- D. Welded Joints:
 1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 2. Interior Components: Continuously seal joined pieces by continuous welds.
 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

2.06 STEEL AND IRON FINISHES

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
 1. Number of Coats: One.

- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 1. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

PART 3 EXECUTION

3.01 EXAMINATION

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

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.
- F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

3.05 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

3.06 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 057013 - DECORATIVE METAL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Decorative mesh panels and support.

1.02 RELATED REQUIREMENTS

- A. Section 055000 - Metal Fabrications: Supports.
- B. Section 099600 - High-Performance Coatings - Finish coatings.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- F. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2015.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2012.
- H. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2010.
- I. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.
- J. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009.
- K. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength, Low Alloy, and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2013.
- L. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- M. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2010 w/Errata.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Schedule and conduct a preinstallation meeting one week before starting work of this section.

1. Attendees shall include, but not be limited to:
 - a. Contractor.
 - b. Architect.
 - c. Owner's representative.
 - d. Other subcontractors of adjacent work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.
- C. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
- D. Samples: Submit three of each item below for each type and condition shown.
 1. Each type of exposed metal: 12 inch by 12 inch (305 mm by 305 mm), illustrating color, thickness and edge condition.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in installing decorative metal and acceptable to manufacturer.
- B. Templates: Supply installation templates, reinforcing and required anchorage devices.

1.08 MOCK-UP

- A. Mock-Ups: Construct an example of each item specified. Locate mock-ups where directed. Mock-ups may remain as part of the work.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in factory provided protective coverings and packaging.
- B. Protect materials against damage during transit, delivery, storage, and installation at site.
- C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- D. Prior to installation, store materials and components under cover, in a dry location.

1.10 FIELD CONDITIONS

- A. Do not install decorative metal until project is enclosed and ambient temperature of space is minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C).
- B. Maintain ambient temperature of space at minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C) for 24 hours before, during, and after railing installation.

PART 2 PRODUCTS

2.01 DECORATIVE MESH

- A. Decorative Mesh : Steel.
 - 1. Basis of Design Product:
 - a. McNichols; 3150 Decorative Mesh Stainless Steel.
 - 1) Pattern: Techna.
 - 2. Percent Open Area: 74 percent.
 - 3. Frame: As indicated on Drawings.
 - 4. Fastening Devices: As indicated on Drawings.

2.02 MATERIALS

- A. General:
 - 1. Provide architecturally exposed metals free from surface blemishes in finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
 - 2. Provide architectural grade steel where exposed to view.
- B. Steel Components:
 - 1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
 - 2. Tubing: ASTM A500/A500M, Grade B cold-formed structural tubing.
 - 3. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
 - 4. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
 - a. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
 - b. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
 - 5. Bolts, Nuts, and Washers: ASTM A325 (ASTM A325M), Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
 - 6. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- C. Stainless Steel Components:
 - 1. ASTM A666, Type 304.
 - 2. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
 - 3. Stainless Steel Finish: No. 4 Brushed finish.

2.03 ACCESSORIES

- A. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete for bolting anchors.
 - 2. Exposed Fasteners: No exposed bolts or screws.
- B. Carbon Steel Bolts and Nuts: ASTM A307.
- C. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet current requirements for VOC (Volatile Organic Compounds) limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and CAL-Green Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 - 1. CAL-Green Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
- D. Zinc-Rich Primer
 - 1. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance. Similar to galvanizing.
 - 2. Maximum Allowable Dry Time: 1 hour to touch; 12 hours to top coat.
 - 3. Pigment Content: Minimum 63% zinc in dry film by weight.
 - 4. Compatible with finish paint system specified in 099600.
 - 5. Basis of Design Products:
 - a. Tnemec Company, Inc.: 94H20 Hydro-Zinc, 4.0 to 6.0 mils total dry film thickness.
 - b. Prior approved equal.
- E. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 0.015 inch (0.4 mm) dry film thickness per coat.
- F. Welding Electrodes and Filler Metal: Type and alloy of filler metal and electrodes as recommended by producer of metal to be welded, complying with applicable AWS specifications, and as required for color match, strength, and compatibility in fabricated items.

2.04 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Interior Aluminum Components: Type 304 stainless-steel fasteners.
 - 2. Copper-Alloy (Brass) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed; brass (Alloy 260 or Alloy 360) fasteners where exposed.
 - 3. Interior Stainless-Steel Components: Type 304 stainless-steel fasteners.
 - 4. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
 - 5. Dissimilar Metals: Type 304 stainless-steel fasteners.
- 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. 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 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.05 FABRICATION

- A. General:
 - 1. Form decorative metalwork to required shapes and sizes, with true curves, lines, and angles.
 - 2. Provide components in sizes and profiles indicated, but not less than required to comply with requirements for structural performance.
 - 3. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
 - 4. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
 - 5. Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending 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.
 - 6. 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
 - 7. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work.
 - a. Drill and tap for required fasteners.
 - b. Use concealed fasteners wherever possible.
 - 8. Comply with AWS for recommended practices in shop brazing. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
 - a. Where welding cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint and Type 2 Welds: completely sanded joint, some undercutting and pinholes okay.
 - 9. Joints:
 - a. Mill joints to tight, hairline fit.
 - b. Cope or miter corner joints.
 - c. Form joints exposed to weather to exclude water penetration.
 - 10. Provide castings sound and free of warp, cracks, blow holes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gatemarks, casting flash, and other casting marks.
 - 11. Finish exposed surfaces to smooth, sharp, well-defined lines and arrises.
 - 12. Assemble items 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. Use connections that maintain structural value of joined pieces.

B. Sheet Metal Work:

1. Provide materials selected for their surface flatness, smoothness and freedom from surface blemishes where exposed to view in the finished unit.
2. Do not use materials having exposed-to-view surfaces exhibiting pitting, seam marks, roller marks "oil canning", stains, discoloration or other imperfections.
3. Sheet Steel: Commercial quality cold-rolled carbon steel sheet as follows, unless otherwise indicated:
 - a. Zinc-coated Sheet Steel: ASTM A879, with Class C zinc coating; chemically treated in mill with phosphate solution and light chromate rinse.
 - b. Sheet Steel: ASTM A1008/A1008M, Class I, matte finish.
4. Provide Phillips flat-head or hex-head machine screws for exposed fasteners.
5. Form sheet metal items in maximum lengths with minimum joints.
6. Do not expose cut edges of sheet metal.
7. Fold back exposed ends of unsupported sheet metal to form 1/2 inch wide hem of concealed side or ease exposed edges with backing to radius of approximately 1/32 inch.
8. Form items with flat, flush surfaces, true to line and level, without cracking or grain separation at bends.
9. Install with fastener patterns indicated.

C. Shop Assembly: Preassemble items in shop to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1. Fasteners and Connections: Concealed.
2. Exterior Joints: Weathertight.
3. Formed or Bent Corners: 1/4 inch minimum radius.
4. Clips, Braces, and Miscellaneous Attachments: Hot-dip galvanized steel or aluminum.

2.06 EXPOSED ARCHITECTURAL STRUCTURAL STEEL

A. General:

1. Provide metals free from surface blemishes where exposed to view in finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, fabricator's name, or other imperfections on finished units are not acceptable.
2. Comply with applicable provisions of AISC "Code of Standard Practice", Section 10 "Architecturally Exposed Structural Steel (AESS)."
3. Provide Category 2 - High Profile Conditions that are out of reach to touch and can be viewed in close proximity within 20 feet or less.
4. Form architecturally exposed steel to required shapes and sizes, with true lines and angles.
5. Provide components in sizes and profiles indicated, but not less than required to comply with requirements for structural performance.
6. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work.
 - a. Drill and tap for required fasteners.
 - b. Use concealed fasteners wherever possible.
7. Comply with AWS for recommended practices in shop welding and brazing.

- a. Provide welds and brazes behind finished surfaces without distortion or discoloration of exposed side.
- b. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
- c. Grind exposed welds smooth with adjacent surfaces.
8. Joints: Mill joints to tight, hairline fit. Cope or miter corner joints.
9. Finish exposed surfaces to smooth, sharp, well-defined lines and arrises.
10. Assemble items 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. Use connections that maintain structural value of joined pieces.

2.07 FINISHES

- A. Finishes, General: Comply with NAAMM 500-06.
 1. Complete mechanical finishes before fabrication. After fabrication, finish joints, bends, abrasions and surface blemishes to match sheet.
 2. Protect mechanical finishes on exposed surfaces from damage.
 3. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
 4. Appearance: Limit variations in appearance of adjacent to one-half the range represented in approved samples. Noticeable variations in the same piece are not acceptable. Install components within the range of approved samples to minimize contrast.
- B. Steel Finishes:
 1. Surface Preparation: Comply with SSPC-SP 1; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust from uncoated steel; comply with SSPC-SP 5.
 2. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.
 3. Factory Prime: Apply shop primer to prepared surfaces of items where field painting after installation indicated, unless indicated otherwise..
- C. Stainless Steel Finishes:
 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 2. Type MT-3: Polished Finishes: Comply with NAAMM AMP 500-06; grind and polish surfaces to uniform finish free of cross scratches. Run grain of directional finishes with long dimension of each item.
 - a. Directional Satin: No. 4.
 3. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
- B. Verify field dimensions of locations and areas to receive work.
- C. Notify Architect immediately of conditions that would prevent satisfactory installation.

- D. Do not proceed with work until detrimental conditions have been corrected.
- E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates and supports for attachment of anchors.

3.02 PREPARATION

- A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions and directions for installation of anchorages and fasteners.
- B. Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions, and directions for installing items having integral anchors that are to be embedded in concrete or masonry construction.
- C. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.03 INSTALLATION

- A. Comply with manufacturer's drawings and written instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.
- C. Provide anchorage devices and fasteners where necessary for securing decorative metal items to in place construction.
 - 1. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- E. Perform cutting, drilling, and fitting required to install decorative metalwork.
- F. Set products accurately in location, alignment, and elevation, plumb, level, and true, measured from established lines and levels.
- G. Fit exposed connections to form tight, hairline joints or, where indicated, with uniform reveals and spaces for sealants and joint fillers.
- H. Restore finishes to eliminate evidence of cutting, welding, and grinding.
- I. Do not cut or abrade finishes that cannot be completely restored in field. Return such items to shop for required alterations, followed by complete refinishing, or provide new units.
- J. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses, to make work weatherproof, soundproof, or lightproof where necessary for proper performance.
- K. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
- L. Retain protective coverings intact and remove simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.

- M. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal-arc welding, for appearance and quality of welds made, and for methods used in correcting welding work.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations.
 - 2. Grind exposed welded joints smooth and restore finish to match finish of adjacent surfaces.
- N. Weld connections that cannot be shop welded due to size limitations.
 - 1. Weld in accordance with AWS D1.1/D1.1M.
 - 2. Match shop welding and bolting.
 - 3. Clean welds, bolted connections and abraded areas.
 - 4. Touch up shop primer and factory applied finishes.
 - 5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.
- O. Isolate dissimilar materials with bituminous coating, bushings, grommets or washers to prevent electrolytic corrosion.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/16 inch (1.58 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/16 inch (1.58 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

3.05 ADJUSTING

- A. Touchup Finishing: Immediately after erection, clean abraded areas and refinish to match adjacent exposed areas with same material.

3.06 CLEANING

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.
- C. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.07 PROTECTION

- A. Protect installed components and finishes from damage after installation.
- B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
 - 1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION 057013

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 057300 - DECORATIVE METAL RAILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Railing and guardrail assemblies.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 055000 - Metal Fabrications: Supports.
- C. Section 099600 - High-Performance Coatings - Finish coatings.

1.03 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2010.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2011a.
- C. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- D. AWS D1.6 - Structural Welding Code - Stainless Steel; 1999.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Review and coordinate setting drawings, shop drawings, templates, and instructions for installation of related items to be embedded in concrete and masonry.
- B. Pre-Installation Meeting: Schedule and conduct a preinstallation meeting one week before starting work of this Section.
 - 1. Convene under general provisions of Section 017000.
 - 2. Require attendance by the following:
 - a. Contractor.
 - b. Architect.
 - c. Owner's representative.
 - d. Other subcontractors of adjacent work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data including description of materials, components, finishes, fabrication details, infill, anchors, and accessories.
- C. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in installing glazed railing systems and approved by manufacturer.

1.08 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 014000.
- B. Mock-up: Construct a railing of each type specified.
 - 1. Locate where directed.
 - 2. Mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver railing materials in factory provided protective coverings and packaging.
- B. Protect railing materials against damage during transit, delivery, storage, and installation at site.
- C. Inspect railing materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- D. Prior to installation, store materials and components under cover, in a dry location.

1.10 FIELD CONDITIONS

- A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C).
- B. Maintain ambient temperature of space at minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C) for 24 hours before, during, and after railing installation.

1.11 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Warranty: Manufacturer's standard one year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers:
 - 1. Handrail Design Inc.; Circum: www.handrail-design.com.
 - 2. Prior approved equal.

2.02 RAILING SYSTEMS

- A. Design and fabricate railing and handrails in accordance with California Building Code 11B-505.
 - 1. Top of gripping surfaces of handrails shall be 34 inches minimum and 38 inches maximum vertically above walking surfaces, stair nosings, and ramp surfaces. Handrails shall be at a consistent height above such surfaces.
 - 2. Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-1/2 inches minimum. Handrail may be located in a recess if the recess is 3 inches maximum deep and 18 inches minimum clear above the top of the handrail.
 - 3. Handrail gripping surfaces shall be continuous along their length and shall not be obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20 percent of their length. Where provided, horizontal projections shall occur 1-1/2 inches minimum below the bottom of the handrail gripping surfaces.
 - 4. Handrail gripping surfaces with a circular cross section shall have an outside diameter of 1-1/4 inches minimum and 2 inch maximum.
 - 5. Handrail gripping surfaces with a non-circular cross section shall have an outside dimension of 4 inches minimum and 6-1/4 inches maximum, and a cross-sectional dimension of 2-1/4 inches maximum.
 - 6. Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive elements and shall have rounded edges.
 - 7. Handrails shall not rotate within their fittings.
 - 8. Handrail gripping surfaces shall extend beyond and in the same direction of stair flights and ramp runs in accordance with CBC Section 11B-505.10. Such extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
 - 9. A 2 inch minimum high curb or a barrier shall be provided to prevent the passage of a 4 inch diameter sphere rolling off the sides of a ramp surface. Such a curb or a barrier shall be continuous and uninterrupted along the length of a ramp. CBC Section 11B-405.9.2.
- B. Railings - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
 - 1. Design Criteria: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
 - a. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 50 pounds per linear foot (730 N/m) applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.

- b. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.
 - c. Allow for expansion and contraction of members and building movement without damage to connections or members.
 - d. Concentrated Loads on Intermediate Rails: 50 pounds per square ft (0.22 per sq m), minimum.
 - e. AWS D1.6 - Structural Welding Code - Stainless Steel; 1999.
 2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
 3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
 4. Field Connections: Provide sleeves to accommodate site assembly and installation.
 5. Welded and Brazed Joints: Make exposed joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
 - a. Ease exposed edges to small uniform radius.
 - b. Welded Joints:
 - 1) Carbon Steel: Perform welding in accordance with AWS D 1.1/D1.1M.
 - 2) Stainless Steel: Perform welding in accordance with AWS D 1.6.
 - C. Dimensions: Refer to drawings for configurations and heights.
 - D. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - E. Post Railing System: Engineered, post supported railing system with mesh infill panels.
 1. Configuration and Size: As indicated on Drawings.
 2. Posts: Round, stainless steel tube, 1.9 inch diameter by 0.14 inch wall thickness.
 3. Rails: Stainless steel tube, 1-1/2 inch diameter by 0.145 inch wall thickness.
 4. Rail With LED Light Strip Inserts : Stainless steel tube, 1-1/2 inch diameter by 0.15 inch wall thickness.
 5. Infill Support Tubes: Rectangular, continuous 1/2 by 1.5 inch stainless steel tube.
 6. Infill: Woven-wire mesh (DM-1):
 - a. Product: McNichols; 3150 Decorative Mesh Stainless Steel.
 - 1) Pattern: Techna.
 - 2) Percent Open Area: 74 percent.
 7. Handrail: Stainless steel tube, 1-1/2 inch diameter by 0.145 inch wall thickness.
 8. Handrail Brackets:
 - a. Same metal as railing.
- 2.03 MATERIALS
- A. Stainless Steel Components:
 1. ASTM A666, Type 304.
 2. Tubing: ASTM A 554, Grade MT 304.
 3. Sheet, Strip, Plate, and Flat Bar: ASTM A 666 or ASTM A 240/A 240M, Type 304.
 4. Bars and Shapes: ASTM A 276, Type 304.

2.04 ACCESSORIES

- A. LED Lighting Inserts: LED light with beam spread of 45 degrees to 90 degrees, or asymmetrical beam spread of 28 degrees and 65 degrees off nadir.
 - 1. Standard clear lens.
 - 2. Light output at 42 inch guard height, lumens per ft as indicated, ranging from 36.8 to 616 lumens per ft dependent on standard or high output and symmetrical or asymmetrical.
 - 3. Color temperature as indicated, ranging from 2700K (Kelvin) to 6500K, dependent on lumens per ft and beam spread required.
 - 4. Electrical supply for LED strip inserts to be 120-277Volt supply for 24 volt remote power supply. (Power supply range 20-240watts), refer to Division 26.
 - 5. Transition sleeves for intermediate supports, backing strips for LED light strips, slotted tube inserts and mounting clips by HDI provided as required.
 - 6. Power supply low voltage dimmers available.
- B. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete for bolting anchors.
 - 2. For anchorage to stud walls, provide backing plates for bolting anchors.
- C. Sealant: As specified in Section 079200 - Joint Sealants.

2.05 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Components: Type 304 stainless-steel fasteners.
- 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. ICC-ES AC193 is for mechanical anchors and ICC-ES AC308 is for adhesive anchors.
- 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 or ICC-ES AC308.
 - 1. Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.06 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to 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.

2.07 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. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. 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.
- H. Form changes in direction as follows:
 - 1. As detailed.
- I. Close exposed ends of hollow railing members with prefabricated end fittings.
- J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work where 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.
- K. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.08 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- B. 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.

- C. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.09 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: 240 grain/grit finish.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
- B. Verify field dimensions of locations and areas to receive work.
- C. Notify Architect immediately of conditions that would prevent satisfactory installation.
- D. Do not proceed with work until detrimental conditions have been corrected.
- E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates and supports for attachment of anchors.

3.02 PREPARATION

- A. Protect existing work.
- B. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions and directions for installation of anchorages and fasteners.
- C. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.03 INSTALLATION

- A. Comply with manufacturer's drawings and written instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- E. Isolate dissimilar materials with bituminous coating, bushings, grommets or washers to prevent electrolytic corrosion.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

3.05 CLEANING

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents or other substances that may damage the material or finish.

3.06 PROTECTION

- A. Protect installed components and finishes from damage after installation.
 - 1. Remove at substantial completion.
- B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
 - 1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION 057300

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Wood blocking and nailers at roof.
 - 2. Plywood backing panels.
- B. Related Requirements:
 - 1. Section 018114 - Sustainable Design Requirements - CAL-Green.

1.02 DEFINITIONS

- A. Blocking: Wood used for blocking and nailers at roof level.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NLGA: National Lumber Grades Authority.
 - 2. WCLIB: West Coast Lumber Inspection Bureau.
 - 3. WWPA: Western Wood Products Association.

1.03 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 3. 5.504.4.5 Formaldehyde Limit requirements.

1.04 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

2.01 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. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.02 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying 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 E 84, 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 beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.03 DIMENSION LUMBER FRAMING

- A. Framing: Construction or No. 2
 - 1. Douglas fir-larch; WCLIB or WWPA.

2.04 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction at the roof level, including the following:
 - 1. Blocking.
 - 2. Nailers.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and any of the following species:
 - 1. Douglas fir-larch; WCLIB or WWPA.
 - 2. Hem-fir; WCLIB or WWPA.
- C. 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.

2.05 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
Fire-treated.
 - 1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 2. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with CAL-Green Table 5.504.4.5 - Formaldehyde Limits requirements.

2.06 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 of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Metal Framing: ASTM C 1513, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.07 METAL FRAMING ANCHORS

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- B. Hot-Dip Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
 - 1. Use for exterior locations and where indicated.

2.08 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 3. Adhesives and sealants shall meet or exceed the VOC and chemical component limits of SCAQMD Rule 1168, CAL-Green Table 5.504.4.1 Adhesive VOC Limit, and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
 - a. Current requirement refers to the date on which the materials are installed in the building.
 - b. A copy of SCAQMD Rule #1168 is referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. 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.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. 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 o.c.
- G. Sort and select lumber so that natural characteristics will 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.

- H. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- I. 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.

3.02 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.03 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring horizontally and vertically at 24 inches (600 mm) o.c.

3.04 PROTECTION

- A. 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 061053

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 061643 - GYPSUM SHEATHING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Gypsum sheathing.
- B. Sheathing joint and penetration treatment.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.

1.03 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 3. 5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. 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

2.01 CONSTRUCTION PANELS

- A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, square long edges, 5/8 inch Type X fire-resistant (16 mm Type X fire-resistant).
 - 1. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly.
 - 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia-Pacific Building Products; Dens-Glass Sheathing.
 - b. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
 - c. Temple-Inland Building Products by Georgia-Pacific; GreenGlass Exterior Sheathing.
 - d. United States Gypsum Co.; Securock.

2.02 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. 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, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

- a. For steel framing less than 0.0329 inch (0.835 mm) thick, use screws that comply with ASTM C 1002.
- b. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C 954.

2.03 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealants shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
- B. Sealant at Glass Fiber Faced Gypsum Sheathing: Silicone-General Purpose (Designation S GP): ASTM C920, Type S, Grade NS:
 1. Class: 50. Joint movement range without cohesive/adhesive failure: Plus 50 percent to minus 50 percent of joint width.
 2. Uses: NT, M, G, A, O
 3. Low modulus, single component, neutral curing, non-staining, non-bleeding silicone sealant.
 4. Color: Manufacturer standard.
 5. Acceptable Products:
 - a. Dow Corning; 795.
 - b. General Electric; Silpruf.
 - c. Rhone-Poulenc, Inc.; Rhodorsil 5C.
- C. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, 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.
- D. Sheathing Tape: Self-adhering rubberized asphalt tape.
 1. Capable of being applied at temperature of 25 degrees F.
 2. Thickness: 30 mils.
 3. Permeance: 0.1 perms.
 4. Puncture Resistance: ASTM E514, 40 pounds-force, minimum.
 5. Tensile Strength of Membrane: ASTM D412, 600 PSI, minimum.
 6. Pliability: 180 degree bend over 1 inch at 25 degrees F.
 7. Primer: Manufacturer's required surface primer.
 8. Acceptable Products and Manufacturers:
 - a. Carlisle Coatings and Waterproofing; CCW MiraDRI 400VB Air/Vapor Barrier.
 - b. Grace Construction Products; Perm-A-Barrier Wall Membrane.
 - c. Henry Company; Henry Blueskin SA.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.

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

3.02 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.

3.03 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 1. Fasten gypsum sheathing to wood framing with screws.
 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.

3.04 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 017419.
 1. Comply with applicable regulations.
 2. Do not burn scrap on project site.

END OF SECTION 061643

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 062023 - INTERIOR FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Finish carpentry items.
- B. Hardware and attachment accessories.

1.02 REFERENCE STANDARDS

- A. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.
- C. AWI (AWS) - Architectural Woodwork Standards; 2009.
- D. WI/AWMAC (NAAWS) - North American Architectural Woodwork Standards - 3.0; 2016.
- E. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; National Hardwood Lumber Association; 2011.
- F. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/certification.
- G. WI (MCP) - Monitored Compliance Program (MCP); current edition at www.woodworkinstitute.com/certification.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.
- B. Sequencing: Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

1.04 SUBMITTALS

- A. See Section Administrative Requirements for submittal procedures.
- B. Product Data:
 - 1. Provide data on fire retardant treatment materials and application instructions.
 - 2. ~~Provide instructions for attachment hardware and finish hardware.~~
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot (1:8).
 - 2. Provide the information required by WI/AWMAC (NAAWS).
 - 3. Include certification program label.
- D. Samples: Submit three samples of wood trim 12 inch (305 mm) long.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 6. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this Section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
 - 3. Single Source Responsibility: Provide and install this work from single fabricator.
- B. Installer Qualifications: Fabricator of products and Licensee of WI's Certified Compliance Program.
- C. Fabrication and Installation Standards: Fabricate and install in accordance with North American Architectural Woodwork Standards – 3.0, as listed below.
 - 1. Lumber grades: WI/AWMAC (NAAWS) Section 3.
 - 2. Standing and running trim: WI/AWMAC (NAAWS) Section 6.
- D. Quality Certification: Provide WI Certified Compliance Program (CCP) inspection report and quality certification of completed work.
 - 1. Provide labels or certificates indicating that the work complies with requirements of AWS Grade or Grades specified.
 - 2. Prior to delivery to the site provide shop drawings with certification labels.
 - 3. Provide labels on each product when required by certification program.
 - 4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
 - 5. Arrange and pay for inspections required for certification.
 - 6. Replace, repair, or rework all work for which certification is refused.

1.07 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 01 4000.
- B. Mock-up wood wall base include splice, outside corner, and inside corner.
- C. Mock up one Living Unit of each type of finish carpentry item.
 - 1. Locate where directed.

2. Mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces.
- B. Store finish carpentry items in installation areas. If finish carpentry items must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.
- C. Stack lumber and provide for adequate air circulation within and around stacks and under temporary coverings.
- D. Protect work from moisture damage prior to installation.

1.09 ENVIRONMENTAL CONDITIONS

- A. Comply with specified standard and as additionally specified.
- B. Do not deliver finish carpentry items until environmental conditions meet specified requirements for installation areas.
- C. Do not deliver or install finish carpentry items until building is enclosed and weatherproof, wet work in installation areas is complete and nominally dry, and building's environmental control systems are operating and will maintain temperature and relative humidity at designed occupancy levels throughout the remainder of the construction period.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

- A. Refer to Finish Schedule for selected products and finishes.
- B. Quality Grade: Unless otherwise indicated provide products of quality specified by WI/AWMAC (NAAWS) for Custom Grade.
- C. Interior Woodwork Items:
 1. Moldings, Bases, and Miscellaneous Trim : Hardwood; prepare for transparent finish.
 - a. Species: Species as indicated on Finish Schedule.
 - b. Miscellaneous Running and Standing Trim: As indicated on Drawings.

2.02 LUMBER MATERIALS

- A. Hardwood Lumber and Trim: Species as indicated on Finish Schedule species, heartwood only (sapwood not permitted), maximum moisture content of 11 percent according to ASTM D4442; with; with vertical grain.
 1. Grade WI/AWMAC (NAAWS) Custom grade.
 2. Cut: Plain sliced
 3. Finish: As indicated on Finish Schedule
 4. Grading: In accordance with NHLA Grading Rules; www.natlhardwood.org.

2.03 FASTENINGS

- A. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.

1. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
2. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and CAL-Green Table 5.504.4.1 Adhesive VOC Limit requirements.

B. Fasteners: Of size and type to suit application; no finish.

C. Concealed Joint Fasteners: Threaded steel.

2.04 ACCESSORIES

A. Wood Filler: Solvent base, tinted to match surface finish color.

2.05 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

2.06 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. Apply wood filler in exposed nail and screw indentations.

C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.

D. Finish work in accordance with AWI (AWS), Section 5 - Finishing for Grade specified and as follows:

1. Transparent:
 - a. System - 11, Polyurethane, Catalyzed.
 - b. Stain: As selected by Architect.
 - c. Sheen: Satin.

E. Prime paint.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

C. See Section 061053 Miscellaneous Rough Carpentry for installation of wood blocking.

3.02 INSTALLATION

A. Install work in accordance with WI/AWMAC (NAAWS) requirements for grade indicated.

B. Set and secure materials and components in place, plumb and level.

- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.
- D. Install components with finish nails at maximum 8 inch (203 mm) on center.
- E. Install finish carpentry items with minimum number of joints practical, using full length pieces from maximum lengths of lumber available. Do not use individual pieces less than 24 inches long, except where necessary.
 - 1. Stagger joints in adjacent and related standing and running trim.
 - 2. Cope at returns and miter at corners to produce tight-fitting joints with full surface contact throughout the length of joints.
 - 3. Use scarf joints at end-to-end joints.
 - 4. Plane back surfaces of casings as required to provide uniform thickness and flush finished surfaces across joints.
 - 5. Match color and grain across joints.
- F. Install trim after finishing of substrate surfaces is complete.
- G. Pre-drill pilot holes in hardwood carpentry items before fastening to prevent splitting. Securely fasten to prevent warping or movement.
- H. Install prefinished paneling with full bed contact adhesive applied to substrate.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

3.04 PROTECTION

- A. Protect installed finish carpentry items from damage due to subsequent construction operations.

END OF SECTION 062023

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Cabinet hardware.
- C. Preparation for installing utilities.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 061053 - Miscellaneous Rough Carpentry.
- C. Section 123600 - Countertops: Countertops for casework.

1.03 REFERENCE STANDARDS

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2009.
- B. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.
- C. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/certification.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Field verify critical dimensions and clearances prior to fabrication of casework items; assure that field conditions are as required to comply with indicated design requirements.
 - 2. By accurate field measurements before being enclosed, verify locations of concealed framing, blocking, reinforcements, and furring that support woodwork; record measurements on shop drawings.
 - 3. Coordinate construction to ensure that actual dimensions correspond to established required dimensions.
- B. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this Section; require attendance by all affected installers.
 - 1. Agenda:
 - a. Discuss and agree upon acceptable delivery, storage, and handling, environmental conditions, preparatory work, and methods of installation.
 - b. Review coordination and environmental controls required for proper installation and ambient temperature and humidity conditioning in areas to receive woodwork.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot (1:8).
 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural wood cabinets.
 4. Show plastic laminate with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
 5. Apply WI Certified Compliance Program label to Shop Drawings.
 6. Provide the information required by AWI/AWMA/ WI Architectural Woodwork Standards (AWS).
 7. Shop drawings are required to be generated as separate digital drawings specific to this Project, not utilizing Architect's digital drawing files in any manner.
 8. Show all adjacent construction including abutting walls, columns and similar elements affecting casework installation.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches (300 mm) square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.
- F. Samples for Verification:
1. Plastic laminates, 12 by 12 inches (300 by 300 mm), for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
 2. Wood-grain plastic laminates, 12 by 24 inches (300 by 600 mm), for each type, pattern and surface finish, with one sample applied to core material and specified edge material applied to one edge.
 3. Thermoset decorative panels, 8 by 10 inches (200 by 250 mm), for each color, pattern, and surface finish, with edge banding on one edge.
 4. ~~Corner pieces as follows:~~
 - a. ~~Cabinet front frame joints between stiles and rails, as well as 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.~~
 5. Exposed cabinet hardware and accessories, one unit for each type[and finish].
- G. Informational Submittals
1. Qualification Data: For installer.
 2. Product Certificates: For each type of product.
 - a. Composite wood and agrifiber products.
 - b. Thermoset decorative panels.
 - c. Adhesives.
 3. Woodwork Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.
- H. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 6. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Installer Qualifications: Fabricator of products and Licensee of WI's Certified Compliance Program.
- C. Quality Certification: Provide WI Monitored Compliance Program (MCP) inspection report and quality certification of completed work.
 - 1. Provide labels or certificates indicating that the work complies with requirements of AWS Grade or Grades specified.
 - 2. Prior to delivery to the site provide shop drawings with certification labels.
 - 3. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
 - 4. Arrange and pay for inspections required for certification.
 - 5. Replace, repair, or rework all work for which certification is refused.
- D. Fabrication and Installation Standards: Fabricate and install in accordance with Architectural Woodwork Standards, Edition 2 as listed below.
 - 1. Lumber grades: AWS Section 3.
 - 2. Panel products: AWS Section 4.
 - 3. Casework: AWS Section 10.
- E. Woodwork Certification:
 - 1. Millwork, casework and cabinetwork shall be manufactured in accordance with standards established in the Architectural Woodwork Standards, Latest Edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada, in grade or grades herein specified or as shown on Drawings.

2. Before delivery to jobsite, woodwork supplier shall submit Woodwork Institute Certified Compliance Certificate indicating millwork products being supplied and certifying that products fully meet the requirements of Grade or Grades specified.
3. Each elevation of casework, each laminated plastic top, and each solid surface top shall bear Woodwork Institute Certified Compliance Label.
4. At completion of installation, woodwork installer shall provide Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
5. All fees charged by the Woodwork Institute for their Certified Compliance program are responsibility of millwork manufacturer and/or installer and shall be included in their bid.
6. The foregoing shall not be construed to limit power and authority of Owner to reject any millwork which does not in Owner's opinion meet with any one or more of the specifications of this Contract.

1.08 ~~MOCK UP~~

- A. ~~Comply with general mock-up requirements specified in Section 014000.~~
- B. ~~Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.~~
 1. ~~Locate where directed.~~
 2. ~~Mock-up may remain as part of the Work.~~

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver casework items to installation areas only after clean, well ventilated, and temperature-controlled installation areas are available. Do not deliver casework items to installation areas until painting and similar operations are complete in those areas.
- B. Protect units from moisture and impact damage during transit, delivery, and storage; use protective covers during delivery, storage, and handling operations..

1.10 ENVIRONMENTAL CONDITIONS

- A. Environmental Limitations: 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. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
- 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, and indicate measurements on Shop Drawings.

1.11 WARRANTY

- A. Furnish warranty with provisions for repairing or replacing, at no additional cost to Owner, architectural woodwork items that exhibit defects in material or workmanship for 2 years.

PART 2 PRODUCTS

2.01 CABINETS

- A. Operable parts for all accessible casework shall comply with CBC Section 11B-309.
- B. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards (AWS) for Custom Grade.
 - 1. Provide certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
 - 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

2.02 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Refer to Finish Schedule for selected products and finishes
- B. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
 - 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
- C. Grade: Premium.
- D. Type of Construction: Frameless.
- E. Cabinet and Door and Drawer Front Interface Style: Flush overlay.
- F. Case: Plywood with plastic laminate.
- G. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
- H. Drawer Bottoms: Thermoset decorative panels.
- I. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- 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 or glued dovetail joints.
- 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. Refer to Finish Schedule for selected products.

2.03 LAMINATE MATERIALS

- A. Provide specific types as follows:
1. Horizontal Surfaces: HGS, 0.048 inch (1.22 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 2. Vertical Surfaces: HGS, 0.048 inch (1.22 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch (1.0 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 4. Post-Formed Vertical Surfaces: VGP, 0.028 inch (0.71 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 5. Semiexposed Surfaces: VGS, 0.028 inch (0.71 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 6. Cabinet Liner: CLS, 0.020 inch (0.51 mm) nominal thickness, through color, colors as scheduled, finish as scheduled.
 7. Laminate Backer: BKL, 0.020 inch (0.51 mm) nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.
 8. Edges: Grade HGS.
 - a. Semiexposed Surfaces: PVC T-mold matching laminate in color, pattern, and finish.
 - b. Edges of Thermoset Decorative Panel Shelves: PVC T-mold matching laminate in color, pattern, and finish.
 9. Pattern Direction: Vertically for drawer fronts, doors, and fixed panels.

2.04 COUNTERTOPS

- A. Countertops: Specified in Section 123600.

2.05 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.
 2. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
 2. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 3. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with CAL-Green Table 5.504.4.5 - Formaldehyde Limit requirements.
 4. Medium-Density Fiberboard: ANSI A208.2, Grade 130 and made with binder containing no urea formaldehyde.
 5. Softwood Plywood: DOC PS 1.

2.06 ACCESSORIES

- A. Adhesive: Type recommended by WI to suit application.
 - 1. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 2. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and CAL-Green Table 5.504.4.1 Adhesive VOC Limit requirements.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.07 HARDWARE

- A. Adjustable Shelf Supports - Type B: Standard back-mounted system using surface mounted metal shelf standards and coordinated cantilevered shelf brackets, stainless steel finish, for nominal 1 inch (25 mm) spacing adjustments.
 - 1. Product: Series 87 SS manufactured by Knape & Vogt.
- B. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.
- C. Drawer and Door Pulls: "U" shaped wire pull, steel with satin finish, 4 inch centers ("U" shaped wire pull, steel with satin finish, 100 mm centers).
- D. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
- E. Drawer Slides
 - 1. Type: Full extension, self-closing.
 - 2. Static Load Capacity: Commercial grade.
 - a. For drawers not more than 3 inches (75 mm) high and not more than 24 inches (600 mm) wide, provide Grade 2.
 - b. For drawers more than 3 inches (75 mm) high but not more than 6 inches (150 mm) high and not more than 24 inches (600 mm) wide, provide Grade 1.
 - c. For drawers more than 6 inches (150 mm) high or more than 24 inches (600 mm) wide, provide Grade 1HD-200.
 - d. For computer keyboard shelves, provide Grade 1HD-100
 - 3. Mounting: Bottom mounted.
 - 4. Stops: Integral type.
 - 5. Features: Provide self closing/stay closed type.
 - 6. Acceptable Manufacturers:
 - a. Accuride International, Inc.: www accuride.com.
 - b. Accuride International, Inc.: www accuride.com.
 - c. Grass America Inc.: www grassusa.com.

- d. Hettich America, LP: www.hettichamerica.com.
 - e. Knappe & Vogt Manufacturing Company: www.knappeandvogt.com.
 - f. Prior approved equal.
- F. Standard Hinges: European style concealed, self-closing type, steel with satin finish.
- 1. Opening: 170 degrees of opening, self-closing.
 - 2. Acceptable Manufacturers:
 - a. Grass America Inc.: www.grassusa.com.
 - b. Hardware Resources: www.hardwareresources.com.
 - c. Hettich America, LP: www.hettichamerica.com.
 - d. Julius Blum, Inc.: www.blum.com.
 - e. Prior approved equal.

2.08 FABRICATION

- A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets: 1/16 inch (1.5 mm) unless otherwise indicated.
- B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements 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.
- D. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- E. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this Section.
- C. Verify critical clearances and dimensions prior to installation of casework items.

3.02 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
 - 1. Condition cabinets to humidity conditions 72 hours minimum.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.03 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop
- C. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- D. Use fixture attachments in concealed locations for wall mounted components.
- E. Use concealed joint fasteners to align and secure adjoining cabinet units.
- F. Maximum filler panel width: 2 inches.
- G. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (1 mm). Do not use additional overlay trim for this purpose.
- H. Secure cabinets, counter bases, and other casework to floor using appropriate angles and anchorages.
- I. Secure full height cabinets, shelving units, and similar casework items exceeding 60 inches in height to floor using appropriate angles and anchorages
- J. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- K. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Provide fabricator's standard concealed fasteners.
- L. Site glaze glass materials using the interior dry method specified in Section 088000.

3.04 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.
- C. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

3.05 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.06 PROTECTION

- A. Protect installed casework items from damage due to subsequent construction operations.

END OF SECTION 064116

SECTION 064221 - PHENOLIC PANELING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Custom phenolic paneling.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 061000 - Rough Carpentry: Grounds and concealed blocking.

1.03 REFERENCE STANDARDS

- A. ANSI A208.1 - American National Standard for Particleboard; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- D. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/services.
- E. WI (MCP) - Monitored Compliance Program (MCP); current edition at www.woodworkinstitute.com/services.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fire retardant treatment materials and application instructions.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot (1:8).
 - 2. Include plan of panel number sequencing.
 - 3. Provide the information required by AWI/AWMAC/WI (AWS).
 - 4. Include certification program label.
- D. Samples for Initial Selection.
- E. Samples: Submit actual sample items of proposed trim, demonstrating hardware design, quality, and finish.
- F. Samples for Verification:

1. Phenolic panels, not less than full width by 12 inches (300 mm) long, for each type and finish, finished on one side and one edge.

G. Informational Submittals

1. Qualification Data: For installer and fabricator.
2. Product Certificates: For each type of product.
 - a. Composite wood and agrifiber products.
 - b. Phenolic panels.
 - c. Adhesives.
3. Woodwork Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 4. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 5. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.
- C. Installer Qualifications: Licensee of WI's Certified Compliance Program.
- D. Quality Certification: Provide WI (CCP) inspection report and quality certification of completed work.
1. Provide labels or certificates indicating that the work complies with requirements of AWI/AWMAC/WI (AWS) Grade or Grades specified.
 2. Prior to delivery to the site provide shop drawings with certification labels.
 3. Provide labels on each product when required by certification program.
 4. Upon completion of installation provide certificate certifying that the installation and products meet the specified requirements.
 5. Arrange and pay for inspections required for certification.
 6. Replace, repair, or rework all work for which certification is refused.
- E. Fabrication and Installation Standards: Fabricate and install in accordance with Architectural Woodwork Standards, Edition 2 as listed below.

1. Lumber grades: AWS Section 3.
2. Panel products: AWS Section 4.
3. Wall Surfacing: AWS Section 8.

F. Woodwork Certification:

1. Millwork, casework and cabinetwork shall be manufactured in accordance with standards established in the Architectural Woodwork Standards, Latest Edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada, in grade or grades herein specified or as shown on Drawings.
2. Before delivery to jobsite, woodwork supplier shall submit Woodwork Institute Certified Compliance Certificate indicating millwork products being supplied and certifying that products fully meet the requirements of Grade or Grades specified.
3. Each elevation of casework, each laminated plastic top, and each solid surface top shall bear Woodwork Institute Certified Compliance Label.
4. At completion of installation, woodwork installer shall provide Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.
5. All fees charged by the Woodwork Institute for their Certified Compliance program are responsibility of millwork manufacturer and/or installer and shall be included in their bid.
6. The foregoing shall not be construed to limit power and authority of Owner to reject any millwork which does not in Owner's opinion meet with any one or more of the specifications of this Contract.

1.08 REGULATORY REQUIREMENTS

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

1.09 ~~MOCK UP~~

- A. ~~Comply with general mock-up requirements specified in Section 014000.~~
- B. ~~Construct mock-up, 10 feet (3 m) long by full height, illustrating full panel sheet, edge trim, joint trim, applied finish.~~
 1. ~~Locate where directed.~~
 2. ~~Mock-up may remain as part of the Work.~~

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protect work from moisture damage.

1.11 FIELD CONDITIONS

- A. Environmental Limitations: 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 25 and 55 percent during the remainder of the construction period.
- B. 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 and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.01 PANELING

- A. Refer to Finish Schedule for selected products.
- B. Quality Level: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Custom Grade.
- C. Flat Paneling:
 1. Panels: Veneer of selectively reduced center-balance matched.
 - a. Panels more than one leaf high; Center-balanced end matching.
 - b. All panels in an single area; Sequence matched uniform size sets and doors and other components.
 - c. Matching of Adjacent Veneer Leaves: Book match.
 2. Visible Edges and Reveals: As indicated on the Drawings.
 3. Outside Corners: Mitered and splined.
- D. Panel-Matching Method: Made-to-order, sequence-matched panels within each separate area.
- E. Panel Reveals: As indicated on Drawings.
- F. Assemble panels by gluing and concealed fastening.

2.02 WOOD-BASED MATERIALS - GENERAL

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
 1. Wood Moisture Content: 5 to 10 percent.
- B. Coatings, Primers, and Adhesives: Comply with urea-formaldehyde prohibition, adhesives and sealants, and VOC limitations product requirements specified in Section 033543.
- C. Phenolic Core Panels: Solid phenolic core with multiple resin-impregnated kraft, color, and melamine surface sheets fused at high temperature and pressure to form a homogeneous, non-delaminating panel, with colored/patterned faces and black edges; stain resistant to domestic chemicals and cleaners.

2.03 ADHESIVES AND FASTENERS

- A. Adhesives: Type suitable for intended purpose, complying with applicable air quality regulations.
 1. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and Cal GREEN Table 5.504.4.1 Adhesive VOC Limit requirements.
- B. Fasteners: Of size and type to suit application; stainless steel (No. 4) finish in exposed locations.

- C. 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.
- D. Concealed Joint Fasteners: Threaded steel.

2.04 ACCESSORIES

- A. Lumber for Shimming, Blocking: Softwood lumber specified in Section 061053.
- B. Wood Filler: Tinted to match surface finish color.
- C. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- D. Concealed Panel-Hanger Clips: Aluminum Z-clip, 3/8 inch engagement.
 - 1. Clip Length: 2 inches.
 - 2. Rail Length: Width of panel minus 2 inches.
 - 3. Product: Monarch Metal Fabrication; MF375 or prior approved equal.
- E. 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.
- F. VOC Limits for Installation Adhesives: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Multipurpose Construction Adhesives: 70 g/L.
 - 3. Contact Adhesive: 80 g/L.
 - 4. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine-covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch (1.6 mm) or less in thickness to any surface): 250 g/L.

2.05 FABRICATION

- A. Shop prepare and identify panels for matching during site erection.
- 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. 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 and finishing, 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.
- E. Prepare panels for delivery to site, permitting passage through building openings.
- F. Finish exposed edges of panels as specified by grade requirements.
- G. When necessary to cut and fit on site, provide materials with ample allowance for cutting and scribing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated on shop drawings.
- B. Verify adequacy of backing and support framing.
- C. Verify mechanical, electrical, and building items affecting work of this Section are placed and ready to receive this work.

3.02 INSTALLATION

- A. Install work in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.
- B. Do not begin installation until wood materials have been fully acclimated to interior conditions.
 1. Condition to humidity conditions 72 hours minimum.
- C. Set and secure materials and components in place, plumb and level, using concealed fasteners wherever possible.
- D. Where necessary to cut and fit on site, scribe work abutting other components. Do not use additional overlay trim to conceal gaps.
- E. Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening unless otherwise indicated.
- F. Set exposed fasteners, fill with wood filler, and finish to match panel finish.
- G. Touch up damaged finish to match original, using materials provided by fabricator; replace components that cannot be refinished like new.

3.03 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.8 mm).

3.04 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 064221

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 068316 - FIBER GLASS REINFORCED PLASTIC (FRP) PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fiberglass reinforced plastic panels.
- B. Accessories and trim.

1.02 REFERENCE STANDARDS

- A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation; current edition.
- B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
- C. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor; 2013a.
- D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- E. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Samples: Submit two samples 4 by 4 inch (102 by 102 mm) in size illustrating material and surface design of panels.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.04 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS - GENERAL

- A. Refer to Finish Schedule for finish material selections.

2.02 PANEL SYSTEMS

- A. Wall Panels:
 1. Panel Size: 4 by 8 feet (1.2 by 2.4 m).
 2. Panel Thickness: 0.10 inch (2.5 mm).
 3. Surface Design: Smooth.
 4. Color: As indicated on Materials & Specifications Legend.
 5. Attachment Method: Adhesive only, with trim and sealant in joints.

2.03 MATERIALS

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
 4. Impact Strength: Greater than 6 ft lb force per inch (320 J per m), when tested in accordance with ASTM D256.
 5. Sanitation and Cleanability: Comply with 9 CFR 416.2.
 6. Wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Trim: Vinyl; color coordinating with panel.
- C. Adhesive: Type recommended by panel manufacturer.
 1. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 2. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168, CAL-Green Table 5.504.4.1 Adhesive VOC Limit, and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
 - a. Current requirement refers to the date on which the materials are installed in the building.
 - b. A copy of SCAQMD Rule #1168 is referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual

current version of the rule that will be applicable at the date of installation during construction.

- D. Sealant: Mildew-resistant, single-component, neutral-curing or acid-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 - Joint Sealants.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- B. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- C. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- D. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches (300 mm) wide.
 - 1. Mark plumb lines on substrate at panel joint locations for accurate installation.
 - 2. Locate panel joint to allow clearance at panel edges according to manufacturer's written instructions.

3.03 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
 - 1. Mop Sinks: Locate 12 inches beyond mop sink on both sides, 48 inches above sink.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.

- J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION 068316

SECTION 071616 - CRYSTALLINE WATERPROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Crystalline waterproofing.
- B. Preparation of surfaces to be waterproofed, including plugging active water leaks.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete work to be waterproofed.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation with installation of products that must penetrate waterproofed surfaces.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Test data including hydraulic permeability.
 - 2. Details for waterproofing at joints, intersections, and other special conditions.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 2. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 3. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 4. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 5. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 6. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 7. A5.405.5: Provide documentation that cement and concrete used are made with recycled content and/or alternative energy.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company with 10 years minimum experience specializing in manufacture of products of the type specified and providing technical representatives to visit project site.
- B. Installer Qualifications: Acceptable to manufacturer, with documented experience on at least 5 projects of similar nature within the last five years.
- C. Single Source Responsibility for Waterproofing: Provide and install products from single source.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Take necessary precautions to keep cementitious materials dry.

1.08 FIELD CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide 5 year labor and material warranty.
- C. Provide installer's warranty agreeing to correct leaking waterproofing for 2 years from Date of Substantial Completion, unless leakage is caused by structural failure, movement of the structure, or other causes beyond the installer's control.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Waterproofing for building surfaces:
 - 1. Inside of elevator pits.

2.02 MATERIALS

- A. Crystalline Waterproofing: Portland cement, quartz silica, and chemical compound that when applied to the surface of concrete forms insoluble crystals in the capillary pores preventing the passage of liquids, while having no adverse effect on the normal properties of concrete.
 - 1. Product: Krystol T1/T2.
 - 2. Waterproofing Treatment: Provide installed products that comply with the following, when tested using regular concrete samples made without admixtures, with two 1 mm (0.05 in.) thick coats of waterproofing:
 - a. Penetration: At least 10 cm (4 in.) penetration of crystal material, evidenced by independent microscopic analysis.
 - b. Integral Waterproofing: Continued waterproofing performance after removal of surface treatment - verified by independent testing.
 - c. Permeability: Reference concrete becomes waterproof with crystalline surface treatment when tested using DIN 1048 Part-5 for direct water penetration at 51 m (167 ft.) of head pressure.
 - d. Permeability: Waterproofing coating reduces water penetration by 75% compared to untreated concrete when testing according to DIN 1048 part 5.
 - e. Resistance to Chloride Ion Penetration: Chloride content at 15 mm (0.67 in.) depth below threshold for corrosion in new construction according to guidelines from ACI Committee Report 222R-85 after ponding in a chloride solution for 90 days.

- f. Sulfate Resistance: Treated concrete shows increased resistance to sulfate attack compared to untreated concrete after repeated exposure to a 10% sodium sulfate solution.
 - g. Self-Sealing: Surface treatment penetrates and seals leaking cracks, verified by independent testing.
 - h. Potable Water Contact Approval: Certified by NSF to NSF/ANSI Standard 61 Drinking Water System Components - Health Effects for use in structures holding potable water.
 - i. Hydrostatic Pressure: Resist hydrostatic pressure of no less than 164 feet (50 m) of head pressure when tested to DIN 1048 Part-5 direct water penetration test.
3. Color: Gray.
- B. Plugging Compound: Rapid-setting hydraulic cement based grout that sets in 60 seconds and will effectively arrest flowing water through a crack or hole in concrete.
- 1. Product: Krystol Plug.
- C. Patching Compound: Ready-mixed cementitious mortar recommended or approved by waterproofing manufacturer.
- D. Waterproof Capping and Finishing Material: Krystol Bari-Cote.
- 2.03 MIXES
- A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
- B. Notify Architect in writing of active leaks or defects that would affect system performance.
- C. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions. Use sand blasting, water blasting, or acid etching as recommended.
- C. Protect other work from damage caused by cleaning, preparation, and application of waterproofing.
 - 1. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.
- D. Patch holes, construction joints, and cracks. Remove defective concrete.
- E. Repair damaged or unsatisfactory substrate with patching compound.

1. At holes and cracks 1/16 inch (1.6 mm) wide or larger in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and minimum 1 inch (25 mm) deep. Fill reveal with patching compound flush with surface.
- F. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
- G. Surface Preparation: Remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
 1. Clean concrete surfaces according to ASTM D 4258.
 - a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic acid solution according to ASTM D 4260.
 - b. Smooth-Formed and Trowel-Finished Concrete: Prepare by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
- H. Concrete Joints: Clean reveals.
- I. Obtain approval of manufacturer's field representative before beginning installation.

3.03 INSTALLATION

- A. Install in strict accordance with manufacturer's instructions. Maintain environmental conditions required and recommended by manufacturer. Keep a copy of manufacturer's instructions on site.
- B. Coordinate installation with installation of products that must penetrate waterproofed surfaces.
- C. Saturate surface with water for several hours and maintain damp condition until applying waterproofing. Remove standing water.
- D. Apply waterproofing to surfaces, and extend waterproofing onto adjacent surfaces as follows:
 1. Onto interior nontreated walls intersecting exterior treated walls, for a distance of 24 inches (600 mm) for cast-in-place concrete.
 2. Onto every substrate in areas indicated for treatment, including elevator pits, sumps, and similar offsets and features.
- E. Number of Coats: Two.
- F. Application Method: Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
 1. Dampen surface between coats.
- G. Final Coat Finish: Smooth.
- H. Prevent excessive drying of surface.
 1. Cure waterproofing for at least 3 days, or length of time required by manufacturer, with water spray and adequate air circulation.
 2. Do not use chemical curing agents unless explicitly approved by waterproofing manufacturer.

- I. Do not backfill, fill water or liquid holding structures, or apply finish coatings until time period recommended by manufacturer has passed.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed application of waterproofing.
- B. Prepare inspection reports.

3.05 PROTECTION

- A. Protect from damage by weather. Do not cover with impermeable (plastic) sheeting unless air circulation is provided.
- B. Touch-up, repair or replace damaged waterproofing after Date of Substantial Completion.

END OF SECTION 071616

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 072100 - THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Batt insulation in exterior wall construction.

1.02 RELATED REQUIREMENTS

- A. Section 072500 - Weather Barriers: Separate air barrier and vapor retarder materials.
- B. Section 075400 - Thermoplastic Membrane Roofing: Insulation specified as part of roofing system.

1.03 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2009.
- C. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2004.
- D. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.06 QUALITY ASSURANCE

- A. Comply with fire resistance and flammability ratings as shown and specified.
- B. Thicknesses specified are for the thermal conductivity (k-value at 75 degrees F) specified for each material. Provide adjusted thicknesses for approved use of substituted materials with different thermal conductivity ratings. Where insulation is specified to have a specific "R" value, furnish manufacturer's standard thickness required to equal or exceed the specified value.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

1.08 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers:
 1. AFM Corp: www.r-control.com.
 2. CertainTeed Corporation: www.certainteed.com.
 3. Diversifoam Products: www.diversifoam.com.
 4. Dow Chemical Co.: www.dow.com.
 5. GAF Materials Corporation: www.gaf.com.
 6. Grace Construction Products: www.na.graceconstruction.com.
 7. Johns Manville Corporation;; JM Formaldehyde- Free™ Thermal Fiber Glass Insulation:www.jm.com.

2.02 APPLICATIONS

- A. As indicated on Drawings.
- B. Insulation at Perimeter of Foundation: Expanded polystyrene board.
- C. Insulation in Metal Framed Walls: Batt insulation with integral vapor retarder.

2.03 INSULATION MATERIALS

- A. General: Comply with regionally-sourced, recycled content, urea-formaldehyde prohibition, adhesives and sealants, aerosol adhesives, and volatile organic compound (VOC) product requirements specified in Section 018114.
- B. Where units are included in fire rated wall, ceiling, or floor construction, provide insulation units which have been tested and rated as required for the indicated assembly.
- C. Materials of This Section: Provide a continuous thermal, and vapor and air barrier at building enclosure elements.

2.04 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Complies with fire-resistance requirements shown on the Drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285, 2012 Edition.
 2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84, 2009 Edition.

3. Smoke Developed Index: 50 or less except as otherwise specified, when tested in accordance with ASTM E84, 2009 Edition.
 4. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 5. Formaldehyde Content: Zero.
 6. Provide insulation made with minimum 20 percent recycled glass content.
 7. Thermal Resistance: As noted on Drawings, minimum value.
 8. Facing: Provide following types, and as indicated on Drawings:
 - a. Aluminum foil, flame spread 25 rated; one side.
 9. Acceptable Manufacturers:
 - a. CertainTeed Corporation: www.certainteed.com.
 - b. Johns Manville: www.jm.com.
 - c. Owens Corning Corp.: www.owenscorning.com.
 - d. Prior approved equal.
- B. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Complies with fire-resistance requirements shown on the Drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 2. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 3. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
 4. Acceptable Manufacturers:
 - a. Thermafiber, Inc.: www.thermafiber.com.
 - b. ROXUL, Inc.; ComfortBatt: www.rspect.com.
- 2.05 LOOSE-FILL INSULATION
- A. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84, 2009 Edition.
1. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
 2. Location: Tight spaces that batt insulation will not fit.
- 2.06 ACCESSORIES
- A. Tape: Type and composition matching each type of membrane to be taped; self-adhering, mesh reinforced, 2 inch (50 mm) wide.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify building is weathertight.

3.02 BATT INSTALLATION

- A. Installation - General:

1. Install insulation at locations indicated and in accordance with manufacturer's instructions.
 2. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
 3. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
 4. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- B. Metal Stud Framing: Tape insulation batts in place.
- C. Floor/Ceiling and Roof/Ceiling Assemblies: Retain insulation batts in place with wire mesh secured to framing members in accordance with tested assembly requirements.
- D. Tape seal butt ends, lapped flanges, and tears or cuts in vapor retarder membranes.
- E. Install ventilation baffles at attic ventilation locations indicated.
- 3.03 PROTECTION
- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 072100

SECTION 072160 - CONTINUOUS THERMAL / AIR BARRIER WALL SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Complete thermally broken, continuous, exterior-insulated rain screen wall assembly including:
 - 1. Thermal insulation and air barrier systems.
 - 2. Metal support and attachment system.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green for submittal requirements.
- B. Section 072500 - Weather Barriers: Separate air barrier and vapor retarder materials.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate work of this Section with requirements for air barrier seal specified in Section 072500.
- B. Preinstallation Meeting: Conduct a preinstallation meeting at least one week prior to the start of the work of this Section; require attendance by all affected installers.
 - 1. Participants: Contractor, installing subcontractors, Architect, support and attachment system manufacturer's technical representative, and Owner.
 - 2. Review wall framing assemblies for potential interference and conflicts, and coordinate layout and support provisions for interfacing work.
 - 3. Review and document methods, procedures and manufacturer's installation guidelines and safety procedures for insulated sheathing, flashings, spray polyurethane foam, support framing and attachment system, and penetration and gap sealants.
 - 4. Review construction schedule and confirm availability of products, applicator/installer personnel, equipment and facilities.
 - 5. Review governing regulatory requirements and requirements for insurance and certificates.
 - 6. Review field quality control procedures.
- C. Sequencing: Schedule work of this Section in proper sequence with other construction to avoid delaying timely installation of cladding systems and related work.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Provide shop drawings showing interface of cold-formed metal support and attachment system with cladding system and adjacent construction, detailing system installation and attachment.
 - 1. Show field measurements which affect system installation.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

2. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
3. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
4. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

1.06 QUALITY ASSURANCE

- A. Comply with fire resistance and flammability ratings as shown and specified.
- B. Thicknesses specified are for the thermal conductivity (k-value at 75 degrees F) specified for each material. Provide adjusted thicknesses for approved use of substituted materials with different thermal conductivity ratings. Where insulation is specified to have a specific "R" value, furnish manufacturer's standard thickness required to equal or exceed the specified value.
- C. Single Source Responsibility:
 1. Furnish all thermal system components from single manufacturer.
 2. All system products and components must be approved by thermal wall system manufacturer.
- D. Field Measurements: Take field measurements to verify actual supporting and adjoining construction before fabrication; record field measurements on shop drawings.

1.07 MOCK-UP

- A. Mock-Up: Provide full system mock-up, including cladding system; 10 by 10 feet (3 by 3 m) in size.
 1. Locate where directed.
 2. Mock-up may remain as part of the Work.
 3. Demonstrate prepared substrate, support and attachment framing, insulation, cladding system(s), outside corner, inside corner, penetrations, exterior finishes, and aesthetic appearance.
 4. Verify mock-up as conforming to manufacturer's instructions.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and components in manufacturer's original, unopened, and undamaged containers or bundles, fully identified. Exercise care to avoid damage during unloading, storing and installation.
- B. Store, protect, and handle materials and components in accordance with manufacturer's recommendations to prevent damage, contamination, and deterioration. Keep materials clean, dry, and free of dirt and other foreign matter, and protect from damage due to weather or construction activities.
- C. Do not allow insulation materials to become wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage, and protection during installation.
- D. Protect plastic insulation from exposure to direct sunlight.

- E. Do not deliver plastic insulation materials to the project site ahead of time of installation. Protect at all times against ignition. Complete the installation and concealment of plastic materials as soon as possible in each area of work.

1.09 FIELD CONDITIONS

- A. Commence installation only when weather conditions are in compliance with manufacturer's specific environmental requirements and when conditions will permit work to be performed in accordance with manufacturer recommendations and warranty requirements.
- B. Do not install insulation systems when temperature or weather conditions are detrimental to successful installation.

1.10 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion; remove and replace materials concealing thermal and air barrier wall system at no extra cost to Owner.
- C. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace system components that do not comply with requirements.
 - 1. Warranty Period: 10 years from date of Substantial Completion
- D. Special Installer's Warranty: Specified Contractor's form, signed by Subcontractor, covering Work of this Section, for warranty period of two years.
 - 1. Warranty includes removing and reinstalling materials concealing thermal and air barrier wall system components as required to make necessary repairs.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers - Board Insulation:
 - 1. Dow Chemical Co.: www.dow.com.
 - 2. GAF Materials Corporation: www.gaf.com.
 - 3. Grace Construction Products: www.na.graceconstruction.com.
 - 4. Johns Manville Corporation: www.jm.com.
 - 5. Owens Corning Corp.: www.owenscorning.com.

2.02 INSULATION MATERIALS

- A. Where units are included in fire rated wall construction, provide insulation units which have been tested and rated as required for the indicated assembly.
- B. Polyisocyanurate Foam Plastic Sheathing Board: ASTM C1289 Type I, Class 2 glass-fiber reinforced; aluminum foil both faces.
 - 1. Complies with fire-resistance requirements shown on the Drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 2. Compressive Strength: ASTM D1621; 25 psi, minimum.

3. Aged Thermal Resistance: ASTM C518, measured at mean temperature of 75 degrees F: R=6.5 per inch of thickness.
4. Flexural Strength: ASTM C203; 55 psi, minimum.
5. Water Absorption: ASTM C209: 0.1 percent by volume, maximum.
6. Water Vapor Permeance: ASTM E96/E96M; less than 0.03 perms.
7. Maximum Use Temperature: 250 degrees F.
8. Panel Size: 4 feet wide x 8 feet long.
9. Basis of Design Product: Dow Chemical Co.; THERMAX ci Exterior Insulation: www.dow.com.
 - a. Other acceptable manufacturers:
 - 1) GAF Materials Corporation: www.gaf.com.
 - 2) Grace Construction Products: www.na.graceconstruction.com.
 - 3) Johns Manville Corporation: www.jm.com.
 - 4) Owens Corning Corp.: www.owenscorning.com.
 - 5) Prior approved equals.

2.03 ATTACHMENT AND SUPPORT FRAMING SYSTEM

- A. Framing Materials: ASTM A792/A792M; Commercial Steel (CS), Grade B, 50 ksi Yield, Minimum AZ55.
 1. Spacing: Comply with applicable live and dead loads, and any other requirements of the cladding system, and in accordance with engineering calculations.
 2. Tested to AAMA TIR-A8 Section 7.2 to determine structural performance and effective moment of inertia for each perforated component.
- B. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22.2 mm), minimum bare-metal thickness of 0.33 inch (0.84 mm), and depth required to fit insulation thickness indicated.

2.04 ACCESSORIES

- A. Continuous Insulation Fasteners: As indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and existing conditions for compliance with manufacturer's requirements for installation.
 1. Verify that metal wall studs, opening framing, bridging, bracing and other framing support members and anchorage have been installed within thermal wall system alignment tolerances and requirements.
 2. Ensure that:
 - a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants.
 - b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
 3. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 4. Verify that items required to penetrate thermal wall system are placed, and that penetration gaps and cracks are properly sealed.

5. Do not proceed with installation until unsatisfactory conditions have been corrected.
6. Ensure weather barrier system is properly installed and discontinuities in weather barrier are properly flashed and sealed prior to installing support framing and attachment system.

- B. Commencement of installation constitutes acceptance of existing conditions and acceptance of responsibility for satisfactory performance.

3.02 ATTACHMENT AND SUPPORT FRAMING INSTALLATION

- A. Z-Shaped Furring Members:

1. Erect insulation, horizontally and hold in place with Z-shaped furring members spaced 16 inches (406 mm) o.c maximum and as indicated on Drawings.
2. Installation Tolerance: Install each furring member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.03 CLEANING

- A. Remove overspray from non-prescribed surfaces in accordance with manufacturer's recommendations, without causing damage to surfaces. Remove protective covers from adjacent surfaces.
- B. Leave surfaces clean and free of debris and residue. Where required, clean exposed surfaces in accordance with manufacturer's instructions.

3.04 PROTECTION

- A. Do not permit installation to be damaged prior to its concealment.

END OF SECTION 072160

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 072500 - WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and that serves as a liquid-water drainage plane.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 076200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.
- C. Section 079200 - Joint Sealants: Sealing building expansion joints.

1.03 DEFINITIONS

- A. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.

1.04 REFERENCE STANDARDS

- A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
- F. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007.
- G. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials; 2013.
- H. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2012.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of weather barriers with adjacent flashings and weather barriers for compatibility and continuity of those systems.
 - 2. Coordinate installation of flexible flashing at openings with Sections that specify window, door, and other opening installations.

- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this Section; require attendance by all affected installers.
 - 1. Convene under general provisions of Section 017000.
 - 2. Required Attendance: Contractor's quality control supervisor or superintendent, Architect, all affected trades including reinforcing subcontractor and concrete supplier, and weather barrier manufacturer.
 - 3. Discuss installation procedures, requirements for items that penetrate the system, and other pertinent issues.
 - 4. Meet manufacturer requirements for warranty.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on system materials and accessory components, material characteristics, performance criteria, limitations, and manufacturer's standard flashing and termination details.
- C. Shop Drawings: Provide drawings of project-specific flashing, termination, and special joint conditions based on manufacturer's standard details; minimum scale 1-1/2 inch equals 1 foot.
 - 1. Show locations and extent of weather barrier on plans/elevations with detail references.
 - 2. Indicate special joint or termination conditions and conditions of interface with other materials.
 - 3. Manufacturer's approval shall be clearly indicated on shop drawings prior to submittal.

1.07 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.08 QUALITY ASSURANCE

- A. Installer Qualifications: Company accredited and certified under the Air Barrier Association of America (ABAA) Quality Assurance Program (QAP).
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than three years of documented experience.
- D. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of documented experience; approved by primary weather barrier system manufacturer.

- E. Single Source Responsibility for Weather barrier: Provide and install products from single source.
- F. System Compatibility: Assume responsibility for confirming that weather barrier system components are compatible with each other as a system, and also compatible with substrate surfaces with which they will be in contact, including but not limited to wall and sheathing surfaces, opening materials, other flashings and weather barrier materials, and joint sealants.
 - 1. Assure that system components are compatible as specified prior to preparing and making specified submittals.
 - 2. Assume responsibility for removal of incompatible system components and installation of properly compatible components at no additional cost to Owner regardless of when incompatibility is discovered.

1.09 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 014000.
- B. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.
 - 1. ~~Indicate portion of wall represented by mockup on Drawings or draw mockup as separate element.~~
 - 2. ~~Build integrated mockups of exterior wall assembly, as directed by Architect and Owner, incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air barrier assembly.~~
 - a. ~~Coordinate construction of mockups to permit inspection by Owner's testing agency of weather barrier before external insulation and cladding are installed.~~
 - b. ~~Include junction with roofing membrane, building corner condition, and foundation wall intersection.~~
 - c. ~~If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.~~
 - 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 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.
- B. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.11 DELIVERY, STORAGE, AND HANDLING

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

- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Protect stored materials from direct sunlight.

1.12 WARRANTY

- A. Provide manufacturer's standard material warranty for period of 5 years from date of Substantial Completion.
- B. Special Installer's Warranty: Specified Contractor's form, signed by Subcontractor, covering Work of this Section, for warranty period of two years.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Air Barrier:
 - 1. On outside surface of sheathing of exterior walls use air barrier sheet, self-adhesive type.

2.02 AIR BARRIER MATERIALS

- A. Air Barrier Sheet - Self-Adhered: Modified bituminous membrane consisting of a breathable carrier film with a specially designed adhesive with release liner on adhesive side and formulated for application with primer that complies with VOC limits of authorities having jurisdiction.
 - 1. Thickness: 40 mils.
 - 2. Air Permeance: 0.0002 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
 - 3. Water Vapor Permeance: 0.05 perms (2.9 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 - 4. Basis of Design Products:
 - a. GCP Applied Technologies; Perm-A-Barrier Wall Membrane
- B. Air Barrier Sheet - Self-Adhered, Vapor Permeable (WTP-20): Modified bituminous membrane integrally bonded to 4 mil (0.1 mm) of aluminum faced film.
 - 1. Thickness: 18 mils.
 - 2. Air Permeance: 0.004 cubic feet per minute per square foot (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
 - 3. Water Vapor Permeance: Less than 0.1 perm, minimum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 - 4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for maximum of 365 weather exposure.
 - 5. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
 - 6. Water Resistance, AATCC-127: No less than 5 hrs at 55 cm/21 inch
 - 7. Breaking Force, ASTM D5034: 55 lbf MD, and 44 lbf CD
 - 8. Pull Adhesion, ASTM D4541: min. 5 psi to primed glass faced gypsum sheathing, min. 12 psi to primed CMU
 - 9. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly
 - 10. Basis of Design Products:

- a. GCP Applied Technologies; Perm-A-Barrier NPS: www.gcpat.com.
 - b. Prior approved equal.
- C. Underlayment, Self-Adhering, High-Temperature (WTP-30): Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mils total thickness; with strippable release film and woven polyolefin top surface.
1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for non-self-adhesive sheet.
 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 3. Low Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 4. Water Vapor Permeance: 0.05 perm (29 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M Procedure A (desiccant method).
 5. Products:
 - a. Grace Construction Products; W.R. Grace & Co. -- Conn.; Grace Ice and Water Shield HT: grace.com.
 - b. Prior approved equal.
- D. Transition Membrane and Flexible Flashing: Self-adhering membrane consisting of engineered film, permeable adhesive with a split-back poly-release film.
1. Membrane Thickness: As required by manufacturer of air barrier system.
 2. Product:
 - a. GCP Applied Technologies; Perm-A-Barrier Detail Membrane.
 3. Location: Permanently concealed locations.
- E. Flexible Membrane Wall Flashing (WTP-40): 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mil) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane.
1. Membrane Thickness: As required by manufacturer of air barrier system.
 2. Product:
 - a. GCP Applied Technologies; Perm-A-Barrier Wall Flashing.
 3. Location: Permanently concealed locations.
- F. Metal Faced Window and Door Penetration Membrane: Self-adhesive composite membrane of rubberized asphalt and dual-layers of high strength polyethylene with surface layer of metallic aluminum film having the following physical properties:
1. Aluminum surfacing offers ideal substrate for adhesion of construction sealants
 2. UV and weather resistance due to metallic aluminum surfacing
 3. Excellent adhesion to primed surfaces
 4. Flexible for ease of penetration detailing
 5. Membrane Thickness: 23 mils.
 6. Product:
 - a. GCP Applied Technologies; Perm-A-Barrier Aluminum Flashing and Vycor Aluminum.
 7. Location: Permanently exposed locations.
- G. Primer : Polymer emulsion based adhesive, quick setting, having the following physical properties:
1. Color: Aqua,
 2. Weight: 8.7 lbs/gal,
 3. Solids by weight: 53 percent.
 4. Water based, no solvent odors, low VOC.

5. Drying time (initial set): 30 minutes at 50% RH and 70 degrees F.
6. Product:
 - a. GCP Applied Technologies; WB Primer.

H. Liquid Membrane to pre-detail penetrations and corners flashings, fasteners and attachment anchor penetrations:

1. Product:
 - a. GCP Applied Technologies; Bituthene Liquid Membrane.

2.03 SEALANTS

A. Silicone Sealant: ASTM C920, Grade NS, Class 25; single component, neutral curing, non-sagging, non-staining, fungus resistant, non-bleeding.

1. Color: White.
2. Movement Capability: Plus and minus 25 percent, minimum.
3. Service Temperature Range: -65 to 180 degrees F (-54 to 82 degrees C).
4. Shore A Hardness Range: 15 to 35.
5. Applications:
 - a. Perimeter air seals not exposed to weather or sunlight between weather barriers and frames of windows, aluminum curtainwall framing, and similar applications
 - b. Concealed membrane laps.
 - c. As indicated on Drawings.
6. Basis of Design Products:
 - a. GCP Applied Technologies; Perm-A-Barrier S100 Sealant.

B. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

1. Acceptable Products:
 - a. Dow Corning Corporation; 123 Silicone Seal.
 - b. Pecora Corporation; Sil-Span.
 - c. Tremco Incorporated, an RPM company; Spectrem Simple Seal.
 - d. Prior approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are in accordance with manufacturer requirements and ready to accept the work of this Section.
- B. Verify that substrate work is complete, clean and dry before beginning installation of weather barrier materials.
 1. Do not proceed with installation until after minimum curing period recommended by weather barrier manufacturer.
 2. Ensure that:
 - a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants.
 - b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.

- c. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
 - 3. Verify substrate is visibly dry and free of moisture. Test concrete surfaces for capillary moisture by plastic sheet method according to ASTM D4263.
 - C. Do not begin installation until substrates have been properly prepared.
- 3.02 PREPARATION
- A. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
 - B. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
 - C. Clean and prime substrate surfaces to receive air barriers in accordance with manufacturer's instructions and ASTM C1193.
 - 1. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
 - D. Seal penetrations, cracks, voids, and change in planes larger than a 1/4 inch and reinforce changes in substrate and other areas as recommended by manufacturer.
 - E. Fill voids as recommended by manufacturer.
 - F. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
 - G. Bridge and cover isolation joints, expansion joints, discontinuous wall-to-wall, deck-to-wall, and deck-to-deck as depicted in contract documents, approved shop drawings, and manufacturers literature.
 - H. At changes in substrate plane, apply liquid membrane at sharp corners and edges to form a smooth transition from one plane to another.
 - I. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- 3.03 INSTALLATION
- A. Install materials in accordance with manufacturer's instructions and contract documents. The most stringent shall dictate.
 - 1. Comply with ASTM E2112 for installation of weather barrier materials in conjunction with installation of aluminum storefronts, doors, and louvers.
 - B. Water-Resistive Barriers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.
 - C. Self-Adhesive Sheets:
 - 1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials as recommended by manufacturer and as otherwise specified.

2. Install air barrier to dry surfaces at air and surface temperatures of -4°C (25°F) and above in accordance with manufacturer's recommendations, at locations indicated on Construction Documents.
3. Prime substrate to receive air barrier membrane.
4. Lap sheets shingle-fashion to shed water and seal laps air tight; lap sheets over separate metal or flexible flashings in shingle fashion to shed water and seal laps.
5. Overlap adjacent pieces 3 inches (76 mm) minimum. Stagger end laps. Roll sheets in place with a hard neoprene roller.
6. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that all laps are firmly adhered with no gaps or fishmouths.
7. Seal around penetrations with sealant or liquid membrane.
8. Continue the membrane into all openings in the wall, such as doors, windows, etc., and terminate at points that will prevent visibility from interior.
9. Do not expose air barrier membrane to sunlight for more than thirty days prior to enclosure.
10. Use same material, or other material approved by sheet manufacturer for the purpose, to seal to adjacent construction and as flashing. Seal reverse laps with weather barrier sealant or liquid membrane. Provide 4 inch minimum laps with adjacent roofing and waterproofing systems. Provide a foil tape separation at laps with PVC materials.
11. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air barrier sheet extending 6 inches beyond repaired area in all directions. Seal perimeter of patch with liquid membrane or sealant.

D. Openings and Penetrations in Exterior Weather Barriers:

1. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flexible flashing at least 9 inches (230 mm) wide, covering entire depth of framing.
2. Seal with manufacturer's recommended sealant.
3. At head of openings, install flexible flashing under weather barrier extending at least 2 inches (50 mm) beyond face of jambs; seal weather barrier to flashing.
4. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
5. Service and Other Penetrations: Form flexible flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Do not cover installed weather barriers until required inspections have been completed.
- C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- D. Take digital photographs of each portion of the installation prior to covering up.
- E. Test air barrier assemblies according to ASTM E779. Correct test failures as required to achieve passing tests, at no additional cost to Owner.
- F. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-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.
7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied exposed edges), with no fishmouths.
8. Liquid membrane or weather barrier sealant shall be used in lieu of mastic.
9. Air barrier 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, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

G. Field-Testing

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Prior to installing exterior cladding and interior finishes, water-test the WRB and flashings with an ASTM-E-1105-calibrated spray rack for no less than 15 minutes.
 - a. Monitor the interior for leaks and repair as necessary to maintain a watertight building enclosure.
3. Field-Testing at Portland Cement Plaster: After installing lath and before installing the scratch coat and interior finishes, water-test the WRB and flashings with an ASTM-E-1105-calibrated spray rack for no less than 15 minutes.
 - a. Monitor the interior for leaks and repair as necessary to maintain a watertight building enclosure.
 - b. Water test each penetration and termination and perform one water test for each 144 square feet of uninterrupted plaster.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.
- 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. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes and sealants not approved by air barrier manufacturer.
- E. Protect weather barriers from damage during installation and while left exposed during construction. Repair damage before proceeding with subsequent construction.

- F. Restore damaged areas to match adjacent areas as recommended by the weather barrier manufacturer and approved by Architect.
- G. Remove and replace materials that are damaged or cannot be satisfactorily repaired, as determined and directed by Architect, at no cost to the Owner.

END OF SECTION 072500

SECTION 072600 - VAPOR RETARDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vapor retarders for use below slabs-on-grade.
- B. Vapor retarder accessories.

1.02 RELATED SECTIONS

- A. Section 033000 - Cast-in-Place Concrete: Slabs on grade.

1.03 REFERENCE STANDARDS

- A. ASTM E96/E96M - Water Vapor Transmission of Materials; 2010.
- B. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2011.
- C. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this Section; require attendance by all affected installers.
 - 1. Convene under general provisions of Section 017000.
 - 2. Required Attendance: Contractor's quality control supervisor or superintendent, Architect, affected trades including reinforcing subcontractor and concrete supplier, and weather barrier manufacturer.
 - 3. Discuss installation, protection, penetrations, and coordination with other work.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Product Test Reports: For each product, for tests performed by a qualified testing agency.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation methods.
 - 5. Typical Details.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this Section with minimum 5 years of documented experience; approved by vapor barrier system manufacturer.

- C. Single Source Responsibility for Weather barrier: Provide and install products from single source.
- D. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store materials in a clean, dry area in accordance with manufacturer's instructions.
- D. Protect materials during handling and installation to prevent damage.

1.08 WARRANTY

- A. Warranty: Provide written five year material warranty issued by the membrane manufacturer upon completion of work.

PART 2 PRODUCTS

2.01 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, 15 mil. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Product(s):
 - a. GCP Applied Technologies; Florprufe 120.
 - b. Raven Industries, Inc.; Vapor Block 15.
 - c. Reef Industries, Inc.; Griffolyn 15 mil Green.
 - d. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.02 ACCESSORIES

- A. General: Ensure accessories are manufactured or recommended same manufacturer as vapor retarders.
- B. Tape: Manufacturer's standard tape compatible with other system components.
- C. Self-Adhesive Repair Tape: Manufacturer's standard tape compatible with other system components.
- D. Mastic: Manufacturer's recommended mastic or liquid membrane.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces and areas to receive vapor retarders. Notify Architect in writing defects of work and other unsatisfactory site conditions that would cause defective installation of vapor retarders. Do not begin installation until unacceptable conditions have been corrected.
- B. Verify site dimensions.

- C. Commencement of work will imply acceptance of substrate.

3.02 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.03 INSTALLATION

- A. Install vapor retarders in accordance with manufacturer's instructions and ASTM E1643 at concrete slabs, and as follows.
 1. Fine grade under slab soils to smooth and level surface prior to installation of slab on grade edge and construction joint forms.
 2. Tamp and level subbase soil materials to within plus zero (0) inches to minus 3/4 inches from required subgrade elevation.
 3. Unroll vapor barrier with longest dimension parallel with direction of pour.
 4. Lap vapor barrier up and over foundation elements and seal to foundation walls.
 5. Lap joints minimum 2 inches and seal.
 6. Seal penetrations, including pipes, with manufacturer's recommended details; no penetrations of vapor barrier membrane are permitted except for reinforcing steel and permanent utilities.
 7. Turn up sheets 12 inches at perimeter; at footers and vertical walls, and against penetrations. Seal joints and terminations with tape. Cut off excess material after concrete has been installed and reviewed by the Architect.
 8. Do not disturb or damage vapor barrier while placing concrete. Repair damaged vapor barrier by cutting patches of vapor barrier, overlapping damaged area 6 inches minimum and taping all four side with seal tape.
- B. Install vapor retarders continuously at locations as indicated on the Drawings. Ensure there are no discontinuities in vapor retarder at seams and penetrations.
- C. Install vapor retarders in largest practical widths.
- D. Ensure surface beneath vapor retarder is smooth with no sharp projections.
- E. Join sections of vapor retarder and seal penetrations in vapor retarder with seam tape. Ensure vapor retarder surfaces to receive mastic tape are clean and dry.
- F. Immediately repair holes in vapor retarder with self-adhesive repair tape.
- G. Seal around pipes and other penetrations in vapor retarder with pipe boots in accordance with manufacturer's instructions.

3.04 PROTECTION

- A. Protect vapor retarders from damage during installation of reinforcing steel and utilities and during placement of granular materials or concrete slab.
- B. Immediately repair damaged vapor retarder in accordance with manufacturer's instructions.
- C. Use only concrete dobies.

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D. Confirm membrane is free of debris prior to concrete placement.

END OF SECTION 072600

SECTION 074213.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.
- B. Matching flashing and trim.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 072500 - Weather Barriers: Weather barrier behind rainscreen wall system.
- C. Section 074213 - Metal Wall Panels.
- D. Section 076200 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system that are not a part of this section.
- E. Section 079200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2016.
- E. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip; 2015.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- I. ASTM D523 - Standard Test Method for Specular Gloss; 2014.
- J. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives; 1998 (Reapproved 2012).
- K. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 2014.

- L. ASTM D2244 - Standard Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates; 2011.
- M. ASTM D4145 - Standard Test Method for Coating Flexibility of Prepainted Sheet; 2010.
- N. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films; 2007.
- O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- P. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- Q. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- R. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, co-ordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.
 - 1. Require attendance by the Owner, Architect, installer and relevant sub-contractors.
 - 2. Include MCM sheet manufacturer's representative and wall system manufacturer's representative to review storage and handling procedures.
 - 3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
 - 4. Review procedures for protection of work and other construction.
 - 5. Review submittals.
- B. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
 - 1. Finish manufacturer's data sheet showing physical and performance characteristics.
 - 2. Storage and handling requirements and recommendations.
 - 3. Fabrication instructions and recommendations.
 - 4. Specimen warranty for finish, as specified herein.
- C. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical characteristics of components shown on shop drawings.

2. Storage and handling requirements and recommendations.
 3. Installation instructions and recommendations.
 4. Specimen warranty for wall system, as specified herein.
- D. Shop Drawings: Show layout and elevations with detail references, dimensions and thickness of panels, connections, project specific details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
1. Indicate panel numbering system.
 2. Differentiate between shop and field fabrication.
 3. Indicate substrates and adjacent work with which the wall system must be coordinated.
 4. Include large-scale details of anchorages and connecting elements, such as windows, doors, louvers, and light fixtures..
 5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches (1:10).
 6. Include large-scale elevations detailing penetrations of wall by pipes and utilities.
- E. Verification Samples: For each finish product specified, submit at least three samples, minimum size 12 inch (305 mm) square, and representing actual product in color and texture.
- F. Test Report: Submit report of full-size mock-up tests for air infiltration, water penetration, and wind performance.
- G. Test Report: Submit report of full-size mock-up test for NFPA 285 fire performance.
- H. Installer's Qualifications.
- I. Certificate: Certify that the work results of this section meet or exceed specified requirements.
- J. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.
- K. Manufacturer's Qualification Statement.
- L. Installer's Qualification Statement.
- M. Testing Agency's Qualification Statement.
- N. Maintenance Data: Care of finishes and warranty requirements.
- O. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 4. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.

5. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.

1.07 QUALITY ASSURANCE

- A. Single Source Responsibility: Furnish each product from one manufacturer, unless otherwise acceptable to Architect.
- B. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.
 1. With not less than 10 years of documented experience.
 2. Approved by MCM sheet manufacturer.
 3. Submit contact names and phone numbers for at least three references connected with successful past projects.
- D. Installer Qualifications:
 1. Company specializing in performing work of the type specified and with at least 5 years of documented experience.
 2. Approved by wall system manufacturer.
 3. Submit contact names and phone numbers for at least three references connected with successful past projects.
- E. Testing Agency Qualifications: Independent agency experienced in testing assemblies of the type required for this project and having the necessary facilities for full-size mock-up testing of the type specified.
- F. Manufacturer's certification that Installer is approved to perform work.
- G. Manufacturer's and fabricator's certification that products furnished for Project meet or exceed specified requirements.
- H. Submit coating manufacturer's certification stating fluoropolymer coating formulation is fluorosurfactant free (FSF).
- I. Manufacturer's system cleaning recommendations, including graffiti.

1.08 MOCK-UPS

- A. Mock-Up: Provide a mock-up 10 feet by 10 feet, minimum, for evaluation of fabrication workmanship.
 1. Locate where directed.
 - a. One interior mockup.
 - b. One exterior mockup per finish.
 2. Provide panels finished as specified.
 3. Mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
 1. Protect finishes by applying heavy duty removable plastic film during production.
 2. Package for protection against transportation damage.

3. Provide markings to identify components consistently with drawings.
 4. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
1. Store in well ventilated space out of direct sunlight.
 2. Protect from moisture and condensation with tarpaulins or other suitable weather tight covering installed to provide ventilation.
 3. Store at a slope to ensure positive drainage of any accumulated water.
 4. Do not store in any enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
 5. Avoid contact with any other materials that might cause staining, denting, or other surface damage.
 6. Retain strippable protective covering on metal composite material panels during installation.

1.10 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Wall System Warranty: Fabricator and installer agree to correct defects in fabrication or installation, structural failures including rupturing, cracking, or puncturing, within a 10 year period after Date of Substantial Completion.
- C. MCM Sheet Manufacturer's Finish Warranty: Provide manufacturer's written warranty stating that the finish will perform as follows for minimum of 30 years:
1. Chalking: No more than that represented by a No. 8 rating based on ASTM D4214.
 2. Color Retention: No fading or color change in excess of 5 Hunter color difference units, calculated in accordance with ASTM D2244.
 3. Gloss Retention: Minimum of 30 percent gloss retention, when tested in accordance with ASTM D523.
 4. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Metal Composite Material Sheet Manufacturers (Type MP-1):
1. Alcoa, Inc; Reynobond FR: www.alcoa.com
 2. Other Acceptable Metal Composite Material Sheet Manufacturers:
 - a. 3A Composites USA: www.alucobondusa.com.
 - b. ALPOLIC Materials: www.alpolic-usa.com.
 - c. Prior Approved equal.

2.02 WALL PANEL SYSTEM

- A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing; provide installed panel system capable of maintaining specified performance without defects, damage or failure.
1. Provide structural design by or under direct supervision of a Structural Engineer licensed in the State in which the Project is located.

2. Provide panel jointing and weatherseal using dry seal system.
3. Anchor panels to supporting framing without exposed fasteners.

B. Performance Requirements:

1. Tests are to be on full-size mock-ups; tests performed previously for other projects are acceptable provided tested assemblies are truly equivalent to those to be used on this project, unless otherwise indicated.
2. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F (minus 29 degrees C) to 180 degrees F (82 degrees C) without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.
3. Air Infiltration: 0.06 cfm/sq ft (0.003 L/s/sq m) of wall area, maximum, when tested at 1.57 psf (0.075 kPa) in accordance with ASTM E283.
4. Water Penetration: No water penetration under static pressure when tested in accordance with ASTM E331 at a differential of 10 percent of inward acting design load, 6.24 psf (0.299 kPa) minimum, after 15 minutes.
 - a. Water penetration is defined as the appearance of uncontrolled water on the interior face of the wall.
 - b. Design to drain leakage and condensation to the exterior face of the wall.
5. Fire Performance: Tested in accordance with, and complying with the acceptance criteria of, NFPA 285; testing must be performed specifically for this project.

2.03 MATERIALS

- A. Metal Composite Material (MCM) Sheet Types (MP-1 and MP-5): Two sheets of aluminum sandwiching a core of extruded thermoplastic material; formed into profile for installation method indicated. Include attachment assembly components, and accessories required for weathertight system.
1. Overall Sheet Thickness: 4 mm, minimum.
 2. Face Sheet Thickness: 0.020 inches (0.5 mm), minimum.
 3. Alloy: Manufacturer's standard, selected for best appearance and finish durability.
 4. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 25 inch-pound/inch (178 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
 5. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 6. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater, when tested in accordance with ASTM D1929.
 7. Approvals: ICC ERS - 2653.
 8. Factory Finish: Three coat polyvinylidene fluoride (PVDF) resin coating, approved by the coating manufacturer for the length of warranty specified for the project, and applied by coil manufacturing facility that specializes in coil applied finishes.
 - a. Finish: Duranar GR Graffiti-Resistant Coatings, low gloss.
 - b. Coating Flexibility: Pass ASTM D4145 minimum 1T-bend, at time of manufacturing.

- c. Long-Term Performance: Not less than that specified under WARRANTY in PART 1.
 - d. Product:
 - 1) Reynobond PE.
 - e. Color:
 - 1) MP-1: Reynobond Anodic Clear.
 - 2) MP-3: Reynobond Pewter.
 - 3) MP-4 and MP-10: Reynobond Scottish Oak.
 - 4) MP-5: Reynobond Bone White.
- B. Metal Composite Material (MCM) Sheet Types (MP-4 and MP-10): Two sheets of aluminum sandwiching a core of extruded thermoplastic material; formed into profile for installation method indicated. Include attachment assembly components, and accessories required for weathertight system.
- 1. Overall Sheet Thickness: 4 mm, minimum.
 - 2. Face Sheet Thickness: 0.020 inches (0.5 mm), minimum.
 - 3. Alloy: Manufacturer's standard, selected for best appearance and finish durability.
 - 4. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 25 inch-pound/inch (178 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
 - 5. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - 6. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater, when tested in accordance with ASTM D1929.
 - 7. Approvals: ICC ERS - 2653.
 - 8. Factory Finish: Four coat polyvinylidene fluoride (PVDF) resin coating, approved by the coating manufacturer for the length of warranty specified for the project, and applied by coil manufacturing facility that specializes in coil applied finishes.
 - a. Finish: Duranar GR Graffiti-Resistant Coatings, low gloss.
 - b. Coating Flexibility: Pass ASTM D4145 minimum 1T-bend, at time of manufacturing.
 - c. Long-Term Performance: Not less than that specified under WARRANTY in PART 1.
 - d. ~~Product: ALPOLIC Materials;; ALPOLIC /frLT (interior fire resistant).~~
 - e. Product:
 - 1) Reynobond PE.
 - f. ~~Color:~~
 - 1) ~~MP-4 and MP-10: Walnut (4-4WLN-G30).~~
- C. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
- 1. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
 - 2. Stainless Steel Sheet Components: ASTM A480/A480M.
 - 3. Aluminum Components: ASTM B209 or B 221, 6063-T5.
- D. Flashing: Sheet aluminum; 0.032 inch (0.8 mm) thick, minimum; finish and color to match MCM sheet.

- E. Stainless Steel: ASTM A666, Type 304, soft temper, 28 gage (0.0156 inch) (0.40 mm) thick, smooth No. 4 finish.

2.04 ACCESSORIES

- A. Extrusions, formed members, sheet, and plate, ASTM B209 and the recommendations of the manufacturer.
- B. Anchors, Clips and Accessories: Do not allow contact with dissimilar metals. Use one of the following:
 - 1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.
 - 2. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A153/A153M.
 - 3. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A123/A123M Coating Grade 10.
- C. Fasteners:
 - 1. Exposed Fasteners: Stainless steel; permitted only where absolutely unavoidable and subject to prior approval of the Architect.
 - 2. Screws: Self-drilling, self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
 - 3. Bolts: Stainless steel.
 - 4. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.
- D. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 15 mil (0.4 mm) dry film thickness per coat.
- E. Joint Sealer: Clear silicone sealant approved by MCM sheet manufacturer.
- F. Solid shims.
- G. Provide panel system manufacturer's and installer's standard corrosion resistant accessories, including fasteners, clips, anchorage devices and attachments.
- H. Anti-Graffiti Coating: Anti-graffiti coating as recommended by manufacturer.
 - 1. Product:
 - a. PPG Surface Solutions; Duraprep Prep 400 Graffiti Remover.

2.05 FABRICATION

- A. General: Fabricate and finish metal composite material panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal composite material 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.

- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations 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 Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel 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 metal composite material wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall panel manufacturer.
 - a. Verify that air 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 metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Verify dimensions, tolerances, and interfaces with other work.
- E. Notify Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage during installation.

- B. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal composite material panel manufacturer's written recommendations.
- C. Install subgrits perpendicular to panel length and level to uniform plane over 1/8 inch minimum solid shims set in weather barrier sealant. Fasteners must engage solid backing. Inspect and repair any damage to weather barrier as a result of support framing installation prior to panel installation.
 - 1. Seal fasteners penetrating air barrier in accordance with Section 072500 - Weather Barriers.

3.03 INSTALLATION

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.
 - 1. Shim or otherwise plumb substrates receiving metal composite material panels.
 - 2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal composite material panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.
- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.
- F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.
- G. Where joints are designed for field applied sealant, seal joints completely with specified sealant.
- H. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- I. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.
- J. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
 1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- K. Installation: Attach metal composite material wall panels to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.
 1. Dry Seal Systems: Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gasket system.
- L. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-returned flanges of wall panels to panel clips with manufacturer's standard fasteners.
 1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 079200 - Joint Sealants.
 2. Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gaskets.
- M. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 1. Install components required for a complete metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.
- N. 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 sheet metal flashing and 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 feet with no joints allowed within 24 inches 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 deep, filled with mastic sealant (concealed within joints).

- O. Install flashings as indicated on shop drawings At flashing butt joints, provide an 8 inch lap strip under flashing and seal lapped surfaces with a full bed of non-hardening sealant.
- P. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
 - 1. Variation From Plane or Location: 1/4 inch in 20 feet (6 mm in 6 m) of length and up to 3/4 inch in 300 feet (20 mm in 100 m), maximum.
 - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
 - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch (0.75 mm), maximum.
- Q. Replace damaged products.
 - 1. Exception: Field repairs of minor damage to finishes are permitted only when approved in writing by Architect, panel manufacturer, and fabricator.
 - a. Field Repairs to Finishes: Using materials and methods sufficient that repairs are not discernible when viewed at distance of 10 feet (3 m) under all typical light conditions experienced at the project.

3.04 FIELD QUALITY CONTROL

- A. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.
 - 1. Site Visits: Schedule two site visits during execution of installation.
- B. Testing Agency: Engage a qualified independent testing agency to perform field tests and inspections.
- C. Water-Spray Test: After installation, prior to installation of interior finishes, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.
- D. Metal composite material wall panels will be considered defective if they do 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.

3.05 CLEANING

- A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.
- E. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.06 PROTECTION

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

END OF SECTION 074213.23

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 075400 - THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered system with thermoplastic roofing membrane.
- B. Roofing stack boots and walkway pads.

1.02 RELATED REQUIREMENTS

- A. Section 061053 - Miscellaneous Rough Carpentry.
- B. Section 076200 - Sheet Metal Flashing and Trim: Counterflashings, reglets and other flashing assemblies.
- C. Section 077100 - Roof Specialties: Prefabricated copings and other flashings.
- D. Section 077200 - Roof Accessories: Roof-mounted units; prefabricated curbs.
- E. Section 086200 - Unit Skylights: Skylight frame, integral curb, and counterflashing.
- F. Division 22 - Plumbing Piping Specialties: Roof drains.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- C. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics; 2010.
- D. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2008.
- E. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging; 2009.
- F. ASTM D4434/D4434M - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing; 2006.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.
- H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2005.
- I. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2007.
- J. FM 4450 - Class I Insulated Steel Roof Decks; current edition.
- K. FM 4470 - Class I Roof Covers; current edition.
- L. FM 4880 - Approval Standard for Insulated Wall or Wall and Roof/Ceiling Panels; current edition.

- M. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; Fifth Edition, with interim updates.
- N. UL 1256 - Fire Test of Roof Deck Constructions; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate with installation of associated counterflashings and roof drainage components installed under other Sections as the work of this Section proceeds.
- B. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review deck substrate requirements for conditions and finishes, 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 affects 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.
- C. Preinstallation Meeting: Convene one week before starting work of this Section.
 - 1. Convene under general provisions of Section 017000.
 - 2. Notify Owner, who may request attendance by an independent roofing consultant.
 - 3. Require attendance of parties directly concerned with the work of this Section, including those who are required to coordinate with the work, and those who are required to protect the work upon completion. Include the manufacturer's technical representative.
 - 4. Review submittals.
 - 5. Review preparation and installation procedures and coordinating and scheduling required with related work.
 - 6. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 7. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 8. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 9. Review structural loading limitations of roof deck during and after roofing.

10. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
11. Review governing regulations and requirements for insurance and certificates if applicable.
12. Review temporary protection requirements for roofing system during and after installation.
13. Review roof observation and repair procedures after roofing installation.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- C. Specimen Warranty: For approval.
- D. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, and paver layout.
 1. Show locations and extent of roofing on plans with detail callouts.
 2. Manufacturer's approval shall be clearly indicated on shop drawings prior to submittal. Include project specific details and a tapered plan that includes slopes and elevations for high and low points.
 3. Base flashings and membrane terminations.
 4. Tapered insulation, including slopes.
 5. Roof plan showing orientation of roof deck and orientation of roofing, fastening spacings, and patterns for mechanically fastened roofing.
 6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 7. Manufacturer of roof membrane system shall review and approve Shop Drawings prior to submission for review and approval. Manufacturer's approval shall be clearly indicated on the Shop Drawings.
- E. Manufacturer's Installation Instructions: Indicate membrane seaming precautions, special procedures, and perimeter conditions requiring special attention.
- F. Certificate: Certify that products meet or exceed specified requirements.
 1. Manufacturer's Project Acceptance Document: Certification that manufacturer and installer will warrant the waterproofing for the specific site, design, details, and application indicated for this project.
 2. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements
 3. Installer Certification: Written document from Manufacturer stating installer is certified, approved, and licensed, or acceptable to install specified products.
- G. Maintenance Data: For roofing system to include in maintenance manuals.
- H. Manufacturer's Warranty Certification: Certification that manufacturer and installer will warrant roofing system for the specific site, design, details and application indicated for this Project.
- I. Warranty Documentation:

1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
2. Submit installer's certification that installation complies with warranty conditions for waterproof membrane.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
 1. Maintain one copy on site.
- B. Manufacturer Qualifications: Obtain roofing materials including sheets, adhesives, insulation, roof vents, roof drains, system accessories, and flexible flashings, and sheet metal flashings and flexible flashings from a single manufacturer who publishes complete information on the specified system, and which has produced the specified system successfully for a minimum of five years. Provide materials and accessories not manufactured by the membrane manufacturer from sources acceptable to the membrane manufacturer, complying with warranty provisions.
 1. Company specializing in manufacturing the products specified in this Section with minimum 20 years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this Section:
 1. With minimum 10 years documented experience.
 2. Approved by membrane manufacturer.
 3. Provide current manufacturer's written certification of proposed installer before start of roofing work.
 4. Supervisor: Installer to maintain full-time supervisor/foreman who is on the jobsite during roofing work and who is experienced in installation of specified roofing system.
- D. Single Source Responsibility: Provide and install products from single source.
- E. Obtain periodic and final inspection of completed roofing installation by roofing manufacturer for acceptance and warrantability.

1.08 REGULATORY REQUIREMENTS

- A. Conform to applicable Building Code requirements for roof insulation in conjunction with roof assembly classifications.
- B. Provide insulation materials which are identical to those whose fire performance characteristics have been determined by UL or other testing agency acceptable to jurisdictional authorities.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
 1. Protect and maintain within manufacturer's recommended temperature range.

- B. Store products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- D. Water entry and resulting damage to building, its contents, or to partially completed roofing work shall be deemed the responsibility of the Contractor; Prevent bitumen, adhesives, and debris from entering and clogging roof drains and rainwater leaders.

1.11 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
 - 1. Warranty Term: 20 years No Dollar Limit.
 - a. Provide no dollar limit (NDL) warranty and Non-Prorated for full replacement cost of completed installation signed by manufacturer and applicator guaranteeing against water infiltration and defects of materials and workmanship for period of 20 years from date of Substantial Completion. Warranty shall not exclude ponding water and no time limited shall be assigned for any such ponding water during the warranty period.
 - b. Provide material required for warranty including penetrations, terminations, flashings, sealants, roof sheathing board, membrane, insulation, adhesives, and fasteners. Defects include (but are not limited to) unadhered membrane and flashings, moisture blisters, open seams, and weld scuffs.
 - 2. Include coverage of roofing system, metal flashings, and insulation materials provided by membrane manufacturer, including installation, resulting from failure to resist penetration of moisture, and failure to comply with specified performance requirements.
 - 3. For repair and replacement include costs of both material and labor in warranty.
 - 4. Exceptions NOT Permitted:
 - a. Damage due to roof traffic.
 - 5. Provide material required for warranty including penetrations, terminations, flashings, sealants, roof sheathing board, membrane, insulation, adhesives, and fasteners. Defects include (but are not limited to) unadhered membrane and flashings, moisture blisters, open seams, and weld scuffs.
- C. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of membrane roofing system such as

membrane roofing, base flashing, walkways, and fasteners, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 ROOFING

- A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over insulation.
- B. Roofing Assembly Requirements:
 1. General: Provide installed roofing membrane and base flashing system that will remain watertight, will not permit the passage of water, and resist specified uplift pressures, thermally induced movement, and exposure to weather, without failure.
 2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
 3. 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.
 4. Uplift Pressure Resistance: Provide installed insulation, roofing membrane, and base flashing system that will resist uplift pressures calculated according to ASCE 7 and applicable Building Code requirements, as demonstrated by manufacturer's independent testing.
 - a. Zone 1 Areas (Field Areas): 35 lb/sq ft.
 - b. Zone 2 Areas (Perimeter Areas; a = 10 feet): 55 lb/sq ft.
 - c. Zone 3 Areas (Corner Areas; a = 10 feet): 80 lb/sq ft.
 5. Factory Mutual (FM) Listing: Provide membrane, base flashings, and component materials that comply with requirements in FM DS 1-28, FM 4450, and FM 4470 as part of a roofing system, and that are listed by FM for Class I or non-combustible construction, as applicable. Identify materials with FM markings.
 - a. Windstorm Classification: Class I-120.
 - b. Hail Resistance: SH.
 6. Fire-Test Response Characteristics: Provide roofing materials with fire-resistance-response characteristics as determined by testing identical products by UL, FM, or other independent testing agency acceptable to jurisdictional authority, according to following test methods. Identify materials with applicable testing agency markings.
 - a. ASTM E108, Class A; for application and slopes indicated.
 - b. ASTM E119; fire-resistance-rated roof assemblies of which roofing materials are a part.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

- A. Membrane Roof-1:
 1. Material: Polyvinyl chloride (PVC) complying with ASTM D4434/D4434M.
 2. Basis of Design Product (RF-1): Sarnafil G410-15 feltback, 60 mil .
 3. Reinforcing: Fiberglass.
 4. Sheet Width: Factory fabricated into largest sheets possible.

5. Solar Reflectance: 0.75 minimum initial, and 0.65 minimum 3-year; certified by Cool Roof Rating Council.
6. Thermal Emissivity: 0.90 minimum initial, and 0.86 minimum 3-year; certified by Cool Roof Rating Council.
7. Approvals: ICC ESR 1157.
8. Roof Field Color: Energy Smart White.

B. Flexible Flashing Material: Same material as membrane.

1. Prefabricated Corners: Same material as roof membrane.

C. Fiberglass Reinforced Membrane Flashing: Fiberglass reinforced membrane adhered to asphalt, other contaminated surfaces.

2.04 DECK SHEATHING AND COVER BOARDS

- A. Deck Sheathing: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 1/4 inch (6 mm) thick.

2.05 INSULATION

- A. Polyisocyanurate Board Insulation: Isocyanurate foam that is accepted in writing by membrane manufacturer and approved by its manufacturer for fully adhered installations; ASTM C1289, Class 1 or 2; integrally faced both sides with fiberglass mat, or glass fibrous mat membrane; thermal conductivity (k-value at 75 degrees F) 0.17, aged r-values in accordance with ASTM C1289, Long Term Thermal Resistance (LTTR) Method.

1. Board Size: 48 x 96 inch (1220 x 2440 mm).
2. Total Board Thickness: As indicated on Drawings.
3. Minimum R-value (Excluding Tapered Layers): As indicated on Drawings
4. Density: ASTM D1622; 2.0 pcf minimum.
5. Compressive Strength: ASTM D1621; 20 psi minimum.
6. Dimensional Stability: ASTM D2126; 2 percent maximum at 7 days.
7. Moisture Vapor Transmission: ASTM E96/E96M; less than 2 perms.
8. Flame Spread (Foam Core): ASTM E84; 0-25.
9. Service Temperature: ASTM E84; minus 40 to plus 250 degrees F.
10. Comply with UL 1256, and FM 4450, and FM 4880 as applicable.
11. Acceptable Product: Sarnatherm Insulation Glass Fiber Mat Facer.
 - a. Provide tapered insulation of the same material.

- B. Tapered Insulation System: Provide polyisocyanurate foam tapered units where indicated in conjunction with other non-tapered boards.

1. Slopes: As indicated on Drawings.

2.06 ACCESSORIES

- A. Adhesives & Sealants: Only use adhesives and sealants that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168, CAL-Green Table 5.504.4.1 Adhesive VOC Limit, and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements [on the interior of the building].

1. Current requirement refers to the date on which the materials are installed in the building.
2. A copy of SCAQMD Rule #1168 is referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

- B. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
 - 1. Product: Sarnastack Universal.
- C. Membrane Adhesive: As recommended by membrane manufacturer.
 - 1. Comply with adhesives and sealants and volatile organic compound (VOC) product requirements specified in Section 018114.
 - 2. Product:
 - a. Sarnafil; Sarnacol 2121 Adhesive, water-based.
 - 3. Location: Walls and curbs and as required by manufacturer.
- D. Thinners and Cleaners: As recommended by adhesive manufacturer, compatible with membrane.
- E. Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.
 - 1. Corners: Factory pre-fabricated.
 - 2. Product: Sarnareglet.
- F. Sealants: As recommended by membrane manufacturer.
- G. Perimeter Warning Tape: Manufacturer's proprietary 2 inch wide pressure sensitive reflective tape.
- H. Walkway Pads: Manufacturer's proprietary membrane roll product; adhered to primary membrane, 9/16 inch (14 mm) thick flexible TPO with a heavily textured surface, loose laid on top of completed roof assembly.
 - 1. Product:
 - a. Sarnafil; Crossgrip Walkway.
- I. PVC-Coated Sheet Metal Flashing: 24 gauge, G90 galvanized metal sheet with a 20 mil (0.5 mm) unsupported Sarnafil membrane laminated on one side.
 - 1. Product:
 - a. Sarnafil; Sarnaclad.
- J. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.
- K. Metal Termination Bars: Membrane manufacturer's standard extruded aluminum or formed stainless steel bars with upper flange to receive sealant, minimum 1 inch wide by 1/8 inch thick with prepunched holes at 6 inches on center.
- L. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
- M. Miscellaneous Accessories: Provide membrane manufacturer's recommended preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, foil tape, and other accessories required for the roofing installation.
 - 1. Fasteners, anchors, nails, straps, bars, etc. shall be stainless steel. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1-1/4

inch (32 mm) and shall be approved for such use by the fastener manufacturer. 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
- C. Verify deck is supported and secure.
- D. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- E. Verify deck surfaces are dry and free of snow or ice.
- F. Verify deck surfaces are dry.
- G. Verify that roof openings, curbs, and penetrations through roof are solidly set, and roof drain bodies are in place.

3.02 CONCRETE DECK PREPARATION

- A. Fill surface honeycomb and variations with latex filler.
- B. Verify that lightweight insulating cellular concrete has passed required pull tests.
- C. Confirm dry deck by moisture meter with 12 percent moisture maximum.
- D. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- E. 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.
- F. 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.
- G. Protect adjacent construction from damage during roofing operations.

3.03 INSTALLATION - GENERAL

- A. Perform work in accordance with NRCA Roofing and Waterproofing Manual and manufacturer's instructions.
- B. Do not apply roofing membrane during unsuitable weather.

- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.04 MEMBRANE APPLICATION

- A. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
- B. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- C. Shingle joints on sloped substrate in direction of drainage.
 - 1. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Minimize seams in general, and wrinkles, fishmouths, and bubbles where possible.
- E. Fully Adhered Application: Apply adhesive to substrate at rate recommended by manufacturer for specified performance requirements. Fully embed membrane in adhesive except in areas directly over or within 3 inches (75 mm) of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- F. Around roof penetrations, fully hot-air weld watertight flanges and flashings with flexible flashing.
- G. Hot-Air Welding of Seam Overlaps:
 - 1. General:
 - a. Adjacent sheets shall be welded in accordance with manufacturer's instructions.
 - b. Side and end lap joints shall be hot-air welded. Seam overlaps should be 3 inches wide when automatic machine-welding and 4 inches wide when hand welding.
 - c. Overlaps shall be with the flow of water where possible.
 - d. Welding equipment shall be provided by or approved by membrane manufacturer. Mechanics intending to use the equipment shall have successfully completed a training course provided by a manufacturer's representative prior to welding.
 - e. Membrane surfaces to be welded shall be clean and dry in accordance with manufacturer's instructions. No adhesives shall be present within the lap areas.
 - 2. Hand-Welding: Hand-welded seams shall be completed in three stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
 - a. The lap shall be tack welded every 3 feet to hold the seam in place.
 - b. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.
 - c. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller shall be positioned perpendicular to the nozzle and rolled lightly.
 - 3. Machine Welding: Machine welded seams are achieved by the use of various automatic welding equipment.

- a. When using this equipment, manufacturer's instructions shall be followed and local codes for electric supply, grounding and over current protection observed.
 - b. Automatic welding machines required 218 to 230 volts at 30 amps. Dedicated circuit house power or a dedicated portable generator is recommended.
 - c. T-Joints (Three-Way Laps):
 - d. When welding a three-way overlap with membrane thicker than 1.5 mm, the top edge of the second membrane layer shall be shaved down to create a smooth transition for the top membrane layer to conform to for positive welding.
 - e. Chamfer the edge of the membrane using means and methods acceptable to manufacturer.
4. Quality Control of Welded Seams:
- a. Completed welded seams shall be checked by the installer after cooling for continuity using a rounded screwdriver or other suitable blunt object.
 - b. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of black material from the edge of completed joints.
 - c. On-site evaluation of welded seams shall be made daily by the Contractor at locations as directed by the membrane manufacturer's representative.
 - d. 2 inch wide cross-section samples of welded seams shall be taken at least three times a day through completed seams.
 - e. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Contractor at no extra cost to the Owner.
 - f. Welded seams shall be left exposed until inspected and accepted by the membrane manufacturer.
- H. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring. Prime backside of flashing membrane prior to setting in compatible sealant bed.

3.05 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories according to roofing system manufacturer's written instructions and as shown in Contract Documents and approved Shop Drawings.
- B. Adjacent sheets of PVC coated metal shall be spaced 1/4 inch apart. The end joints of the metal shall be fastened 6 inches on center. Joints shall be covered with 1 inch wide aluminum tape. A 4 inch wide membrane flashing strip shall be hot-air welded over the joint.
- C. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- D. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- E. 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.

- F. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars. Provide foil tape over membrane at all locations membrane will interface with self-adhesive flashing.

3.06 SAFETY STRIP INSTALLATION

- A. Safety Strip: Install safety strip six feet from the building edge or as indicated on the drawings. Apply to substrate according to roofing system manufacturer's written instructions.

3.07 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field quality control and inspection.
- B. Request site attendance of roofing manufacturer technical representative at the beginning of roofing operations and during various stages of installation of roof assembly.
 - 1. Manufacturer's Field Services:
 - a. Provide inspection to ascertain specified material and workmanship quality is being maintained and for purposes of warranty verification.
 - b. Perform final inspection after roof completion.
 - c. Field Reports: Submit summary of Project site observations, instructions and monitoring activities.
 - 2. Site Tests and Inspections:
 - a. Inspect cured seams with probe or similar device to ensure welds are consistent.
 - b. Correct defective seams.
 - 3. Correct identified defects or irregularities.
- C. Testing Agency: Owner will engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
- D. ~~Flood Testing: Flood test each roofing area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.~~
 - 1. ~~Flood to an average depth of 2-1/2 inches (65 mm) with a minimum depth of 1 inch (25 mm) and not exceeding a depth of 4 inches (100 mm). Maintain 2 inches (50 mm) of clearance from top of base flashing.~~
 - 2. ~~Flood each area for 48 hours.~~
 - 3. ~~After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.~~
 - a. ~~Cost of retesting is Contractor's responsibility.~~
 - 4. ~~Testing agency shall prepare survey report indicating locations of initial leaks, if any, and final survey report.~~
- E. Infrared Thermography: Testing agency shall survey entire roof area using infrared color thermography according to ASTM C 1153.
 - 1. Perform tests before overlying construction is placed.
 - 2. After infrared scan, locate specific areas of leaks by electrical capacitance/impedance testing or nuclear hydrogen detection tests.

3. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 4. Testing agency shall prepare survey report of initial scan indicating locations of entrapped moisture, if any.
- F. Electrical Capacitance/Impedance Testing: Testing agency shall survey entire roof area for entrapped water within roof assembly according to ASTM D 7954/D 7954M.
1. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - a. Cost of retesting is Contractor's responsibility.
 2. Testing agency shall prepare survey report indicating locations of entrapped moisture, if any.
- G. Nuclear Hydrogen Detection Testing: Testing agency shall survey entire roof area for entrapped water within roof assembly according to SPRI/RCI NT-1.
1. After testing, repair leaks, repeat tests, and make further repairs until roofing and flashing installations are watertight.
 - a. Cost of retesting is Contractor's responsibility.
 2. Testing agency shall prepare survey report indicating locations of entrapped moisture, if any.
- H. Low-Voltage Electrical Conductance Testing: Testing agency shall survey entire roof area and flashings to locate discontinuity in the roof membrane using an exposed metal electrical loop to create an electrical field tested with handheld probes or a scanning platform with integral perimeter electrical loops creating a complete electrical field.
1. Perform tests before overlying construction is placed.
 2. After testing, repair areas of discontinuities, repeat tests, and make further repairs until roofing and flashing installations are contiguous.
 - a. Cost of retesting is Contractor's responsibility.
 3. Testing agency shall prepare survey report indicating locations of initial discontinuities, if any.
- I. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- J. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- K. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.
- 3.08 CLEANING
- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
 - B. Remove markings from finished surfaces.³³
 - C. In areas where finished surfaces are soiled by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their documented instructions.
 - D. Repair or replace defaced or damaged finishes caused by work of this Section.

3.09 PROTECTION

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does 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 roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.
- D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 075400

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings and counterflashings.
- B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 061053 - Miscellaneous Rough Carpentry: Wood nailers for sheet metal work.
- C. Section 075400 - Thermoplastic Membrane Roofing.
- D. Section 079200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.
- E. Section 099113 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- F. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2014.
- G. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007 (Reapproved 2012).
- H. NRCA ML104 - The NRCA Roofing and Waterproofing Manual; Fifth Edition, with interim updates.
- I. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- J. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; Single Ply Roofing Industry; 2003. (ANSI/SPRI ES-1)

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate with roofing work for scheduling installation of counterflashing, rain drainage and similar items related to roofing.

2. Coordinate with the work of Section 079200 for installation of related sealants.
- B. Preinstallation Meeting: Convene one week minimum before starting work of this Section.
1. Convene a pre-installation meeting under general provisions of Section 017000.
 2. Require attendance of parties directly concerned with the work of this Section, including those who are required to coordinate with the work, and those who are required to protect the work upon completion. Include the manufacturer's technical representative, Owner and Architect.
 3. Review submittals.
 4. Review preparation and installation procedures and coordinating and scheduling required with related work.
 5. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 6. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
 7. Review requirements for insurance and certificates if applicable.
 8. Review sheet metal flashing observation and repair procedures after flashing installation.
- C. Sequencing: Do not proceed with installation of flashing and sheet metal work until substrate construction, cants, blocking, reglets, and other construction are ready to receive the work of this Section.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product criteria, characteristics, accessories, jointing and seaming methods, and termination conditions.
1. Product Data: Submit for each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- C. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
1. Include plans, elevations, sections, and attachment details. reference details to plans. elevations, and sections. Key details to plans. elevations and sections.
 2. Detail fabrication and installation layouts, and keyed details. Distinguish between shop- and field-assembled work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming, including profiles, shapes, seams, laps, and dimensions.
 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of termination points and assemblies.
 7. Include details of roof-penetration flashing.
 8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 9. Include details of special conditions.
 10. Include details of connections to adjoining work.
 11. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches..
- D. Qualification Data: For Fabricator and Installer.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.07 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise indicated.
- B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 5 years of documented experience.

1.08 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 014000.
- B. Build mockup of typical roof edge, including built-in gutter and fascia, approximately 10 feet long, including supporting construction cleats, seams, attachments and accessories.
- C. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- D. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.09 DELIVERY, STORAGE, AND HANDLING

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

1.10 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion. Defective work includes failure of watertightness or seals.
- C. Provide 20 year manufacturer warranty for prefinished sheet metal materials. Warranty shall include degradation of metal finish.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.
- D. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:
 - 1. Design Pressure: As indicated in Section 075400 - Thermoplastic Membrane Roofing.
- E. Recycled Content of Steel-Sheet Flashing and Trim: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.02 SHEET METAL FLASHING AND TRIM ASSEMBLIES

- A. Flashing Assemblies:
 - 1. Capable of withstanding structural movement, thermally induced movement, and exposure to wind and weather without failure or permanent deformation.
 - 2. Physically protect roofing systems, roof accessories, and other building elements and systems from damage that would permit water leakage to building interior under all weather conditions.
- B. Roof Edge Flashing Assemblies:
 - 1. Pull-Off Resistance: Tested in accordance with SPRI ES-1 RE-1, RE-2, and RE-3 as applicable to positive and negative design wind pressure as defined by applicable code.
 - 2. Capable of withstanding structural movement, thermally induced movement, and exposure to wind and weather without failure or permanent deformation.
 - 3. Physically protect roofing systems, roof accessories, and other building elements and systems from damage that would permit water leakage to building interior under all weather conditions.

2.03 SHEET MATERIALS

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239) inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.
 - 1. Applications: Flashings and counterflashings exposed to public view, and where specifically indicated on Drawings.
 - 2. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 3. Color: As selected by Architect from manufacturer's full colors.
- B. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); plain finish shop pre-coated with fluoropolymer coating.
 - 1. Applications: As indicated on Drawings.

2. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
3. Color: As selected by Architect from manufacturer's full colors.

C. Lead Sheet: ASTM B749, 0.047 inch (1.19 mm) minimum thickness; UNS Number L51121.

D. Stainless Steel: ASTM A666, Type 304, soft temper, smooth No. 4 finish.

2.04 ACCESSORIES

A. 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. Self-Adhered High Temperature Underlayment: 40 mil, cold applied, self-adhering membrane composed of a high strength polyethylene film coated on one side with a layer of butyl rubber adhesive. An embossed, slip resistant surface is provided on the polyethylene.

1. Product:
 - a. GCP Applied Technologies; Grace Ice and Water Shield HT..

C. Protective Backing Paint: Asphaltic mastic, ASTM D4479 Type I.

D. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

E. Sealant to be Exposed in Completed Work: ASTM C920; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

F. Sealant: Specified in Section 079200.

G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

H. Solder: ASTM B32; Sn50 (50/50) type.

I. Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

J. Stainless steel band clamp.

K. Solid Rivets: Made from same materials as product being inserted into.

2.05 FABRICATION

A. Sheet Metal Thickness/Mass:

1. Flashing: In accordance with SMACNA Chapter 4.

B. Flashing and Counter Flashing:

1. Fabricate as indicated on Drawings and in accordance with SMACNA Architectural Sheet Metal Manual, Chapter 4.
2. Hem exposed flashings on underside 1/2 inch; miter and seam corners.

3. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
 4. Fabricate flashings to allow toe to extend minimum 2 inches over wall surfaces.
 5. Shop fabricate items where practicable.
 6. Obtain field measurements for accurate fit before shop fabrication.
 7. Factory finished color as selected by Architect from manufacture's full range.
- C. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- D. Fabricate cleats and starter strips of same material as exposed sheet, one gage thickness heavier than exposed sheet, and interlockable with exposed sheet.
1. Provide continuous cleat strips for metal copings and flashings.
- E. Form pieces in longest possible lengths.
- F. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- G. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with Solder unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
1. Tin edges to be seamed, form seams, and solder.
 - a. Solder
 - 1) Mechanically fasten and solder and seal metal joints except those indicated or required to be expansive type joints.
 - 2) After soldering, remove flux. Wipe and wash solder joints clean.
 - 3) Do not use graphite pencils to mark metal surfaces.
- I. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, and mechanically fastened and solder.
1. All corners, saddles, pans, etc. shall have joints w/ mechanically fastened and soldered watertight; only simple lap joints of self adhered metal may be sealed (box-cross method).
- J. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- K. Fabricate flashings to allow toe to extend minimum 4 inches (100 mm) over roofing terminations. Return and brake edges.
- L. Fabricate sheet metal saddles and collars with 4 inch minimum flanges that are mechanically fastened and soldered watertight. Return and brake edges.
- M. Reglet Counterflashings: Form upper edge with snap-lock flange to engage the reglet receiver, and to provide spring action pressure at bottom edge against roof base flashings.
- N. Provide for thermal expansion/contraction of all exposed sheet metal work exceeding 15 feet in running length, except as otherwise indicated.
- 2.06 LOW-SLOPE ROOF SHEET METAL FABRICATIONS
- A. The NRCA, SMACNA, and FM Global offer recommendations for profiles, thicknesses, fastenings, and installation of low-slope roof sheet metal fabrications. Base-metal

thicknesses cited for zinc-tin alloy-coated stainless-steel and copper sheets, for copper-clad stainless-steel sheet, and for zinc sheet are from manufacturer's literature.

- B. Roof-to-Roof Edge-Flashing (Gravel-Stop) and Fascia: Fabricate from the following materials: Shop fabricate interior and exterior corners.
 - 1. Fabricate from the Following Materials:
 - a. Galvanized Steel: 0.034 inch thick.
- C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.
- D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch thick.
- E. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: 0.028 inch thick.
 - 2. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.
- F. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Lead: 4.0 lb/sq. ft. (1.6 mm thick), hard tempered.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

3.03 INSTALLATION - GENERAL

- A. Comply with SMACNA Architectural Sheet Metal Manual.
- B. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
- C. Separate stainless steel work from dissimilar metals, wood and cementitious materials with approved separation material. Use bituminous coating only where high-temperature self-adhering membrane underlayment cannot be used, or is not recommended by metal manufacturer.
- D. Cleats and Edge Strips: Secure edges of sheet metal members over 12 inches wide, and at other indicated locations with cleats. Fasten cleats at maximum 12 inches on center unless

- otherwise indicated. Provide continuous edge strips at eaves and gable ends for attaching exposed terminating edge of copings, gravel stops, or fascias. Provide minimum 1/8 inch butt joints as required to accommodate thermal movement.
- E. Gravel Stops and Fascias: Fill space between gravel stop and cover plate with roofing cement. Nail cover plate to deck at expansion joint. Extend flange of gravel stop out on top of roofing membrane not less than 3-1/2 inches. Set in roofing cement or mastic sealer and nail to wood nailers with one inch long #12 flathead annular head nails at 3 inches on center, staggered. Provide continuous interlocking edge strip where gravel stop extends down to form a finished fascia.
 - F. Formed Metal Copings: Extend front and back edges of coping down over continuous interlocking edge strip. Terminate rear edge with hemmed and folded edge over roof base flashings, or interlock with adjacent flashings as indicated. Miter, seam, weld, and seal corners.
 - G. Recessed Reglet Flashings and Counterflashings: Insert flashings full depth into recessed reglet. Anchor by mechanical means, including driven wedges of lead or other compatible metal spaced at 12 inches on center. Seal joint with elastomeric sealant specified in Section 079200.
 - H. Surface Mounted Reglet Flashings and Counterflashings: Place surface mounted reglet not less than 9 inches above top of finish roof surface.. Place sealant in preformed groove on back of reglet and on lap before installation. Secure reglet to wall with power driven pins through neoprene washers spaced not less than 16 inches on center. Fill top groove with elastomeric sealant specified in Section 079200. After roofing is installed, install snap-lock counterflashing.
 - 1. Lap counterflashing end joints minimum 3 inches. Do not solder joints. Provide continuous and soldered counterflashings at angles and corners, and lap over roof base flashings minimum 4 inches, unless detailed otherwise.
 - I. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for silicone sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
 - J. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
 - K. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate as required for wind anchorage.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 18-inch centers.
 - L. Apply plastic cement compound between metal flashings and felt flashings.
 - M. At rainscreen drainage wall assemblies with continuous concealed air barrier, provide fully soldered collar flashings at all penetrations. Collar flashings shall have continuous, min. 4 inch wide flanges around the penetration for integration with air barrier.

- N. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles. Extend counter flashings 4 in. minimum over roofing or waterproofing.
- O. Extend counter flashings 4 inches minimum over roofing or waterproofing.
- P. Lap joints over minimum 8 in. wide backer plate in butyl sealant bed.
- Q. Lap joints over minimum 8 inches wide backer plate in butyl sealant bed.
- R. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- S. Solder metal joints for full metal surface contact, and after soldering wash metal clean with neutralizing solution and rinse with water.
 - 1. Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches except where pre-tinned surface would show in finished Work.
 - 2. Stainless-Steel Soldering: Pre-tin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.

3.04 INSTALLATION - STAINLESS STEEL

- A. Separate stainless steel and copper work from dissimilar metals, wood and cementitious materials with polyethylene underlayment. Use bituminous coating only where underlayment cannot be used, or is not recommended by metal manufacturer.

3.05 INSTALLATION - ALUMINUM

- A. Bed aluminum base members in plastic cement, anchor and seal in accordance with manufacturer's instructions.
- B. Clean exposed surfaces immediately to prevent the start of non-uniform oxidation or electrolytic action.
- C. Apply protective backing paint to concealed surfaces which will be in contact with cementitious materials, dissimilar metals, wood, or other absorptive substrates.

3.06 UNDERLAYMENT INSTALLATION

- A. Self-Adhering Sheet Underlayment: Install wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water. Overlap edges not less than 3-1/2 in (87 mm). Roll laps with roller. Cover underlayment within 14 days.

3.07 CLEANING AND PROTECTION

- A. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

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

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including copings and fascias.
- B. Roof control joint covers.

1.02 RELATED REQUIREMENTS

- A. Section 077200 - Roof Accessories: Manufactured curbs, roof hatches, and snow guards.
- B. Section 079200 - Joint Sealants.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems; 2017.
- C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- D. NRCA (RM) - The NRCA Roofing Manual; 2017.
- E. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.
- F. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems; 2011.

1.04 PREINSTALLATION CONFERENCE: CONDUCT CONFERENCE AT PROJECT SITE.

- A. 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.
- B. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
- C. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.
- D. Review approved submittals.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings:

1. Include plans, elevations, keyed details. Distinguish between plant- and field-assembled work.
 2. Show locations and extent of components on plans / elevations with detail callouts.
 3. Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- D. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.
- E. Installer and Manufacturer Qualifications.
- 1.06 SUSTAINABILITY SUBMITTALS
- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
- 1.07 QUALITY ASSURANCE
- A. Perform work in accordance with SMACNA (ASMM) details.
- B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 075400 - Thermoplastic Membrane Roofing.
- 1.08 MOCKUPS
- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.
1. ~~Build mockup of typical roof edge as part of Integrated Exterior Mockup specified in Section 014000 "Quality Requirements"~~
 2. Build mockup of typical roof edge, including coping and fascia, approximately 10 feet (3.0 m) long, including supporting construction, seams, attachments, underlayment, and accessories.
 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.
- 1.09 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.

- B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.
 - 1. Coordinate with installer where work is to be performed on a daily basis so that personnel, equipment, and materials below work area are properly protected.
- C. Installation shall not proceed if unusual condition is discovered or one that will preclude work to be performed in accordance with Drawings and Specifications. Contractor shall immediately report this finding to the Architect for discussion and resolution.
- D. Roofing and waterproofing surfaces shall be kept clean and free of debris.

1.11 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 075400 - Thermoplastic Membrane Roofing.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers - Roof Edge Flashings and Copings:
 - 1. Same manufacturer as roof membrane.
 - 2. Sika, Sarnafil.

2.02 ROOFING COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
 - 1. Configuration: Fascia and edge securement for roof membrane;
 - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code.
 - 3. Material: Formed aluminum sheet, 0.040 inch (1.00 mm) thick, minimum.
 - 4. Finish: 70 percent polyvinylidene fluoride.
 - 5. Basis of Design Products:
 - a. Sarnafil; Edge Grip Fascia.
- B. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
 - 1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
 - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.
 - 3. Material: Formed aluminum sheet, 0.050 inch (1.3 mm) thick, minimum.
 - 4. Finish: 70 percent polyvinylidene fluoride.
 - 5. Color: As indicated on drawings.
 - 6. Basis of Design Products:
 - a. Sarnafil; Wall Grip Coping Plus
 - b. Acceptable Products:

- C. Control Joint Covers: Composite construction of flexible EPDM flashing of black color with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 1 inch (25 mm). Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.

2.03 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Sealant: Specified in Section 079200.

2.04 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate, areas, and conditions, with installer present.
- B. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. 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.
- E. Coordinate installation of components of this Section with installation of roofing membrane and base flashings.
- F. Coordinate installation of sealants and roofing cement with work of this Section to ensure water tightness.

3.03 PROTECTION AND CLEANING

- A. Protect copings, roof edges flashings, and expansion joints from damage and wear during the remainder of the construction period.
- B. Clean over-spray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 077100

SECTION 077200 - ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured curbs and pedestals.
- B. Pipe and duct supports.

1.02 RELATED REQUIREMENTS

- A. Section 075400 - Thermoplastic Membrane Roofing.
- B. Section 076200 - Sheet Metal Flashing and Trim: Roof accessory items fabricated from sheet metal.
- C. Section 077100 - Roof Specialties: Other manufactured roof items.
- D. Section 079200 - Joint Sealants.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate with installation of roofing system and related flashings for weather tight installation.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 3. Submit documentation that roof accessories accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for UL requirements as applicable to fire rated roof hatches.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated units.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a two year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURED CURBS

- A. Acceptable Products:
 - 1. Pate Company (The); Style PC-5.
 - 2. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.; Model RC-4A.
 - 3. Roof Products, Inc.; Model RPC-1.
 - 4. ThyCurb; Model TC-1.
- B. Manufactured Curbs, Equipment Rails, and Other Roof Mounting Assemblies:
Factory-assembled hollow sheet metal construction with fully mitered and welded corners, integral counterflashing, internal reinforcing, and top side and edges formed to shed water.
 - 1. Sheet Metal: Hot-dip zinc coated steel sheet complying with ASTM A653/A653M, SS Grade 33 (230); G60 (Z180) coating designation; 18 gage, 0.048 inch (1.21 mm) thick.
 - 2. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing insulation; 1:1 slope; minimum cant height 4 inches (102 mm).
 - 3. Manufacture curb bottom and mounting flanges for installation directly on roof deck, not on insulation; match slope and configuration of roof deck.
 - 4. Provide the layouts and configurations shown on the Drawings.
 - 5. Coordinate height of curbs to provide a 10 inch minimum upturn for both base and counter flashing and membrane termination.
- C. Curbs Adjacent to Roof Openings: Provide curb on all sides of opening, with top of curb horizontal for equipment mounting.
 - 1. Provide preservative treated wood nailers along top of curb.
 - 2. Insulate inside curbs with 1-1/2 inch (38 mm) thick fiberglass insulation.
 - 3. Height Above Finished Roof Surface: 10 inches (254 mm), minimum.
 - 4. Height Above Roof Deck: 14 inches (356 mm), minimum.
- D. Equipment Rails: Two-sided curbs in straight lengths, with top horizontal for equipment mounting.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pate Company (The); Style ES-5.
 - b. Roof Products and Systems (RPS); a division of Hart & Cooley, Inc.; Model ER-4A .

- c. Roof Products, Inc.; Model RPES-1 .
- d. ThyCurb; Model TEMS-1.
2. Provide preservative treated wood nailers along top of rails.
3. Height Above Finished Roof Surface: 10 inches (254 mm), minimum.
4. Height Above Roof Deck: 14 inches (356 mm), minimum.

2.02 NON-PENETRATING ROOFTOP SUPPORTS

- A. Non-Penetrating Rooftop Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly.
 1. Design Loadings and Configurations: As required by applicable codes.
 2. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 3. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 4. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
- B. Adjustable-Height Roller-Bearing Pipe Supports:
 1. Basis-of-Design Product:
 - a. B-Line, DURA-BLOK
 - b. Prior approved equal.
 2. Curb Base: 100% recycled rubber and polyurethane prepolymer with a uniform load capacity of 500 pounds per linear foot of support.
 - a. Dimensions: 6-inches wide by 6-3/4 inches tall by 20 inches long.
 3. Steel frame: Steel, 14gage strut galvanized per ASTM A653 or 12gage strut galvanized per ASTM A653 for bridge series.
 4. Roller housing, with stainless-steel threaded rod designed for adjusting support height, accommodating up to 20 diameter pipe or conduit; with provision for pipe retainer and with manufacturer's support pad or deck plate as recommended for penetration-free installation over roof membrane type; as required for quantity of pipe runs and sizes.
- C. Duct Supports: with manufacturer's recommended hardware for mounting to structure or structural roof deck.
 1. Basis-of-Design Product:
 - a. B-Line, DURA-BLOK
 - b. Prior approved equal.
 2. Curb Base: 100% recycled rubber and polyurethane prepolymer with a uniform load capacity of 500 pounds per linear foot of support.
 - a. Dimensions: 6-inches wide by 6-3/4 inches tall by 42 inches long.
 3. Steel frame: Steel, 14gage strut galvanized per ASTM A653 or 12gage strut galvanized per ASTM A653 for bridge series.
 4. Roller housing, with stainless-steel threaded rod designed for adjusting support height, accommodating up to 20 diameter pipe or conduit; with provision for pipe retainer and with manufacturer's support pad or deck plate as recommended for penetration-free installation over roof membrane type; as required for quantity of pipe runs and sizes.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that deck, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing weather integrity.
- B. Apply bituminous paint on surfaces of units in contact with cementitious materials or dissimilar metals.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.

3.04 ADJUSTING

- A. Adjust hardware for smooth operation.

3.05 CLEANING

- A. Clean installed work to like-new condition.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.
- C. Touch up factory-primed surfaces with compatible primer ready for field painting as recommended by manufacturer.
- D. Clean exposed surfaces according to manufacturer's written instructions.
- E. Clean off excess sealants.
- F. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

3.06 PROTECTION

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

END OF SECTION 077200

SECTION 078400 - FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems, materials, and accessories.
- B. Fire-resistive joint systems.
- C. Firestopping at electrical junction boxes in fire-rated walls.
- D. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on Drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 017000 - Execution and Closeout Requirements: Cutting and patching.
- B. Section 018114 - Sustainable Design Requirements - CAL-Green.
- C. Section 092116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

1.03 SYSTEM DESCRIPTION

- A. General: Make firestop and smoke seal assembly selections that comply with UL Fire Resistance Directory, authority having jurisdiction, and applicable codes for:
 - 1. Materials, fabrication, and installation of firestops and smoke seals.
 - 2. Fire containment.
 - 3. Fire resistant construction joints.
 - 4. Dynamic partition head details.
 - 5. Edge of slab and curtain wall conditions.
 - 6. Penetrations through fire-rated floors, walls, and shafts.
 - 7. Duct and damper firestops.
 - 8. Intumescent wraps and pads at receptacle boxes and recessed items within fire rated walls.
 - 9. Coordinate with mechanical and electrical to provide single manufacturer for all firestopping materials.
- B. Firestop Voids and Openings in Following Locations:
 - 1. Duct, cable, cable tray, conduit, piping, and other penetrations through floor slabs (except on-grade slabs) and through fire rated walls and partitions.
 - 2. Penetrations of vertical shafts, pipe chases, elevator shafts, and utility shafts.
 - 3. Openings between floor slab edges and exterior walls, including glass and aluminum curtain walls.
 - 4. Openings, gaps, and cracks at abutting fire rated assemblies and components, such as wall-to-wall and wall-to-floor including overhead floor and roof decks.
 - 5. Blank openings into or through fire rated floors and walls.
 - 6. Other locations indicated or scheduled.
- C. Design Requirements:
 - 1. Firestop materials used to fill floor openings in which smallest dimension is 4 inches shall support same loads that floor was designed to support. If equal floor loading

capacity cannot be obtained with firestop material, provide fire rated permanent covering to support loads and traffic, capable of being removed to allow access.

2. Insulated Piping and Duct Penetrations: Install firestop systems intended for use with type of insulation on penetrating item.
 - a. Install firestop systems intended for use with type of insulation on penetrating item.
 - b. If compatible firestop system is unavailable, remove insulation at contact area with firestop material
 - c. Coordinate with trades who installed insulation to ensure proper re-sealing of cut edges of insulation.
3. Provide Products that Do Not Deteriorate when Exposed to Following Conditions:
 - a. Plumbing and Wet-Pipe Sprinkler Systems: Moisture-resistant through-penetration firestop.
 - b. Exposed to View:
 - 1) Flame-spread value of less than 25 and smoke-developed value of less than 450, ASTM E84.
 - 2) Compatible with applied finishes.
- D. F and T Rating Requirements: Conform to F and T ratings, ASTM E 814 (ANSI/UL 1479).
 1. Comply with applicable codes and authority having jurisdiction.
 2. F Ratings: Equal to fire resistance rating of assembly being penetrated but not less than one hour.
 3. T Ratings: Equal to F ratings or as required by authority having jurisdiction.
- E. Testing Requirements:
 1. Utilize systems and materials tested and approved by UL or other nationally recognized independent testing agency acceptable to authorities having jurisdiction.
 2. Determine fire ratings in accordance with ASTM E814 (ANSI/UL 1479) for through penetration firestops, ASTM E119 (UL263) for fire rated assemblies, and as required by applicable codes and authority having jurisdiction.
- F. Large openings may be closed with same type construction as adjacent floor, roof, and wall assembly.
- G. Sealing around penetrations fire rated assemblies without approved firestop system is not permitted. Methods and materials not permitted include but are not limited to:
 1. Joint compound at gypsum board assemblies.
 2. Mortar at masonry and concrete assemblies.
 3. Use of joint sealants.
- H. Whenever finished firestop materials are scheduled to receive finish paint or other coatings, test compatibility of firestop materials with coatings to be applied.

1.04 DEFINITIONS

- A. Firestopping: A material or combination of materials used to retain the integrity of fire- and smoke-rated construction by maintaining an effective barrier against the spread of flame, and to impede the passage of smoke, gases, and moisture through penetrations, blank openings, construction joints, and perimeter fire/smoke containment in or adjacent to fire- and smoke-rated wall, floor, ceiling, and other rated construction assemblies.

- B. Assembly: Particular arrangement of materials specific to type of construction described or detailed in referenced UL or other approved design.
- C. Barrier: Time-rated fire walls, smoke barrier walls, time-rated floor/ceiling assemblies, and structural floors.
- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is interrupted.
- E. Membrane Penetration: An opening made through one side of an assembly without passing completely through the assembly.
- F. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, top of wall and ceiling, structural floors or roof decks, and adjacent sections of structural floors.
- G. System: Specific products and applications, classified and numbered by UL or other approved testing agency to close specific barrier penetrations.
- H. Sleeve: Metal fabrication or pipe section extending through thickness of barrier used to permanently guard penetration.
- I. VOC: Volatile organic compound(s).

1.05 REFERENCE STANDARDS

- A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.
- C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2009.
- D. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2010.
- E. ASTM E1399 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems; 1997 (Reapproved 2009).
- F. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems; 2007 (Reapproved 2007).
- G. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2010ae1.
- H. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2004.
- I. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a.
- J. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
- K. IFC - International Firestop Council Recommended Guidelines for Evaluating Firestop Systems Engineering Judgements; current edition.

- L. ITS (DIR) - Directory of Listed Products; current edition.
- M. FCIA - Firestop Contractors International Association Manual of Practice; current edition.
- N. FM 4991 - Approval Standard for Firestop Contractors; 2013.
- O. FM (AG) - FM Approval Guide; current edition.
- P. FA (AG) - FM Approval Guide; Factory Mutual Research Corporation; current edition.
- Q. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; Current Edition, Including All Revisions.
- R. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2011.
- S. UL (FRD) - Fire Resistance Directory; current edition.
- T. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; current edition.
- U. UL 1479 - Standard for Fire Tests of Through-Penetration Firestops; current edition.
- V. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems; current edition.

1.06 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of firestopping systems with affected trades and adjacent work.
- B. Preinstallation Meeting: Convene one week before starting work of this Section. Notify Owner, who may request attendance by an independent consultant.
 - 1. Convene under general provisions of Section 017000.
 - 2. Require attendance of parties directly concerned with the work of this Section, including those who are required to coordinate with the work, and those who are required to protect the work upon completion. Include the manufacturer's technical representative.
 - 3. Review installation procedures and coordination required with related work, and conditions which could affect successful performance of the work.
 - 4. Product and classification schedule.
 - 5. Test firestop materials to confirm compatibility with adjacent materials and chemicals and solvents with which they may come into contact during construction.
- C. Sequencing: Sequence work to permit firestopping materials to be installed after adjacent and surrounding work is complete.
 - 1. Do not cover or conceal firestopping installations until Owner's inspection agency and jurisdictional authority have inspected each installation.

1.07 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
 - D. Provide manufacturer's certification stating:
 - 1. Each penetration of fire rated walls and floor, partition heads, and edge of slabs will be firestopped with a firestopping system tested by UL or other recognized testing agency for substrate and penetrating item.
 - 2. Authorities having jurisdiction have approved firestopping systems for this project.
 - 3. Products and Classifications Schedule:
 - a. Provide tabular form schedule for firestops, fire containment, and fire resistant construction joints.
 - b. Schedule to identify:
 - 1) Construction penetrated including fire resistance rating.
 - 2) Penetrating item.
 - 3) Products and manufacturers included in each system.
 - 4) Form material used.
 - 5) Firestop classification and description from UL or other nationally recognized independent testing agency acceptable to authority having jurisdiction.
 - 6) Fire containment and fire resistant construction joint description.
 - 7) F and T ratings.
 - c. Update schedule periodically to include addition and changes.
 - E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
 - F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- 1.08 SUSTAINABILITY SUBMITTALS
- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
- 1.09 QUALITY ASSURANCE
- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
 - B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.
 - C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Approved by Factory Mutual Research under FM Standard 4991, Approval of Firestop Contractors, or meeting any two of the following requirements:
 - a. With minimum 5 years documented experience installing work of this type.

- b. Verification of at least five satisfactorily completed projects of comparable size and type.
 - c. Licensed by local authorities having jurisdiction (AHJ).
- D. Obtain firestop systems for each type and condition of penetration from a single manufacturer; intermixing of system components for each type and condition of penetration by different manufacturers is not permitted.
- E. Listed and tested assemblies and systems must be utilized, if they exist, before alternative systems requiring Engineering Judgement (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) will be considered. Comply with IFC and FCIA for EJ and EFRRA design and submittal requirements.
- F. Testing Requirements:
- 1. Utilize systems and materials tested and approved by UL or other nationally recognized independent testing agency acceptable to authorities having jurisdiction.
 - 2. Determine fire ratings in accordance with ASTM E814 (ANSI/UL 1479) for through penetration firestops, ASTM E119 (UL263) for fire rated assemblies, and as required by applicable codes and authority having jurisdiction.

1.10 REGULATORY REQUIREMENTS

- A. Comply with execution requirements of authority having jurisdiction including, if applicable, the requirement that all firestopping work be performed by a single qualified firm or subcontractor.

1.11 ~~MOCK-UP~~

- A. ~~Comply with general mock-up requirements specified in Section 014000.~~
- B. ~~Mock-up: Install one firestopping assembly representative of each fire rating design required on project.~~
 - 1. ~~Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.~~
 - 2. ~~Where firestopping is intended to fill a linear opening, install minimum of 1 linear ft (1/3 linear m).~~
 - 3. ~~Obtain approval of authorities having jurisdiction (AHJ) before proceeding.~~
 - 4. ~~If accepted, mock-up will represent minimum standard for the work.~~
 - 5. ~~If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.~~

1.12 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver materials in original unopened containers identified with manufacturer's brand designation and applicable UL label.
- B. Do not use damaged or expired materials.

1.13 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

1.14 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Include agreement to repair or replace joint sealers which fail in joint adhesion, extrusion resistance, migration resistance, general durability, or apparent deterioration beyond manufacturer's printed limitations for stipulated warranty period from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com.
 - 2. Other Acceptable Manufacturers:
 - a. Hilti, Inc.: www.us.hilti.com.
 - b. Specified Technologies, Inc.: www.stifirestop.com.
 - c. Pecora Corporation: www.pecora.com.
 - d. Prior approved equal.

2.02 FIRESTOPPING - GENERAL REQUIREMENTS

- A. General: Use firestopping systems which are acceptable for those applications for which they are specifically designed.
 - 1. Fire Ratings: See Drawings for required systems and ratings.
 - 2. Materials, fabrication, and installation of firestops and smoke seals.
 - 3. Fire containment.
 - 4. Fire resistant construction joints.
 - 5. Dynamic partition head details.
 - 6. Edge of slab and curtain wall conditions.
 - 7. Penetrations through fire-rated floors, walls, and shafts.
 - 8. Duct and damper firestops.
 - 9. Intumescent wraps and pads at receptacle boxes and recessed items within fire rated walls.
 - 10. Coordinate with mechanical and electrical to provide single manufacturer for all firestopping materials.
- B. Large openings may be closed with same type construction as adjacent floor, roof, and wall assembly.
- C. Sealing around penetrations fire rated assemblies without approved firestop system is not permitted. Methods and materials not permitted include but are not limited to:
 - 1. Joint compound at gypsum board assemblies.
 - 2. Mortar at masonry and concrete assemblies.
 - 3. Use of joint sealants.
- D. Whenever finished firestop materials are scheduled to receive finish paint or other coatings, test compatibility of firestop materials with coatings to be applied.
- E. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

- F. Scope: Install firestopping at all locations requiring protected openings where piping, conduit, cables, sleeves, ductwork and similar items penetrate fire-resistive, fire-rated, and smoke assemblies, including but not limited to:
1. Penetrations through wall, floor, and roof assemblies, including empty openings and openings containing penetrations.
 2. Membrane penetrations where items penetrate one side of the barrier assembly.
 3. Joints between rated assemblies to allow independent movement.
 4. Perimeter barriers between exterior wall assemblies and floor and roof assemblies.
 5. Joints, through-penetrations, and membrane penetrations in smoke-rated assemblies.
- G. Materials: Comply with ASTM E814, UL 1479, and UL 2079 as applicable to achieve indicated fire ratings.
- H. General Characteristics:
1. Surface Burning: ASTM E84 and UL 723; flame spread less than 25, smoke developed less than 450.
 2. Mold Resistance: Provide firestopping materials with mold and mildew resistance rating of 0 as determined by ASTM G21.
 3. Air Leakage of Perimeter Firestopping Barriers and Penetrations: UL 2079; L-rating less than 2.0 cfm/sf or 5.0 cfm/lf as applicable to the type and location of joint.
 4. Durability and Longevity: Permanent.
 5. Side Effects During Installation: Non-toxic.
 6. Side Effects Under Fire Exposure: Non-toxic.
 7. Long Term Side Effects: None.
- I. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.
1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.
 2. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.
 3. Air Leakage: In addition, provide systems that have been tested to show L Rating as indicated.
 4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.
- J. Fire Rated Joint Systems: Integrity and indicated fire-resistance ratings as determined by UL 2079, ASTM E1399 or ASTM E1966.
- K. Fire Rated Construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces and types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
- L. Smoke Barrier Construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.
- M. Sealant shall have a VOC content of 250 g/L or less.

- N. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- O. Select adhesives, primers and sealants meeting CAL-Green requirements.
 - 1. Adhesives shall meet or exceed the VOC and chemical component limits of CAL-Green Table 5.504.4.1 Adhesive VOC Limit requirements.
 - 2. Sealants and Sealant Primers shall meet or exceed the VOC and chemical component limits of CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
 - 3. Current requirement refers to the date on which the materials are installed in the building.
 - 4. SCAQMD Rule #1168 is referenced in section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
 - 5. Interior refers to all building construction that is inside of the exterior weatherproofing material.

2.03 MATERIALS

- A. Putty Compound: 100 percent solids intumescent or vinyl-type formulation, free of asbestos, silicones, solvents, halogens, PCB's, and inorganic fibers; flame spread/smoke developed rating 0/0 when tested in accordance with ASTM E84; paintable, not sensitive to freezing after set.
 - 1. Product: 3M Brand; "Fire Barrier" Moldable Putty.
- B. Sealant Compound: One-part intumescent, endothermic, ablative, or elastomeric acrylic water-based caulking material required by applicable UL Design; flame spread/smoke developed rating 0/0 when tested in accordance with ASTM E84.
 - 1. Product: 3M Brand; "Fire Barrier" CP 25WB+ Caulk.
- C. Firestopping Sealant: Silicone elastomer type; single component; non-sagging; neutral cure, re-entrable and repairable; UL classified.
 - 1. Product: 3M Brand; "Fire Barrier" 2000+ Silicone Sealant.
- D. Spray-Applied Compound: Water-based, flexible coating which dries to form a flexible seal; tested in accordance with ASTM E1399, complying with wind sway and thermal category, 500 cycles at minimum 10 cycles/minute.
 - 1. Product: 3M Brand; "FireDam Spray 100.
- E. Foam Compound: Two-part, liquid-silicone elastomer formulated to foam in place when mixed; flame spread/smoke developed rating 0/0 when tested in accordance with ASTM E84.
- F. Plastic Pipe Device: Intumescent strip material, factory or site fabricated in flexible metal collar with adjustable, screw-tightened stainless steel clamp; UL classified for use with PVC, CPVC, CCPVC, CCABS, PVDF, PP, PB, and FRPP plastic pipe.
- G. Composite Sheet: Composite, intumescent sheet, designed for firestopping large openings in conjunction with other firestopping components, capable of being cut to size in the field and fabricated to fit required penetration openings.
 - 1. Product: 3M Brand; "Fire Barrier" CS-195+ Composite Sheet.

- H. Blanket Material: Refractory ceramic fiber blanket encapsulated with aluminum foil scrim complying with NFPA 96; widths and thicknesses required by applicable UL Design; specifically designed as a flexible, fireproof enclosure for kitchen exhaust ducts and fire-rated air ductwork.
- I. Fire-Safing Insulation: ASTM C665, Type I; high-melt mineral fibers and resinous binders formed into blankets, density not less than 4.0 lbs/cu ft, tested for 3-hour fire containment for required depths and dimensions.
- J. Firestopping Pads: Intumescent, dielectric fire putty formed to 7 x 7 or 9.5 x 9.5 inch self-adhering pads, 2-hour fire rating listed by UL.
 - 1. Product: 3M Brand; Fire Barrier Wrap/Strip FS 195.
- K. Fire Rated Cable Pathways: Re-enterable device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill. These device modules shall be engineered such that two or more devices may be ganged together for greater capacity.
 - 1. Basis-of-Design Product: Specified Technologies, Inc.; EZ-Path or a comparable product.
 - a. One to Two Cables: EZ-Path Firestop Grommet.
 - b. One to Nine Cables: EZ-Path Series 22.
 - c. Ten or more cables: EZ-Path Series 33 and 44.

2.04 ACCESSORIES

- A. Provide necessary accessory materials specified in UL Design to achieve complete firestop system at each penetration. Include collars, sleeves, attachment devices, intumescent materials, and other items required.
- B. Primers, Sleeves, Forms, and Accessories: Type required for tested assembly design, and as recommended by firestopping manufacturer for specific substrate surfaces.
- C. Dam Material: Mineral fiberboard, mineral fiber matting, sheet metal, alumina silicate fire board, or other permanent material required as part of the firestopping system, or removable if not specifically required as part of the firestopping system.
- D. Retainers: Impale type clips to support mineral fiber safing blankets.
- E. Foam Type: Foam backer rod.
- F. Sleeves:
 - 1. Steel Type: Cylindrical; gauge, seam lap, and length as required by UL system listing.
 - 2. Wire Mesh Type: #8 steel wire cloth fabricated from galvanized steel wire that is 0.020 inch diameter by 1/8 inch on center in both directions.
- G. Labels:
 - 1. Provide label for each firestop condition.
 - 2. Type information in non-fading ink on 20 pound (minimum) paper.
 - 3. Include following information on each label:
 - a. Manufacturer's name.
 - b. Product name.
 - c. Product type (sealant, putty, mortar, or other generic material description).
 - d. F-Rating.
 - e. T-Rating. State when not required for condition.

- f. Testing and listing agency filing number, such as UL System number

PART 3 EXECUTION

3.01 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. Verify openings are ready to receive the work of this Section.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

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

3.03 INSTALLATION - GENERAL

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.
- C. Apply firestopping materials in sufficient thicknesses to achieve scheduled fire ratings, to uniform density and texture.
- D. Install material at openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping.
- E. Remove dam material after firestopping material has cured only if dam material is not required as part of the firestopping system; otherwise dam material to remain permanently in place.

- F. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- G. Install labeling required by code.

3.04 INSTALLATION - FIRE SAFING INSULATION

- A. Install safing insulation to completely fill spaces between floor slab edges and spandrel construction as detailed.
- B. Install safing insulation to completely fill voids between floor and roof deck flutes and top of wall construction where wall ratings are indicated.
- C. Install and support safing insulation permanently in position to comply with tested fire assembly and applicable building code requirements.

3.05 INSTALLATION - FIRESTOPPING PADS

- A. Install firestopping pads on back side of electrical junction boxes in fire-rated walls where boxes are located in same stud space on opposite sides of same wall, and elsewhere required by jurisdictional authority and local fire department.

3.06 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.
 - 7. Wall partitions are required to have protected openings or penetrations permanently identified with signs or stenciling. Such identification shall be located in accessible concealed floor, floor-ceiling or attic spaces:
 - a. Be repeated at intervals not exceeding 30 feet measured horizontally along the wall or partition; and
 - b. Include lettering not less than 0.5 inch in height, incorporating the suggested wording: "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS," also identify wall specific rating 1 HR, 2 HR etc...as indicated on architectural drawings.
 - 8. Include UL design number

3.07 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 014000.
- B. Inspect installed firestopping systems according to applicable requirements of ASTM E2174 and ASTM E2393.

- C. Do not conceal firestops, fire containments, and fire resistant construction joints prior to required inspection.
 - D. Notify authority having jurisdiction and designated inspectors of work released for inspection.
 - E. Inspection Requirements:
 - 1. Visually examine firestopping, fire containments, and fire resistant construction joints to verify compliance with Contract Documents.
 - 2. Examine firestopping, fire containments, and fire resistant construction joints for proper installation, adhesion, and curing appropriate for each material.
 - 3. Submit written inspection report including following information:
 - a. Identify construction penetrated including fire resistance rating.
 - b. Identify penetrating item.
 - c. Identify products and manufacturers included in each system.
 - d. Identify form material used.
 - e. Firestop classification and description from UL, FM, Warnock Hersey or other independent testing agency.
 - f. Fire containment and fire resistant construction joint description.
 - g. F and T rating.
 - h. State whether firestop, fire containment, and fire resistant construction joint is or is not in full compliance with testing agency classification, description and manufacturer's requirements. If variations occur confirm acceptance of variation by manufacturer and authority having jurisdiction.
 - F. Re-examine firestopping, fire containments, and fire resistant construction joints immediately prior to concealment by other construction to ensure no damage has occurred since initial inspection.
 - G. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.
- 3.08 CLEANING
- A. Clean adjacent surfaces of firestopping materials.
 - B. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
 - C. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is 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 and install new materials to produce systems complying with specified requirements.

END OF SECTION 078400

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 079200 - JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 072500 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- C. Section 074213 - Metal Wall Panels.
- D. Section 074213.23 - Metal Composite Material Wall Panels.
- E. Section 075400 - Thermoplastic Membrane Roofing.
- F. Section 076200 - Sheet Metal Flashing and Trim.
- G. Section 078400 - Firestopping.
- H. Section 079219 - Acoustical Joint Sealants.
- I. Section 085113 - Aluminum Windows.
- J. Section 086300 - Metal-Framed Skylights: Structural and weatherseal sealants and accessories.
- K. Section 088000 - Glazing: Glazing sealants and accessories.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2006 (Reapproved 2011).
- B. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- D. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- F. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- G. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.

1.04 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
- B. Convene pre-installation conference 3 weeks prior to commencing work of this Section.
- C. Conference Purpose and Agenda:
 - 1. Required Attendance: Contractor's quality control supervisor or superintendent, Architect, all affected trades, and sealant manufacturer.
 - 2. Visit Project site to analyze site conditions, and inspect surfaces and joints to be sealed in order that recommendations may be made should adverse conditions exist.
 - 3. Review mock-up and field sample.
 - 4. Discuss following items:
 - a. Approved submittals.
 - b. Substrate conditions.
 - c. Preparatory work.
 - d. Weather conditions under which work will be done.
 - e. Anticipated frequency and extent of joint movement.
 - f. Joint design.
 - g. Sealant installation procedures.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
 - 6. Substrates for which laboratory adhesion and/or compatibility testing is required.
 - 7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
 - 8. Certification by manufacturer indicating that product complies with specification requirements.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Certificate: Certify that products meet or exceed specified requirements.
 - 1. Manufacturer's Project Acceptance Document: Certification that manufacturer and installer will warrant sealant for specific site, design, details, and application indicated for this project.
 - 2. Installer Certification: Written document from Manufacturer stating installer is certified, approved, and licensed, or acceptable to install specified products.
- E. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

- F. Installation Plan: Submit at least four weeks prior to start of installation.
 - G. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
 - H. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
 - I. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
 - J. Installation Log: Submit filled out log for each length or instance of sealant installed.
 - K. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
 - L. Manufacturer and Installer qualification.
- 1.06 SUSTAINABILITY SUBMITTALS
- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
- 1.07 QUALITY ASSURANCE
- A. Maintain one copy of each referenced document covering installation requirements on site.
 - B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 20 years documented experience.
 - C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience and approved by manufacturer.
 - D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
 - E. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Stain Testing: In accordance with ASTM C1248; required only for stone substrates.
 - 4. Allow sufficient time for testing to avoid delaying the work.
 - 5. Deliver to manufacturer sufficient samples for testing.
 - 6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 7. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility with project specific substrates.
 - F. ~~Installation Plan: Include schedule of sealed joints, including the following:~~
 - 1. ~~Joint width indicated in contract documents.~~
 - 2. ~~Joint depth indicated in contract documents; to face of backing material at centerline of joint.~~

3. ~~Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like new condition and therefore prevention is imperative.~~
 4. ~~Approximate date of installation, for evaluation of thermal movement influence.~~
 5. ~~Installation Log Form: Include the following data fields, with known information filled out.~~
 - a. ~~Unique identification of each length or instance of sealant installed.~~
 - b. ~~Location on project.~~
 - c. ~~Substrates.~~
 - d. ~~Sealant used.~~
 - e. ~~Stated movement capability of sealant.~~
 - f. ~~Primer to be used, or indicate as "No primer" used.~~
 - g. ~~Size and actual backing material used.~~
 - h. ~~Date of installation.~~
 - i. ~~Name of installer.~~
 - j. ~~Actual joint width; provide space to indicate maximum and minimum width.~~
 - k. ~~Actual joint depth to face of backing material at centerline of joint.~~
 - l. ~~Air temperature.~~
- G. ~~Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.~~
1. ~~Identification of testing agency.~~
 2. ~~Name(s) of sealant manufacturers' field representatives who will be observing~~
 3. ~~Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.~~
 - a. ~~Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.~~
 - b. ~~Test date.~~
 - c. ~~Location on project.~~
 - d. ~~Sealant used.~~
 - e. ~~Stated movement capability of sealant.~~
 - f. ~~Test method used.~~
 - g. ~~Date of installation of field sample to be tested.~~
 - h. ~~Date of test.~~
 - i. ~~Copy of test method documents.~~
 - j. ~~Age of sealant upon date of testing.~~
 - k. ~~Test results, modeled after the sample form in the test method document.~~
 - l. ~~Indicate use of photographic record of test.~~
- H. ~~Field Quality Control Plan:~~
1. ~~Visual inspection of entire length of sealant joints.~~
 2. ~~Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.~~
 - a. ~~For each different sealant and substrate combination, allow for one test every 12 inches (305 mm) in the first 10 linear feet (3 linear meters) of joint and one test every 24 inches (610 mm) thereafter.~~
 - b. ~~If any failures occur in the first 10 linear feet (3 linear meters), continue testing at 12 inch (305 mm) intervals at no extra cost to Owner.~~
 3. ~~Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.~~

- a. ~~For each different sealant and substrate combination, allow for one test every 100 feet (30 meters) in the first 1000 linear feet (305 linear meters), and one test per 1000 linear feet (305 meters) thereafter, or once per floor on each elevation.~~
 - b. ~~If any failures occur in the first 1000 linear feet (305 linear meters), continue testing at frequency of one test per 500 linear feet (152 linear meters) at no extra cost to Owner.~~
4. ~~Field testing agency's qualifications.~~
 5. ~~Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.~~
- I. ~~Field Adhesion Test Procedures:~~
1. ~~Allow sealants to fully cure as recommended by manufacturer before testing.~~
 2. ~~Have a copy of the test method document available during tests.~~
 3. ~~Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.~~
 4. ~~When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.~~
 5. ~~Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.~~
 6. ~~If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.~~
- J. ~~Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.~~
1. ~~Record results on Field Quality Control Log.~~
 2. ~~Repair failed portions of joints.~~
- K. ~~Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.~~
1. ~~Sample: At least 18 inch (457 mm) long.~~
 2. ~~Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25 mm) by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.~~
 3. ~~If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.~~
 4. ~~Record results on Field Quality Control Log.~~
 5. ~~Repair failed portions of joints.~~
- 1.08 **MOCKUPS**
- A. **Mockups:** Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section. Provide as many mock-ups as required until approved.

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.

1.09 DELIVERY, STORAGE, AND HANDLING.

- A. Deliver materials to Project site in original unopened containers or bundles with manufacturer's labels. Labels on delivered materials shall show manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants or other causes.

1.10 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 (5 deg C)].
 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.
- B. Weather Conditions: Proceed with work only when existing and forecasted weather conditions permit installation according to manufacturer's instructions and warranty requirements.

1.11 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Special Installer's Warranty: Installer agrees to repair or replace non-silicone 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.
- C. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those silicone joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: 20 years from date of Substantial Completion.
- D. 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.

- E. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - 1) Exception: Such gaps and openings in gypsum board finished stud walls and suspended ceilings.
 - 2) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
 - c. Other joints indicated below.
 - 2. Do not seal the following types of joints.
 - a. Intentional weepholes in masonry.
 - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - d. Joints where installation of sealant is specified in another section.
 - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag non-staining silicone sealant, unless otherwise indicated.

2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 018114.
- B. Colors: ~~As manufacturer's full range.~~ As selected by Architect from manufacturer's full range.

2.03 NONSAG JOINT SEALANTS

- A. Type JS-7 Silicone, S, NS, 50, NT: 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, G, A, and O.
 - 1. General purpose, metal to metal joints.
 - 2. Products:
 - a. Dow Corning Corporation; 795.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS2000 SilPruf.
 - c. Tremco; Spectrum 2.
 - d. Prior approved equal.

- B. Type JS-2 - Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses NT, G, M, A and O; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Cure Type: Single-component, neutral moisture curing.
 6. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
 7. Products:
 - a. Dow Corning Corporation; 756 SMS Building Sealant: www.dowcorning.com.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; SilPruf NB.
 - c. Pecora Corporation; 890NST Ultra Low Modulus Architectural Silicone Sealant - Class 100: www.pecora.com.
 - d. Tremco Incorporated; Spectrem 2.
 - e. Pecora Corporation; 895NST Medium Modulus Structural Glazing & Weatherproofing Silicone Sealant - Class 50: www.pecora.com.
 - f. Prior approved equal.
- C. Type JS-8 - Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus 100 percent, minus 50 percent.
 2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
 3. Color: To be selected by Architect from manufacturer's standard range.
 4. Cure Type: Single-component, neutral moisture curing
 5. Service Temperature Range: Minus 65 to 180 degrees F (Minus 54 to 82 degrees C).
 6. Products:
 - a. Dow Corning Corporation; 758 Silicone Weather Barrier Sealant: www.dowcorning.com.
- D. Type JS-6 - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
1. Color: As selected by Architect from manufacturer's full range.
 2. Products:
 - a. Dow Corning Corporation; 786-M White.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
 - c. Pecora Corporation; 898NST Sanitary Silicone Sealant - Class 50: www.pecora.com.
 - d. Tremco Incorporated; Tremsil 200.
- E. Type JS-4 Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products:
 - a. BASF Building Systems; Sonolastic Ultra.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - d. Tremco Incorporated; Dymonic.

- F. Type JS-3 Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T, M, O. Sealant containing mercury not allowed.
1. Products:
 - a. BASF Building Systems; Sonolastic SL 1.
 - b. Bostik, Inc.; Chem-Calk 950.
 - c. May National Associates, Inc.; Bondaflex PUR 35 SL.
 - d. Pecora Corporation; NR-201.
 - e. Sika; Sikaflex 15 LM SL.
 - f. Sonneborn; SL 1 Sealant.
 - g. Tremco; Vulkem 245.
- G. Type JS-1 Urethane, Immersible, M, P, 25, T, NT, I: Immersible, single component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T, M, O. Shore A Hardness: 40 minimum, when tested in accordance with ASTM C661.
1. Products:
 - a. Pecora; NR-201.
 - b. Sika Corporation; Sikaflex 15 LM SL.
 - c. Sonneborn; SL 2 Sealant.
 - d. Tremco; Vulkem 245.
- H. Type JS-5 Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Products:
 - a. BASF Building Systems; Sonolac.
 - b. Bostik, Inc.; Chem-Calk 600.
 - c. May National Associates, Inc.; Bondaflex Sil-A 700.
 - d. Pecora Corporation, AC-20.
 - e. Sonneborn Building Products, Sonolac.
 - f. Schnee-Morehead, Inc.; SM 8200
 - g. Tremco, Inc., Acrylic Latex Tremflex 834.

2.04 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Closed Cell: 25 to 33 percent larger in diameter than joint width.
 - a. Location: Exterior.
 2. Open Cell: 25 to 33 percent larger in diameter than joint width.
 - a. Location: Interior.
- B. Preformed, Pre-Compressed, Self-Expanding, Secondary Sealant System: Expanding cellular foam impregnated with water-based, non-drying, polymer-modified 100 percent acrylic dispersion.
1. Movement: Capable of movements of plus 25 percent, minus 25 percent (50 percent total) of nominal material size.
 2. Product:
 - a. Emseal Joint Systems Ltd.; BACKERSEAL.

- b. As indicated on Drawings.
- C. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
 - 1. Pressure sensitive polyethylene tape or tetrafluorethylene self-adhesive tape required by sealant manufacturer to suit application.
 - 2. Minimum Thickness of 11 mils.
- D. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- E. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- F. Primers: Type recommended by sealant manufacturer to suit application; non-staining.
 - 1. Non-staining to joint substrate beyond the substrate surface.
 - 2. Required for use unless not required by results of:
 - a. "Manufacturer's sealant-substrate compatibility and adhesion test" described under Source Quality Control.
 - b. "Field hand-pull adhesion test" under Field Quality Control.
- G. Tooling Liquids: Non-staining material approved by manufacturer to reduce adhesion of sealant to joint finishing tools.

2.05 SOURCE QUALITY CONTROL

A. Tests:

- 1. ~~Coordinate testing of sealant compatibility and adhesion to:~~
 - a. ~~Sealant backing materials.~~
 - b. ~~Architectural concrete specified in Section 033000.~~
 - c. ~~Glass-fiber reinforced concrete specified in Section 034900.~~
 - d. ~~Metals specified in Section 074213.~~
 - e. ~~Metals specified in Section 074213.19~~
 - f. ~~Metals specified in Section 074213.23.~~
 - g. ~~Metals specified in Section 076200.~~
 - h. ~~Curtain wall system specified in Section 084413.~~
 - i. ~~Tile specified in Section 093000.~~
- 2. ~~Manufacturer's Sealant-Substrate Compatibility and Adhesion Test:~~
 - a. ~~Test Methods:~~
 - 1) ~~Determine if priming and other specific joint preparation techniques are not required to obtain rapid, optimum adhesion of sealants to joint substrates.~~
 - 2) ~~Comply with ASTM C510, ASTM C794, and ASTM C1087.~~
 - b. ~~Submit not less than 9 pieces, 3 by 5 inches in size of each type of material, including joint substrates, shims, sealant backing, and miscellaneous materials.~~
 - c. ~~Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.~~
 - d. ~~Investigate sealant material's failing compatibility/adhesion tests and obtain manufacturer's written instructions for corrective measures, including the use of specially formulated primers.~~
 - e. ~~Include in Test Report, Manufacturer's:~~
 - 1) ~~Interpretation of test results regarding sealant performance.~~
 - 2) ~~Primers and substrate preparation required to achieve adhesion.~~

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 - 2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
 - 3. Arrange for sealant manufacturer's technical representative to be present during tests.
 - 4. Record each test on Preinstallation Adhesion Test Log as indicated.
 - 5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 - 6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. 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.
- E. Provide isolation joints where necessary to prevent surface cracking of concrete topping
- F. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- D. 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.

1. Prime joint substrates unless priming is not required by:
 - a. "Manufacturer's sealant-substrate compatibility and adhesion test" described in Source Quality Control article.
 - b. "Field hand-pull adhesion test" described in Field Quality Control article.
 2. Apply primer to substrate areas where joint sealant is to adhere.
 3. Comply with manufacturer's sequencing requirements for joint priming and sealant backing bond breaker rod installation to assure required primer application coverage and rate without placement of primer on backer rod surface to be in contact with sealant and avoid three-sided sealant adhesion.
 4. Do not allow spillage and migration of primer onto surfaces not to receive primer.
 5. Install sealant to primed substrates after primer has cured.
- E. 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.
 4. Install closed cell backings at exterior locations.
 5. Install open cell backings at interior locations.
- F. Install bond breaker backing tape where backer rod cannot be used.
- G. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- H. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- I. 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.
- J. 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 and according to Figure 8B in ASTM C 1193.

5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings and according to Figure 8C in ASTM C 1193.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

K. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

L. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 CLEANING AND CURING

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.

B. Cure sealants in compliance with manufacturer's instructions and recommendations to obtain high early-bond strength, internal cohesive strength, and surface durability.

3.05 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.

3.06 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at the low temperature in the thermal cycle. Report failures immediately and repair.

3.07 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion JS-1.

1. Joint Locations:

a. Joints in pedestrian plazas.

b. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, immersible, S, P, 25, T, NT, I.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2.

1. Joint Locations:

a. Construction joints in cast-in-place concrete, natural stone.

b. Control and expansion joints in unit masonry.

c. Joints between different materials listed above.

d. Control and expansion joints in overhead surfaces.

e. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.

3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- C. Joint-Sealant Application: Interior joints in horizontal traffic surfaces JS-3.
 - 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in tile flooring.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, S, P, 25, T, 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 JS-4.
 - 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 concrete walls and partitions.
 - d. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, S, NS, 25, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement JS-5.
 - 1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors, wood trim, millwork, windows and elevator entrances.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Acrylic latex.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-6.
 - 1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints in bathrooms, public restrooms, and where indicated.
 - c. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- G. Joint-Sealant Application: General purpose JS-7.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Control and expansion joints in unit masonry.
 - c. Joints in glass unit masonry assemblies.
 - d. Joints between metal panels.
 - e. Joints between different materials listed above.
 - f. Control and expansion joints in overhead surfaces.
 - g. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- H. Joint-Sealant Application: Weather barriers JS-8.
 - 1. Joint Locations:
 - a. Construction joints in weather barriers.
 - 2. Joint Sealant: Silicone, nonstaining, NS, M and A.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 079219 - ACOUSTICAL JOINT SEALANTS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes acoustical joint sealants.
- B. Related Requirements:
 - 1. Section 018114 - Sustainable Design Requirements - CAL-Green.
 - 2. Section 079200 - Joint Sealants for elastomeric, latex, and butyl-rubber-based joint sealants for nonacoustical applications.

1.02 SUBMITTALS

- A. Product Data: For each acoustical joint sealant.
- B. Samples for Verification: For each kind and color of acoustical joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Acoustical-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- D. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by a qualified testing agency.

1.03 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.04 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical 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 Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.
- B. VOC Content of Interior Sealants: Sealants and sealant primers shall comply with the following:
 - 1. Acoustical sealants and sealant primers shall have a VOC content of 250 g/L or less.
- C. Low-Emitting Interior Sealants: Acoustical sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Sealants shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.

2.02 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
 - 1. Products:
 - a. Pecora Corporation; AC-20 FTR.
 - b. Sonneborn; Sonolac.
 - c. Tremco; Acrylic Latex.
 - d. United State Gypsum Company; SHEETROCK Acoustical Sealant.
 - 2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 4. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; BA-98 Acoustical Sealant.
 - b. Sonneborn; Sonolac.
 - c. Tremco; Acoustical Sealant.
 - d. United State Gypsum Company; USG Firecode Sound - Smoke Sealant.
- C. Acoustical Outlet Box Pads
 - 1. Minimum thickness - 1/8 inch.
 - 2. Adhesion - adheres readily to metal or plastic.
 - 3. Service temperature - 30 degrees to 200 degrees F.

4. Shall contain no asbestos.
5. Minimum shelf life - 1 year.
6. Non Fire Rated Products:
 - a. Lowry's Outlet Box Pads as manufactured by Harry A. Lowry & Associates, Inc., Sun Valley, CA.
 - b. Sound Pad #68 as manufactured by L.H. Dottie Co., City of Commerce, CA.
7. Fire Rated Products:
 - a. Flamesafe FSP 1077 Putty Pads as manufactured by W.R. Grace & Co., Hartfield, PA.
 - b. Putty Pads as manufactured by Specified Technologies Inc., Somerville, NJ.
 - c. Hilti CP617 Putty Pads as manufactured by Hilti, Tulsa, OK.
 - d. 3M Fire Barrier Moldable Putty Pads type MPP-X to fit box size as manufactured by 3M, St. Paul, MN.
 - e. Metacaulk ® Putty Pads as manufactured by RectorSeal, Houston, TX.

2.03 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- 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

3.01 EXAMINATION

- A. Examine joints indicated to receive acoustical 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.

3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. 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.

3.03 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.04 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 acoustical joint sealants and of products in which joints occur.

3.05 PROTECTION

- A. Protect acoustical 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 acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079219

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
1. Standard and custom hollow metal doors and frames.
 2. Steel sidelight, borrowed lite and transom frames.
 3. Louvers installed in hollow metal doors.
 4. Light frames and glazing installed in hollow metal doors.
- B. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
 2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
 3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
 4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
 5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
 6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
 10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
 11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.
 12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
 13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
 14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
 15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
 16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.02 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:

1. Elevations of each door design.
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 anchorages, joints, field splices, and connections.
6. Details of accessories.
7. Details of moldings, removable stops, and glazing.
8. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufacturers that are not current members of the Steel Door Institute.

1.03 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40" above sill) or UL 10C.
 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 3. Smoke Control Door Assemblies: Comply with NFPA 105.
 - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.06 COORDINATION

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

1.07 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CECO Door Products (C).
 - 2. Curries Company (CU).
 - 3. Security Metal Products (SMP).

2.02 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

2.03 HOLLOW METAL DOORS

- A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

- B. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Design: Flush panel.
 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
 4. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth. Beveled Lock Edge, 1/8 inch in 2 inches (3 mm in 50 mm).
 5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
 6. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
 7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- C. Manufacturers Basis of Design:
1. Curries Company (CU) - Polystyrene Core - 707 Series.

2.04 HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.
1. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.x
 2. Frames: Minimum 16 gauge (0.053-inch -1.3-mm) thick steel sheet.
 3. Manufacturers Basis of Design:
 - a. Curries Company (CU) - CM Series.
- C. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.05 FRAME ANCHORS

- A. Jamb Anchors:
1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.

3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.
 - B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick.
 - C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.
- 2.06 HOLLOW METAL PANELS
- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal components.
- 2.07 LIGHT OPENINGS AND GLAZING
- A. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints at fabricator's shop. Fixed and removable stops to allow multiple glazed lites each to be removed independently. Coordinate frame rabbet widths between fixed and removable stops with the type of glazing and installation indicated.
 - B. Moldings for Glazed Lites in Doors and Loose Stops for Glazed Lites in Frames: Minimum 20 gauge thick, fabricated from same material as door face sheet in which they are installed.
 - C. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated. Provide fixed frame moldings and stops on outside of exterior and on secure side of interior doors and frames.
 - D. Preformed Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch-thick, cold rolled steel sheet; with baked enamel or powder coated finish; and approved for use in doors of fire protection rating indicated. Match pre-finished door paint color where applicable.
- 2.08 ACCESSORIES
- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
 - B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.
- 2.09 FABRICATION
- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.
 - B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.
 - C. Hollow Metal Doors:
 1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
 2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.

3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
 4. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge strap for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
- D. Hollow Metal Frames:
1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
 3. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 4. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - a. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - b. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
 - c. Provide hardware preparation for electric strikes.
 5. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise butt type hinges at top hinge locations.
 6. Continuous Hinge Reinforcement: Provide welded continuous 12 gauge straps for continuous hinges specified in hardware sets in Division 08 Section "Door Hardware".
 7. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
 8. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
 9. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - a. Floor Anchors: Do not expose to public view.
 10. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.

- b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
 11. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Section 087100 - Door Hardware.
 - E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Section 087100 - Door Hardware.
 1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
- 2.10 STEEL FINISHES
- A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).
- C. Verify that finished walls are in plane to ensure proper door alignment.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.03 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, leveled, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.04 ADJUSTING AND CLEANING

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

- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

END OF SECTION 081113

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 083100 - ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall access door and frame units.
- B. Ceiling access door and frame units.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 099123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

- A. ITS (DIR) - Directory of Listed Products; current edition.
- B. UL (FRD) - Fire Resistance Directory; current edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation with work of other trades, and obtain information on door sizes and exact locations from other trades.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 5. 5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 6. 5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Interior Walls, Unless Otherwise Indicated:
 - 1. Basis-of-Design Product:

- a. Karp; Universal Flush Access Door, Model DSC-214M
 2. Other Acceptable Manufacturers::
 - a. Acudor Products Inc..
 - b. Milcor; Commercial Products Group of Hart & Cooley, Inc..
 - c. Nystrom.
 3. Material: Steel.
 4. Finish: Factory prime.
 5. Size: As required to provide access.
 6. Standard duty, concealed hinged door.
 7. Tool-operated spring or cam lock; no handle.
 8. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
- B. Wall-Mounted Units in Wet Areas:
1. Basis-of-Design Product:
 - a. Karp; Universal Flush Access Door, Model DSC-214M
 2. Other Acceptable Product:
 - a. Acudor Products Inc.
 - b. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - c. Nystrom.
 3. Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
 4. Size: As required to provide access.
 5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 6. Key operated lock, no handle.
 7. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
- C. Fire Rated Walls: See Drawings for wall fire ratings.
1. Basis-of-Design Product:
 - a. Karp; Universal Flush Access Door, Model KRP-150FR
 2. Other Acceptable Product:
 - a. Acudor Products Inc.
 - b. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - c. Nystrom.
 3. Material: Steel.
 4. Finish: Factory prime.
 5. Size: As required to provide access.
 6. Key operated lock, no handle.
 7. Fire-Resistance Rating: Not less than that of adjacent construction.
 8. Temperature-Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.
 9. Hardware: Spanner head cam latch, cylinder lock and key and tamper resistant screws for all exposed screws.
- D. Exterior Wall Access:
1. Basis of Design Product:
 - a. Nystrom; XTL.
 2. Door Material: Stainless steel, Type 304.
 - a. Thickness: 0.025 inch (.064 mm), 24 gauge, 2B finish.
 3. Size: 24 by 36 inch (609.6 by 914.40 mm), unless otherwise indicated.

4. Insulated, double skin door panel.
 - a. Gasket: Extruded santoprene.
 - b. Stainless steel piano hinge.
5. Frame: Exposed.
- E. Ceilings: Recessed access door.
 1. Basis-of-Design Product:
 - a. Karp; Universal Flush Access Door, Model DSC-214M
 2. Other Acceptable Manufacturrs:
 - a. Acudor Products Inc.
 - b. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - c. Nystrom.
 3. Material: Steel.
 4. Finish: Factory prime.
 5. Standard duty, concealed hinged door.
 6. Tool-operated spring or cam lock; no handle.
- F. Fire Rated Ceilings:.
 1. Acceptable Product:
 - a. Acudor Products Inc., FW-5050.
 - b. Milcor; Commercial Products Group of Hart & Cooley, Inc.; UFR.
 - c. Nystrom; IT Series.
 2. Material: Steel.
 3. Finish: Factory prime.
 4. Size: As required to provide access.
 5. Standard duty, concealed hinged door, steel, 20 gage, insulated.
 6. Frame: 16 gage steel.
 7. Key operated door lock.
 8. Fire-Resistance Rating: Not less than that of adjacent construction.
 9. Temperature-Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.
 10. Tool-operated spring or cam lock; no handle.
 11. Hardware: Spanner head cam latch, cylinder lock and key and tamper resistant screws for all exposed screws.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify that rough openings are correctly sized and located.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

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

- D. Adjust hardware and panels for proper operation.

3.03 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083100

SECTION 084313 - ALUMINUM-FRAMED STOREFRONTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green
- B. Section 072500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
- C. Section 079200 - Joint Sealants: Perimeter sealant and back-up materials.
- D. Section 087100 - Door Hardware: Hardware items other than specified in this Section.
- E. Section 088000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems; 2008.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections; 2009.
- E. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- F. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- H. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- K. ASTM E122 - Standard Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process; 2009e1.

- L. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- M. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014.
- N. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- O. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate attachment and seal of perimeter air and vapor barrier materials.
 - 2. Coordinate with installation of other components that comprise the exterior enclosure.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week before starting work of this Section; require attendance by all affected installers.
 - 1. Convene under general provisions of Section 017000.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and internal drainage details.
- C. Shop Drawings: For aluminum-framed storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Submit shop drawings created by storefront manufacturer covering fabrication, installation, and finish of specified systems.
 - 2. Include following:
 - a. Fully dimensioned plans and elevations with detail coordination keys.
 - b. Locations of exposed fasteners and joints.
 - 3. Provide Detailed Drawings of:
 - a. Composite members.
 - b. Joint connections for framing systems and for entrance doors.
 - c. Anchorage.
 - d. System reinforcements.
 - e. Drainage patterns and sill extrusions.
 - f. Expansion and contraction provisions.
 - g. Hardware, including locations, mounting heights, reinforcements and special installation provisions.
 - h. Glazing methods and accessories.
 - i. Internal sealant requirements and recommended types.
 - j. Thermal breaks.

4. Schedule of finishes.
 5. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- D. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Report of field testing for water leakage.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- 1.06 SUSTAINABILITY SUBMITTALS
- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green for the following measures:
1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings
- 1.07 QUALITY ASSURANCE
- A. Single Source Responsibility:
1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.
 2. Glass, glazing, and perimeter sealants for entrance and storefront systems are required as work of this Section.
- B. Installer Qualifications: Company specializing in the installation of aluminum glazing systems with minimum three years of documented experience.
- C. Basis of Design: Drawing details are based on profiles by specified basis of design manufacturer. Similar profiles by other acceptable manufacturers are permitted, subject to compliance with all specified performance characteristics, and provided that deviations in dimension, profile, and finish are minor, and do not detract from the indicated design intent.
1. Comply with requirements specified in Section 014000 and Section 016000.
- D. 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.
- E. Certifications:
1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

2. Submit manufacturer's certificate stating that sealed insulating glass meet or exceed specified requirements.
3. Submit coating manufacturer's certification stating fluoropolymer coating formulation is fluorosurfactant free (FSF).

1.08 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 014000.
- B. Mock-up: Provide 10 by 8 feet (3048 by 2438.40 mm) mock-up including all components occurring on project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
 1. Locate on-site where directed. Mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

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

1.10 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide 10 year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer; Type (SF-1):
 1. Arcadia, Inc.: www.arcadiainc.com, or prior approved equal.
 - a. Frame Series: AFG 451, center pane, outside glazed, stacking system.
 2. Other Acceptable Manufacturers:
 - a. C.R. Laurence Co., Inc.; U.S. Aluminum: www.crl-arch.com.
 - b. EFCO Corporation; System 403 Thermal: www.efcocorp.com.
 - c. Kawneer North America: www.kawneer.com.
 - d. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
 - e. Prior approved equal.

2.02 STOREFRONT SYSTEM

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 1. Glazing Rabbet: For 1 inch (25 mm) insulating glazing.
 2. Glazing Rabbet: For 1/4 inch (6 mm) monolithic glazing.
 - a. Location:

- 1) Interior.
3. Door: As indicated on Drawings.
4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - a. Fabricate individual system frame members, comp heads, sill pans, and other system components in single, continuous pieces; splices are not permitted unless specifically required by project installation conditions.
5. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
6. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
8. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
9. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
10. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and heel bead of glazing compound.

2.03 PERFORMANCE REQUIREMENTS:

- A. Water Penetration Resistance: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 10 lbf/sq ft (480 Pa), minimum.
- B. Air Leakage: Maximum of 0.06 cu ft/min/sq ft (0.3 L/s/sq m) of wall area, when tested in accordance with ASTM E283 at 6.24 pounds per square foot (300 Pa) pressure differential across assembly.
- C. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

2.04 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
 1. Framing members for interior applications need not be thermally broken.
 2. Construction: Nonthermal.
 3. Glazing System: Retained mechanically with gaskets on four sides.
 4. Glazing Rabbet: 1 inch insulated at exterior.
 5. Glazing Rabbet: 1/4 inch non-insulated at interior and at spandrel panels.
 6. Glazing Stops: Flush.
 7. Cross-Section: 2 by 4-1/2 inch (50.8 by 101.6 mm) nominal dimension.
 8. Reinforced Mullions: As required or recommended by manufacturer using manufacturer's standard profile of extruded aluminum with internal reinforcement of steel shaped structural section.

- B. Glazing: As specified in Section 088000.
- C. Swing Doors: Glazed aluminum.
 - 1. Glazing Stops: Square.
 - 2. Finish: Same as storefront.
 - 3. Glazing: One inch insulating glass units.

2.05 MATERIALS

- A. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168, CAL-Green Table 5.504.4.1 Adhesive VOC Limit, and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
 - 1. Current requirement refers to the date on which the materials are installed in the building.
 - 2. A copy of SCAQMD Rule #1168 is referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
- B. Aluminum Materials - General: Comply with recycled content product requirements specified in Section 016000.
- C. Extruded Aluminum: ASTM B221 (ASTM B221M).
- D. Sheet Aluminum: ASTM B209 (ASTM B209M).
- E. Structural Steel Sections: ASTM A36/A36M; shop primed.
- F. Fasteners: Stainless steel.
- G. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch (0.81 mm) minimum thickness; finish to match framing members.
- H. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch (0.48 mm) minimum thickness.
- I. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- J. Perimeter Sealant: Type specified in Section - 079200.
- K. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- L. Glazing Accessories: As specified in Section - 088000.
- M. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.

2.06 ACCESSORIES

- A. Reinforcement: Where fasteners screw-anchor into aluminum less than 1/8 inch thick, reinforce the interior with aluminum or non-magnetic stainless steel to receive screw threads, or provide standard non-corrosive, pressed-in splined grommet nuts.

- B. Brackets: High-strength aluminum brackets and reinforcements where possible; otherwise provide non-magnetic stainless steel or galvanized steel complying with ASTM A123/A123M.
- C. Inserts: Cast iron, malleable iron, or 12 gage galvanized steel for required anchorage to concrete or masonry.
- D. Sill Pans: Manufacturer's standard extruded profile, designed to direct moisture to the exterior at sill conditions; including splice sleeves and continuously sealed end dams.
- E. Comp-Heads: Manufacturer's standard extruded profile, designed to accommodate minimum one inch deflection of building elements at head conditions.
- F. Water Deflectors: Manufacturer's standard internal system accessory specifically designed to route internal water drainage away from top surfaces of insulated glass units.
- G. Expansion Anchors: Lead shield or toothed steel, drilled in type expansion bolts for required attachment to concrete or masonry.
- H. Bituminous Coatings: Cold-applied asphalt mastic, compounded for 30 mil thickness per coat.
- I. Internal System Sealants and Gaskets: As recommended by manufacturer for use within the framing system for fabrication, assembly, and installation. Use products which will remain permanently elastic, non-shrinking, and waterproof.

2.07 FINISHES

- A. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
 - 1. Polyvinylidene fluoride (PVDF) three-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil (0.023 mm); color and gloss as indicated on drawings.
 - a. Products:
 - 1) PPG Metal Coatings; Duranar: www.ppgideascape.com.
 - 2. Color: Duranar XL-Steel City Silver-UC106705XL.
- B. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.08 HARDWARE

- A. For each door, include weatherstripping and sill sweep strip.
- B. Door Hardware: As specified in Section 087100, except as specified in this Section.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
- E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.
- F. Pivots: Offset type; top and bottom.
- G. Locks: Dead latch with thumbturn inside; keyed cylinder outside.
 - 1. Provide on doors as indicated.

- H. Reinforce components internally for door hardware and door operators.
- I. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies, including exposed fasteners.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify dimensions, tolerances, and method of attachment with other work.
- C. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.03 INSTALLATION

- A. General:
 - 1. Comply with manufacturer's written instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure nonmovement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration 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.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install wall system in accordance with manufacturer's instructions.
- D. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- E. Provide alignment attachments and shims to permanently fasten system to building structure.
- F. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- G. Provide thermal isolation where components penetrate or disrupt building insulation.

- H. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- I. Install sill pans with end dams; do not obstruct weep paths with sealants. Locate sill pan joints, if required, minimum 12 inches from centerline of vertical mullions. Seal to adjacent work to form water tight dam.
- J. Install comp-head units where detailed; do not secure comp-heads to primary storefront head frames.
- K. Set thresholds in bed of sealant and secure.
- L. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 2. Indicate entrance door hardware mounting heights on Drawings or insert in "Field-Installed Entrance Door Hardware" Subparagraph below.
 - 3. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- M. Install glass and infill panels in accordance with Section 088000, using glazing method required to achieve performance criteria.
- N. Install internal system sealants as installation progresses. Seal sill pan splices, end dams, water deflectors, and other components to ensure that proper water weepage paths are established and maintained within the system.
- O. Install perimeter sealant in accordance with Section 079200.
 - 1. Install sealants according to storefront manufacturer's instructions; do not obstruct weep paths.
- P. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.04 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft (1.5 mm/m) non-cumulative or 1/16 inches per 10 ft (1.5 mm/3 m), whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).
- C. Location: Limit variation from plane or dimensioned location to 1/8 inch in 12 feet, non-cumulative, and 1/2 inch in overall length of member.

3.05 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

1. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - D. Test installed storefront for water leakage in accordance with AAMA 503; test at full design pressure.
 - E. Test two samples; size samples according to ASTM E122.
 - F. See Section 014000 Quality Requirements for retesting and reinspecting requirements and Section 017000 Execution and Closeout Requirements for requirements for correcting the Work.
 - G. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
 - H. Prepare test and inspection reports.
- 3.06 ADJUSTING
- A. Adjust operating hardware for smooth operation.
- 3.07 CLEANING
- A. Remove protective material from pre-finished aluminum surfaces.
 - B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
 - C. Remove excess sealant by method acceptable to sealant manufacturer.
- 3.08 PROTECTION
- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 084313

SECTION 086200 - UNIT SKYLIGHTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preformed skylights with integral metal frame.
- B. Counterflashings.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 055000 - Metal Fabrications: Miscellaneous steel framing for rough opening.
- C. Section 076200 - Sheet Metal Flashing and Trim: Skylight counterflashing.
- D. Section 077200 - Roof Accessories: Manufactured curbs for installation of unit skylights.

1.03 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/IS.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2011.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- E. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2010.
- F. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 2010.
- G. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007.
- H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2014.
- I. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2011.
- J. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).
- K. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2000 (Reapproved 2009).
- L. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights; 2007.

- M. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide structural, thermal, and daylighting performance values.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for unit skylights.
- C. Shop Drawings: Indicate configurations, dimensions, locations, fastening methods, and installation details.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.
- B. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required for this Project.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty, including coverage for leakage due to defective skylight materials or construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers (SK-1):
 - 1. Velux America, Inc.; FCM 2720, fixed, curb mount, for irregular site-built curbs: www.veluxusa.com.
 - 2. Other Acceptable Manufacturers:
 - a. Bristolite Daylighting Systems, Inc.: www.bristolite.com.
 - b. Oldcastle BuildingEnvelope: www.oldcastlebe.com.
 - c. Wasco Products, Inc.: www.wascoproducts.com.
 - d. Skyline Sky-Lites, LLC:
 - e. Prior approved equal.

2.02 UNIT SKYLIGHTS

- A. Unit Skylights: Factory-assembled glazing in aluminum frame, free of visual distortion, and weathertight.
 - 1. Shape: Rectangular flat.
 - 2. Glazing: Single.
 - 3. Operation: None; fixed.
 - 4. Nominal Size: As indicated on Drawings.

2.03 PERFORMANCE REQUIREMENTS

- A. Provide unit skylights that comply with the following:
 - 1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific skylight type:
 - a. Performance Class (PC): R.
 - 2. Performance Validation: Skylights shall comply with AAMA/WDMA/CSA 101/I.S.2/A440 performance requirements as indicated by having AAMA, WDMA, or CSA certified label, or an independent test report for indicated products itemizing compliance and acceptable by authorities having jurisdiction.
 - 3. Air Infiltration: ASTM E283; not to exceed 0.5 cfm/lin ft of skylight perimeter at minimum 1.57 psf pressure.
 - 4. Water Penetration: ASTM E331; no leakage.
 - 5. Drain water entering joints, condensation occurring in frame channels, or migrating moisture occurring within system, to exterior.
 - 6. Allow for expansion and contraction within system components caused by a cycling surface temperature range of 170 degrees F (95 degrees C) without causing detrimental effects to system or components.
 - 7. Hail Rating: Manufacturer's optional feature.
- B. Flammability: Non-metal parts complying with the following:
 - 1. Roof-Top Components: Class B when tested in accordance with ASTM E108 or UL 790.
 - 2. Smoke Developed Index: Maximum of 450, when tested in accordance with ASTM E84; or maximum rating of 75, when tested in accordance with ASTM D2843.
 - 3. Combustibility - Non-Light Transmitting Parts: Minimum 2.5 inches/min (64 mm/min) (ICC Class CC-2), when tested in accordance with ASTM D635.

2.04 COMPONENTS

- A. Single Glazing: Low-e glass; clear transparent.
- B. Glazing: 1 1/8 inch thick consisting of 1/4 inch tempered exterior lite, 1/2 inch sealed air space and 7/16 inch laminated safety glass interior lite.
- C. Frames: ASTM B221 (ASTM B221M); extruded aluminum reinforced and welded corner joints, integral curb frame mounting flange and counterflashing to receive roofing flashing system, with integral condensation collection gutter, glazing retainer; clear anodized finish.
 - 1. Retainer Frame: Extruded aluminum alloy 6063-T5 (min). ASTM B 221 (ASTM B 221 M) with minimum effective thickness of 0.60 inches

2.05 ACCESSORIES

- A. Provide manufacturer's standard hardware, weatherstripping, gaskets, and sealants to meet specified performance and intended function.

- B. Fasteners and Anchorage Devices: Aluminum, non-magnetic stainless steel, or galvanized steel as recommended by manufacturer, and compatible with items being fastened. Do not use exposed fasteners unless unavoidable for the assembly of units, and installation of hardware. Finish fasteners to match the exposed item being fastened.
- C. Counterflashings: Same metal type and finish as skylight frame.
- D. Protective Back Coating: Zinc molybdate alkyd.
- E. Sealant: Type as specified in Section 079200.
- F. Fall Protection Screens: Metal screen system attached to outer frame skylights to comply with CalOSHA Standard 29 CFR 1910.23 (a)(4) and 29 CFR 1910.23 (e)(8).
 - 1. Mounting Frame: Two extruded 6005-T6 aluminum rails that rest on outside frame of skylight on its long sides.
 - 2. Screen Material: 0.250 diameter 304 stainless steel wire in a 4 by 4 inch grid.
 - 3. Product:
 - a. Simplified Safety Inc.; Model STS - Skylight Fall Protection Screens for Domed Skylights
 - b. Prior approved equal.

2.06 FABRICATION

- A. Fabricate free of visual distortion and defects.
- B. Fabricate to achieve leakproof, weathertight assembly.
- C. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.

2.07 FINISHES

- A. High Performance Organic Coatings: AAMA 2604; multiple coats, thermally cured fluoropolymer system.
 - 1. Color: As selected by Architect from manufacturer's full range.
- B. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that openings and substrate conditions are ready to receive work of this Section.

3.02 PREPARATION

- A. Apply protective back coating on aluminum surfaces of skylight units that will be in contact with cementitious materials or dissimilar metals.

3.03 INSTALLATION

- A. Install unit skylights in accordance with manufacturer's instructions and ASTM E2112.

- B. Install curb assembly, fastening securely to roof decking. Flash curb assembly into roof system.
 - 1. Install curb assembly in accordance with Section 077200 - Roof Accessories.
- C. Comply with ASTM E2112 for installation of weather barrier materials in conjunction with installation of skylights.
- D. Place skylight units and secure to curb assembly. Install counterflashing as required.
- E. Apply sealant to achieve watertight assembly.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for independent testing and inspection requirements. Inspection will monitor quality of installation and glazing.
- B. See Section 014000 - Quality Requirements, for general requirements for testing and inspection.
- C. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - 1. After completion of installation and nominal curing of sealant and glazing compounds but before installation of interior finishes, test for water leaks according to AAMA 501.2.
 - 2. Perform test for total area of each unit skylight.

3.05 CLEANING

- A. Upon completion of installation, thoroughly clean skylight aluminum surfaces in accordance with AAMA 609 & 610.
- B. Remove protective material from prefinished aluminum surfaces.
- C. Wash down exposed surfaces; wipe surfaces clean.
- D. Remove excess sealant.

END OF SECTION 086200

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 087100 - DOOR HARDWARE

PART 1 GENERAL

1.01 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. Automatic operators.
 - 4. Cylinders specified for doors in other sections.

- C. 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. ANSI/SDI A250.13 - Testing and Rating of Severe Windstorm Resistant Components for Swing Door Assemblies.
 - 3. ASTM E1886 - Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
 - 4. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure difference.
 - 5. ASTM E1996 - Standard specification for performance of exterior windows, curtain walls, doors and storm shutters impacted by Windborne Debris in Hurricanes.
 - 6. FEMA 361 2008 - Design and Construction Guidance for Community Safe Rooms.
 - 7. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters.
 - 8. ICC/IBC - International Building Code.
 - 9. NFPA 70 - National Electrical Code.
 - 10. NFPA 80 - Fire Doors and Windows.
 - 11. NFPA 101 - Life Safety Code.
 - 12. NFPA 105 - Installation of Smoke Door Assemblies.
 - 13. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
 - 14. TAS-201-94 - Impact Test Procedures.
 - 15. TAS-202-94 - Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components using Uniform Static Air Pressure.
 - 16. TAS-203-94 - Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
 - 17. State Building Codes, Local Amendments.
 - 18. 521 CMR - Massachusetts Architectural Board Regulations.

- D. Standards: All hardware specified herein shall comply with the following industry standards:
 - 1. ANSI/BHMA Certified Product Standards - A156 Series
 - 2. UL10C - Positive Pressure Fire Tests of Door Assemblies

1.02 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 Part 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 floor plans and in 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 Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary Integrated Wiegand Access Control Products.

- E. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified installer of Windstorm assemblies.
- F. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.
- G. Informational Submittals:
 - 1. LEED Submittals:
 - 2. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 3. Hurricane Resistant Openings: Exterior hurricane opening assemblies to be tested according to ASTM E330, ASTM E1886, ASTM E1996 standards, and certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, with labeling indicating compliance with the wind load and design pressure level requirements specified for the Project.
 - 4. Hurricane Resistant Openings (State of Florida): Within the State of Florida, provide copy of current State of Florida Product Approval or Metro-Dade County Notice of Acceptance (NOA) as proof of compliance that doors, frames and hardware for exterior opening assemblies have been tested and approved for use at the wind load and design pressure level requirements specified for the Project.
 - a. Hurricane Resistant Components (State of Florida): Within the State of Florida, provide copy of independent, third party certified listing to ANSI A250.13.
 - 5. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.
- H. 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 Submittals.

1.03 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 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. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier 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 course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- D. Windstorm Assembly Installer Qualifications: Installers are to be factory trained and certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.
 - E. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.
 - F. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through current members of the manufacturer's "Power Operator Preferred Installer" program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.
 - G. 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.
 - H. Hurricane Resistant Exterior Openings: Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the wind loads, design pressures, debris impact resistance, and glass and glazing requirements applicable to the Project.
 - 1. Test units according to ASTM E330, ASTM E1886, ASTM E1996 standards, certified by a qualified independent third party testing agency acceptable to authority having jurisdiction, and bearing a third party certification agency permanent label indicating windstorm approved product.
 - I. Hurricane Resistant Exterior Openings (State of Florida including the High Velocity Hurricane Zone (HVHZ)): Provide exterior door hardware as complete and tested assemblies, or component assemblies, including approved doors and frames specified under Section 081113 "Hollow Metal Doors and Frames", to meet the wind loads, design pressures, debris impact resistance, and glass and glazing requirements as detailed in the current State of Florida building code sections applicable to the Project.
 - 1. Each unit to bear third party permanent label in accordance with the Florida Building Code requirements.
 - J. Hurricane Resistant Exterior Openings (State of Texas): Provide exterior hollow metal and door hardware assemblies approved by the Texas Department of Insurance, including anchorage, capable of withstanding wind load design pressures calculated for this project by a registered architect or engineer and are part of the construction documents per the

Texas Department of Insurance, authorities having jurisdiction, and the International Building Code Design Loads Section 1609.

1. Each unit to bear third party permanent label in accordance with the Texas Department of Insurance requirements applicable to project.
2. Hurricane Resistance Test Performance: Provide hollow metal and door hardware approved assemblies that pass large missile-impact tests, as required by Texas Department of Insurance systems location above grade and cyclic-pressure tests according to testing requirements of authorities having jurisdiction.
 - a. Impact Resistance: Hollow metal with approved door hardware assemblies must satisfy the Texas Department of Insurance's criteria for protection from windborne debris in both the Inland I zone and the Seaward zone. Assemblies must pass the large missile impact test (which equates to Missile Level D specified in ASTM E 1996-02). Assemblies may be installed at any height on the structure as long as the design pressure rating for the assemblies is not exceeded.
- K. Severe Storm Shelter Openings: Provide complete door systems for hurricane or tornado resistant storm shelters and other areas of refuge complying and tested according to FEMA 361 (2015), Design and Construction Guidance for Community Safe Rooms; and ICC 500 (2014), ICC/NSSA Standard for the Design and Construction of Storm Shelters.
- L. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- M. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.
- N. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures 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 inspecting, testing, commissioning, and demonstration procedures

- O. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving 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 related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.05 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 Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. 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.

1.06 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.
- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - 1. Structural failures including excessive deflection, cracking, or breakage.
 - 2. Faulty operation of the hardware.
 - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
3. Seven years for heavy duty cylindrical (bored) locks and latches.
4. Five years for standard duty cylindrical (bored) locks and latches.
5. Five years for exit hardware.
6. Twenty five years for manual surface door closer bodies.
7. Ten years for heavy duty floor closers.
8. Two years for shallow depth floor closers.
9. Two years for overhead concealed closers.
10. Five years for motorized electric latch retraction exit devices.
11. Two years for electromechanical door hardware.

1.07 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
- C. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.02 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
 - 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 where indicated in the Hardware Sets or on Drawings:
 - a. Non-removable Pins: 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. Acceptable Manufacturers:
 - a. Hager Companies (HA).
 - b. McKinney Products (MK).
- B. Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 Grade 1-600 certified pin and barrel continuous hinges with minimum 14 gauge Type 304 stainless steel hinge leaves, concealed teflon coated stainless pin, and twin self lubricated nylon bearings at each knuckle separation. Factory trim hinges to suit door height and prepare for electrical cut-outs.
1. Acceptable Manufacturers:
 - a. Markar Products (MR).
 - b. McKinney Products (MK).
 - c. Pemko Manufacturing (PE).

2.03 POWER TRANSFER DEVICES

- A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 1. Acceptable Manufacturers:
 - a. Securitron (SU) - EL-CEPT Series.

2.04 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Cylinders: Original manufacturer cylinders complying with the following:
 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

5. Keyway: Manufacturer's Standard. Match Facility Restricted Keyway.
- C. High Security Cylinders: ANSI/BHMA A156.5, Grade 1 High security cylinder conforming to UL437, including both pick and drill resistance. Pick resistance incorporates two or more independent locking mechanisms including a pin tumbler device with six top pin chambers, mushroom-shaped driver pins, and coded sidebar locking mechanism operated independently from the six top pin tumbler device. Drill resistance incorporates cylinder housing with fixed case-hardened inserts protecting the pin tumbler shear line, cylinder plugs with case-hardened inserts protecting both the pin tumbler shear line and the side bar, mushroom-shaped stainless steel driver pins, and stainless steel sidepins. Cylinders to be factory keyed.
 1. Acceptable Manufacturers:
 - a. ASSA (AA) - V10 Series.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified patented cylinders employing a utility patented and restricted keyway requiring the use of a patented key. Cylinders are to be protected from unauthorized manufacture and distribution by manufacturer's United States patents. Cylinders are to be factory keyed with owner having the ability for on-site original key cutting.
 1. Acceptable Manufacturers:
 - a. Arrow (AW) - Pointe Flex Series.
 - b. Medeco (MC) - X4 Series.
 - c. Sargent Manufacturing (SA) - XC Series.
 - d. Schlage Lock (SC) - Everest D Series.
 - e. Stanley Best (BE) - 1CK Best/Peaks Series.
 - f. Stanley Best (BE) - MX8 Series.
 - g. No Substitution.
- E. Keying System: Each type of lock and cylinders to be factory keyed.
 1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. Existing System: Key locks to Owner's existing system.
- F. Key Quantity: Provide the following minimum number of keys:
 1. Change Keys per Cylinder: Two (2) Three (3).
 2. Master Keys (per Master Key Level/Group): Five (5).
 3. Construction Keys (where required): Ten (10).
 4. Construction Control Keys (where required): Two (2).
 5. Permanent Control Keys (where required): Two (2).
- G. Construction Keying: Provide construction master keyed cylinders.
- H. Construction Keying: Provide temporary keyed construction cores.
- I. Key Registration List (Bitting List):
 1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
 2. Provide transcript list in writing or electronic file as directed by the Owner.

- J. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
 - 1. Acceptable Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).
- K. Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into "Key Wizard" software.

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
 - 1. Mortise locks to be certified Security Grade 1.
 - 2. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.13 requirements to 10 million cycles.
 - 3. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) - 8200 Series.

2.06 ELECTROMECHANICAL LOCKING DEVICES

- A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.
 - 1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
 - 2. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
 - 3. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) - 8200 Series.

2.07 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 latchbolts, 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 Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.08 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. 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.
2. 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.
3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
4. 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.
5. 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.
6. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
7. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
8. 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 function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
9. 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.
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 panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) - 80 Series.

2.09 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 including installation and adjusting information on inside of cover.
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. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
4. 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 physically handicapped, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
7. Closer Covers: Provide metal closer covers finished to match other hardware on the project.
8. 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 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. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) - 351 Series.

2.10 AUTOMATIC DOOR OPERATORS

A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for compliance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.

- B. Electrohydraulic Door Operators: Self-contained low-pressure units with rack and pinion design contained within a cast aluminum housing. Door closing speed controlled by independent hydraulic adjustment valves in the sweep and latch range of the closing cycle. Operator is to provide conventional door closer opening and closing forces unless the power operator motor is activated. Unit is to include an adjustable hydraulic backcheck valve to cushion the door speed if opened violently. Non-handed units for both push and pull side applications.
 - C. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonferrous shims for aligning system components.
 - D. Standard: Certified ANSI/BHMA A156.19.
 - 1. Performance Requirements:
 - a. Opening Force if Power Fails: Not more than 15 lbf required to release a latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
 - b. Entrapment Protection: Not more than 15 lbf required to prevent stopped door from closing or opening.
 - E. Certification: Operators shall be furnished with GreenCircle Certification.
 - F. Configuration: Surface mounted. Door operators to control single swinging and pair of swinging doors.
 - G. Operation: Power opening and spring closing operation capable of meeting ANSI A117.1 accessibility guideline. Provide time delay for door to remain open before initiating closing cycle as required by ANSI/BHMA A156.19. When not in automatic mode, door operator to function as manual door closer with fully adjustable opening and closing forces, with or without electrical power.
 - 1. On-off switch to control power to be key switch operated.
 - H. Features: Operator units to have full feature adjustments for door opening and closing force and speed, backcheck, motor assist acceleration from 0 to 30 seconds, time delay, vestibule interface delay, obstruction recycle, and hold open time from 0 up to 30 seconds.
 - I. Provide outputs and relays on board the operator to allow for coordination of exit device latch retraction, electric strikes, magnetic locks, card readers, safety and motion sensors and specified auxiliary contacts.
 - J. Activation Devices: Provide activation devices in accordance with ANSI/BHMA A156.19 standard, for condition of exposure indicated and for long term, maintenance free operation under normal traffic load operation. Coordinate activation control with electrified hardware and access control interfaces. Activation switches are standard SPST, with optional DPDT availability.
 - K. Signage: As required by cited ANSI/BHMA A156.19 standard for the type of operator.
 - 1. Acceptable Manufacturers:
 - a. Norton Door Controls (NO) - 6000 Series.
- 2.11 ARCHITECTURAL TRIM
- A. Door 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. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inch thick.
4. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
5. Acceptable Manufacturers:
 - a. Rockwood Manufacturing (RO).

2.12 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 certified 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. Acceptable Manufacturers:
 - a. Rockwood Manufacturing (RO).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Acceptable Manufacturers:
 - a. Rixson Door Controls (RF).

2.13 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 UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- 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 fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
 - 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. Acceptable Manufacturers:
 1. Pemko Manufacturing (PE).
- 2.14 ELECTRONIC ACCESSORIES
- A. Key Switches: Key switches furnished standard with stainless steel single gang face plate with a 12/24VDC bi-color LED indicator. Integral backing bracket permits integration with any 1 1/4" or 1 1/2" mortise type cylinder. Key switches available as momentary or maintained action and in narrow face plate options.
 1. Acceptable Manufacturers:
 - a. Securitron (SU) - MK Series.
 - B. 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. Acceptable Manufacturers:
 - a. Securitron (SU) - DPS Series.
 - C. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 1. Acceptable Manufacturers:
 - a. Securitron (SU) - BPS Series.
- 2.15 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.
- 2.16 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- 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.

3.02 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.03 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.
- D. 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.

- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. 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.

3.04 FIELD QUALITY CONTROL

- A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.05 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.

3.06 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 any and 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 finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.07 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.08 DOOR HARDWARE SETS

1. MK - MCKINNEY
2. MR - MARKAR
3. SA - SARGENT
4. RO - ROCKWOOD
5. RF - RIXSON
6. NO - NORTON
7. PE - PEMKO
8. SU - SECURITRON

HARDWARE SCHEDULE

SET: 1.0

DOORS: 100A, 150A, 150B, 150C

2	CONTINUOUS HINGE	<u>FM300 CTP WEP</u>	630	MR
2	EXIT DEVICE	<u>43 55 56 AD8610</u>	US32D	SA
2	EXIT DEVICE TRIM	LC 106	US32D	SA
1	CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1	VANDAL RESISTANT TRIM	<u>VRT24</u>	US32D	RO
1	VANDAL RESISTANT TRIM	<u>VRT24 C</u>	US32D	RO
2	CONCEALED OVERHEAD STOP	<u>1-X36</u>	630	RF
2	DOOR OPERATOR	<u>6030</u>	689	NO
1	THRESHOLD	<u>PER SILL DETAIL</u>		PE
1	RAIN GUARD	<u>346C (OMIT @ OVERHANG)</u>		PE
2	SWEEP	<u>18062CNB</u>		PE
2	ELECTRIC POWER TRANSFER	<u>CEPT-10</u>		SU
2	ELECTROLYNX HARNESS	<u>QC-C006P</u>		MK
2	ELECTROLYNX HARNESS	<u>QC-C1500P</u>		MK
2	PUSH PLATE	639		NO
2	POSITION SWITCH	<u>DPS</u>		SU
1	KEYSWITCH	<u>MKA2</u>		SU
1	POWER SUPPLY	<u>BPS-24</u>		SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR
WEATHERSTRIPPING AND ASTRAGAL BY ALUMINUM DOOR SUPPLIER

SET: 2.0

DOORS: 250A

1	CONTINUOUS HINGE	<u>FM300 WEP</u>	630	MR
1	RIM EXIT DEVICE	<u>LC 16 43 AD8504</u>	US32D	SA
2	CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1	VANDAL RESISTANT TRIM	<u>VRT24 C</u>	US32D	RO
1	DOOR CLOSER	<u>351 P10</u>	EN	SA
1	DOOR STOP	<u>466</u>	BLACK	RO
1	THRESHOLD	<u>PER SILL DETAIL</u>		PE
1	RAIN GUARD	<u>346C (OMIT @ OVERHANG)</u>		PE
1	SWEEP	<u>18062CNB</u>		PE

NOTES: WEATHERSTRIPPING BY ALUMINUM DOOR SUPPLIER

SET: 3.0

DOORS: 125A

1	CONTINUOUS HINGE	<u>FM300 CTP WEP</u>	630	MR
1	RIM EXIT DEVICE	<u>LC 43 55 56 AD8504</u>	US32D	SA
1	CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1	VANDAL RESISTANT TRIM	<u>VRT24 C</u>	US32D	RO
1	DOOR CLOSER	<u>351 P10</u>	EN	SA
1	DOOR STOP	<u>466</u>	BLACK	RO
1	THRESHOLD	<u>PER SILL DETAIL</u>		PE

1 RAIN GUARD	<u>346C (OMIT @ OVERHANG)</u>	PE
1 SWEEP	<u>18062CNB</u>	PE
1 ELECTRIC POWER TRANSFER	<u>CEPT-10</u>	SU
1 POSITION SWITCH	<u>DPS</u>	SU
1 POWER SUPPLY	<u>BPS-24</u>	SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR
WEATHERSTRIPPING BY ALUMINUM DOOR SUPPLIER

SET: 4.0

DOORS: 200A

1 CONTINUOUS HINGE	<u>FM300 CTP WEP</u>	630	MR
1 CONTINUOUS HINGE	<u>FM300 WEP</u>	630	MR
1 EXIT DEVICE	<u>43 55 56 AD8610</u>	US32D	SA
1 EXIT DEVICE	<u>LC 16 43 AD8610</u>	US32D	SA
1 EXIT DEVICE TRIM	<u>LC 106</u>	US32D	SA
2 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 VANDAL RESISTANT TRIM	<u>VRT24</u>	US32D	RO
1 VANDAL RESISTANT TRIM	<u>VRT24 C</u>	US32D	RO
2 CONCEALED OVERHEAD STOP	<u>1-X36</u>	630	RF
2 DOOR CLOSER	<u>351 P10</u>	EN	SA
1 THRESHOLD	<u>PER SILL DETAIL</u>		PE
1 RAIN GUARD	<u>346C (OMIT @ OVERHANG)</u>		PE
2 SWEEP	<u>18062CNB</u>		PE
1 ELECTRIC POWER TRANSFER	<u>CEPT-10</u>		SU
1 POSITION SWITCH	<u>DPS</u>		SU
2 POWER SUPPLY	<u>BPS-24</u>		SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR
WEATHERSTRIPPING & ASTRAGAL BY ALUMINUM DOOR SUPPLIER

SET: 5.0

DOORS: 101A, 102A, 102B, 103A, 103B, 104A, 104B, 105B, 106A, 106B, 201A, 202A, 203A, 203B, 204A, 204B, 205B, 206B

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 EXIT DEVICE	<u>LC 43 55 56 8804 ETP</u>	US32D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 CONCEALED OVERHEAD STOP	<u>1-X36</u>	630	RF
1 DOOR CLOSER	<u>351 P10</u>	EN	SA
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
3 SILENCER	<u>608</u>		RO
1 ELECTRIC POWER TRANSFER	<u>CEPT-10</u>		SU
1 POSITION SWITCH	<u>DPS</u>		SU
1 POWER SUPPLY	<u>BPS-24</u>		SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR

SET: 6.0

DOORS: 101B, 105A, 201B, 202B, 205A, 206A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 EXIT DEVICE	<u>LC 43 55 56 8804 ETP</u>	US32D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 DOOR CLOSER	<u>351 P10</u>	EN	SA
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO
1 ELECTRIC POWER TRANSFER	<u>CEPT-10</u>		SU
1 POSITION SWITCH	<u>DPS</u>		SU
1 POWER SUPPLY	<u>BPS-24</u>		SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR

SET: 7.0

DOORS: 110A, 210A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 STOREROOM LOCK	<u>LC 8204 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 CONCEALED OVERHEAD STOP	<u>1-X36</u>	630	RF
3 SILENCER	<u>608</u>		RO

SET: 8.0

DOORS: 113A, 213A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 STOREROOM LOCK	<u>LC 8204 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 MOP PLATE	<u>K1050 6" HIGH 4BE CSK</u>	US32D	RO
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO

SET: 9.0

DOORS: 121A, 122A, 126A, 226A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 STOREROOM LOCK	<u>LC 8204 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 CONCEALED OVERHEAD STOP	<u>1-X36</u>	630	RF
1 DOOR CLOSER	<u>351 P10</u>	EN	SA
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
3 SILENCER	<u>608</u>		RO

SET: 10.0

DOORS: 131A, 136A, 161A, 164A, 165A, 166A, 229A, 236A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 OFFICE LOCK	<u>LC 8205 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO

SET: 11.0

DOORS: 129A, 137A, 138A, 139A, 140A, 231A, 232A, 237A, 238A, 239A, 240A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 OFFICE LOCK	<u>LC 8205 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 CONCEALED OVERHEAD STOP	<u>1-X36</u>	630	RF
3 SILENCER	<u>608</u>		RO

SET: 12.0

DOORS: 160A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 FAIL SECURE ELECTRIC LOCK	<u>LC RX 8271-24V LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 DOOR CLOSER	<u>351 P10</u>	EN	SA
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO
1 ELECTRIC POWER TRANSFER	<u>CEPT-10</u>		SU
1 POSITION SWITCH	<u>DPS</u>		SU
1 POWER SUPPLY	<u>BPS-24</u>		SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR

SET: 13.0

DOORS: 120A, 220A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 FAIL SECURE ELECTRIC LOCK	<u>LC RX 8271-24V LNP</u>	US26D	SA
2 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO
1 ELECTRIC POWER TRANSFER	<u>CEPT-10</u>		SU
1 POWER SUPPLY	<u>BPS-24</u>		SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR

SET: 14.0

DOORS: 260A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
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1 CLASSROOM SECURITY LOCK	<u>LC 8238 LNP</u>	US32D	SA
2 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 DOOR CLOSER	<u>351 O</u>	EN	SA
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO

SET: 15.0

DOORS: 111A, 112A, 211A, 212A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 CLASSROOM LOCK	<u>LC 8237 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 DOOR CLOSER	<u>351 O</u>	EN	SA
1 MOP PLATE	<u>K1050 6" HIGH 4BE CSK</u>	US32D	RO
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO

SET: 16.0

DOORS: 127A, 128A, 227A, 228A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 HOTEL LOCK	<u>LB LC 49 8250 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 DOOR CLOSER	<u>351 P10</u>	EN	SA
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO

SET: 17.0

DOORS: 162A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 PASSAGE SET	<u>8215 LNP</u>	US26D	SA
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO

SET: 18.0

DOORS: 221A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 STOREROOM LOCK	<u>LC 8204 LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO

SET: 19.0

DOORS: 222A

3 HINGE (HEAVY WEIGHT)	<u>T4A3786 NRP</u>	US26D	MK
1 FAIL SECURE ELECTRIC LOCK	<u>LC RX 8271-24V LNP</u>	US26D	SA
1 CYLINDER AS REQ'D	TO MATCH EXISTING FACILITY STD		AA
1 DOOR CLOSER	<u>351 O</u>	EN	SA
1 KICK PLATE	<u>K1050 10" 4BE CSK</u>	US32D	RO
1 WALL STOP	<u>403</u>	US26D	RO
3 SILENCER	<u>608</u>		RO
1 ELECTRIC POWER TRANSFER	<u>CEPT-10</u>		SU
1 POSITION SWITCH	<u>DPS</u>		SU
1 POWER SUPPLY	<u>BPS-24</u>		SU

NOTES: CARD READER, WIRING AND ELECTRICAL INTERFACE BY SECURITY CONTRACTOR

SET: 20.0

DOORS: X301, X302, X303

1 GATES	BY MFR	00
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END OF SECTION 087100

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 088000 - GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 079200 - Joint Sealants: Sealants for other than glazing purposes.
- C. Section 084313 - Aluminum-Framed Storefronts.
- D. Section 085113 - Aluminum Windows: Glazing furnished by window manufacturer.

1.03 REFERENCE STANDARDS

- A. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- C. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- F. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- G. GANA (GM) - GANA Glazing Manual; 2009.
- H. GANA (SM) - GANA Sealant Manual; 2008.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- B. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this Section; require attendance by all affected installers.
 - 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.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

- C. Samples: Submit 3 samples 12 x 12 inch (305 by 305 mm) in size of glass units.
- D. Certificates: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Certificate: Certify that sealed insulated glass meets or exceeds specified requirements.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.
- B. Provide each type of glass, primary sealant, and gasket from a single manufacturer with not less than five years documented experience in the production of required materials.
- C. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- D. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- E. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- F. Certifications:
 - 1. Manufacturer's letter certifying glass and glazing materials compatibility.
 - 2. Manufacturer's letter certifying that sealed insulating glass units meet or exceed specification.
 - 3. Engineering certifications.

1.08 MOCK-UP

- A. See Section 014000 - Quality Requirements, for additional mock-up requirements.
- B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Install glazing in mockups specified in Section 084313 Aluminum-Framed Entrances and Storefronts to match glazing systems required for Project, including glazing methods.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.09 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 C 1087 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 8 Samples of each type of material, including joint substrates, 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. Comply with manufacturer's instructions for shipping, handling, storing, and protection of glass and glazing materials. Exercise exceptional care to prevent edge damage to glass, and damage to coatings.
- B. Where insulating glass units will be exposed to substantial altitude changes during shipping, comply with manufacturer's recommendations for venting and sealing.

1.11 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 50 degrees F (10 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.
- C. Install sealants only when ambient temperature conditions can be maintained at or above 40 degrees F (4 degrees C) during installation and 48 hours immediately following installation.

1.12 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.
- C. Laminated Glass: Provide a ten (10) year warranty to include coverage for delamination, including replacement of failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Guardian Industries Corp.
 - 2. Pilkington North America.
 - 3. PPG Industries, Inc.

4. Viracon, Inc.
5. Prior approved equal.

2.02 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. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
 1. Design Wind Pressures: As indicated on Structural Drawings.
 2. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 3. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 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.

2.03 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. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. 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, and at locations required by code, permanently mark glazing with certification label of the SGCC. 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. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.04 INSULATING GLASS UNITS

- A. Type (GL-1) - Sealed Insulating Glass Units: Vision glazing.
 - 1. Application: All exterior glazing unless otherwise indicated. Fully temper as required by code.
 - 2. Outboard Lite: Heat-strengthened float glass, 1/4 inch (6 mm) thick, minimum.
 - a. Tint: Gray.
 - b. Coating: Low-E (passive type), on #2 surface.
 - 3. Inboard Lite: Heat-strengthened float glass, 1/4 inch (6 mm) thick, minimum.
 - a. Tint: Clear.
 - 4. Total Thickness: 1 inch (25 mm).
 - 5. Total Visible Light Transmittance: 47 percent, nominal.
 - 6. Total Solar Heat Gain Coefficient: 0.24 percent, nominal.
 - 7. U-Value:
 - a. Winter: 0.28.
 - b. Summer: 0.26.
 - 8. Glazing Method: Gasket glazing.
 - 9. Basis of Design Product: PPG Industries; Solarban 70XL, (2) SOLARGRAY + Clear.
- B. Type (GL-2) - Sealed Laminated Insulating Glass Units: Vision glazing.
 - 1. Application: Spandrels.
 - 2. Outboard Lite: Fully tempered float glass, 1/4 inch (6 mm) thick, minimum.
 - a. Tint: Gray.
 - 3. Inboard Lite: Fully tempered float glass, 1/4 inch (6 mm) thick, minimum, Laminated.
 - a. Tint: Clear.
 - b. Coating: GlasPro-BP coating, on #3 surface.
 - 4. Total Thickness: 1 inch (25 mm).
 - 5. Glazing Method: Gasket glazing.
 - 6. Basis of Design Product: PPG Industries; Solarban 70XL.
 - a. Color: On the Rocks.

2.05 MONOLIOTHIC GLASS UNITS

- A. Single Vision Glazing:
 - 1. Application: As indicated on Drawings.
 - 2. Type: Fully tempered float glass.
 - 3. Tint: Clear.
 - 4. Thickness: 1/4 inch (6 mm).

2.06 GLASS MATERIALS

- A. General - Combined Requirements: If a particular glass unit is indicated to comply with more than one type of requirement, such as color, safety characteristics, or other requirements. Comply with all specified requirements for each type as scheduled on Drawings.
- B. Float Glass: Provide float glass based glazing unless noted otherwise.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality-Q3.
 - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048, Kind HS and Kind FT.
 - 3. Tinted Types: ASTM C1036, Class 2 - Tinted, color and performance characteristics as indicated.
 - 4. Thicknesses: As indicated; for exterior glazing comply with requirements indicated for wind load design regardless of thickness indicated.
- C. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - 2. Spacer: Manufacturer's standard spacer material and construction.
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.07 GLAZING COMPOUNDS

- A. Acceptable Manufacturers:
 - 1. Bostik Inc.: www.bostik-us.com.
 - 2. Momentive Performance Materials, Inc. (formerly GE Silicones): www.momentive.com.
 - 3. Pecora Corporation: www.pecora.com.
 - 4. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com.
 - 5. Substitutions: Refer to Section 016000 - Product Requirements.
- B. General Requirements:
 - 1. Provide black exposed glazing accessory materials, unless specifically indicated otherwise.
 - 2. Provide materials of hardness as recommended by manufacturer for required application and condition of installation in each case. Provide only compounds which are known to be fully compatible with surfaces contacted, including glass products, seals, and glazing channel surfaces.
 - 3. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168, Cal-GREEN Table 5.504.4.1 Adhesive VOC Limit, and Cal-GREEN Table 5.504.4.2 Sealant VOC Limit requirements.
 - a. Current requirement refers to the date on which the materials are installed in the building.
 - b. A copy of SCAQMD Rule #1168 is referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

- C. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A; Shore A hardness of 10 to 20; black color; non-skinning.
- D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
- E. Silicone Sealant: As specified in Section 079200.

2.08 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) x width of glazing rabbet space minus 1/16 inch (1.5 mm) x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch (75 mm) long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; properly sized to suit indicated applications; black color.
 - 1. Width: As required for application.
 - 2. Thickness: As required for application.
 - 3. Spacer Rod Diameter: As required for application.
- D. Glazing Gaskets: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; black color.
- E. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- F. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- G. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- H. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- I. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.09 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. Grind smooth and polish exposed glass edges and corners.

PART 3 EXECUTION

3.01 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

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.
- D. Install sealants in accordance with ASTM C1193 and GANA Sealant Manual.
- E. Install sealants in accordance with manufacturer's instructions.
- F. Sealed Insulating Glass Units: Seal breather tubes immediately prior to glass unit installation with bead of silicone sealant according to sealed insulating glass unit manufacturers requirements; do not crimp, bend, or otherwise damage breather tubes.

3.03 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. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. 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.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. 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.
 - G. 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.
 - H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
 - I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
 - J. 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.
 - K. 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.
- 3.04 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)
- A. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
 - B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
 - C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.
 - D. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 - E. 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.
 - F. 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.
 - G. 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.
 - H. Install gaskets so they protrude past face of glazing stops.
- 3.05 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)
- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

- B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3.06 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.07 CLEANING

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

3.08 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

END OF SECTION 088000

SECTION 090561 - COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section applies to all floors identified in the contract documents as to receive the following types of floor coverings:
 - 1. Resilient tile and sheet.
 - 2. Carpet tile.
 - 3. Thin-set ceramic tile and stone tile.
 - 4. Medium-set ceramic tile.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for moisture and alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
 - 1. Contractor shall perform specified remediation of concrete floor slabs at no additional cost to Owner.

1.02 RELATED REQUIREMENTS

- A. Section 014000 - Quality Requirements: Additional requirements relating to testing agencies and testing.
- B. Section 017419 - Construction Waste Management and Disposal: Handling of existing floor coverings removed.
- C. Section 018114 - Sustainable Design Requirements - CAL-Green.

1.03 REFERENCE STANDARDS

- A. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 1999 (Reapproved 2014).
- B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2011.
- E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; Resilient Floor Covering Institute; October 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

- A. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
 - 1. Moisture and alkalinity (pH) limits and test methods.
 - 2. Manufacturer's required bond/compatibility test procedure.
 - 3. Product Test Reports: For each MVE-control system, for tests performed by a qualified testing agency.
- B. Testing Agency's Report:
 - 1. Description of areas tested; include floor plans and photographs if helpful.
 - 2. Summary of conditions encountered.
 - 3. Moisture and alkalinity (pH) test reports.
 - 4. Copies of specified test methods.
 - 5. Recommendations for remediation of unsatisfactory surfaces.
 - 6. Include certification of accuracy by authorized official of testing agency.
 - 7. Submit report to Architect.
 - 8. Submit report not more than two business days after conclusion of testing.
- C. Adhesive Bond and Compatibility Test Report.
- D. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
 - 1. Manufacturer's qualification statement.
 - 2. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
 - 3. Manufacturer's installation instructions.
 - 4. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. A5.405.1: Regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - 5. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.
 - 6. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.

1.07 QUALITY ASSURANCE

- A. Moisture and alkalinity (pH) testing will be performed by an independent testing agency employed and paid by Owner.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
 - 1. ICRI certified independent testing agency.

2. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
1. Provide access for and cooperate with testing agency.
 2. Confirm date of start of testing at least 10 days prior to actual start.
 3. Allow at least 4 business days on site for testing agency activities.
 4. Achieve and maintain specified ambient conditions.
 5. Notify Architect when specified ambient conditions have been achieved and when testing will start.
- D. Remedial Coating Installer Qualifications: Company specializing in performing work of the type specified in this section, trained by or employed by coating manufacturer, and able to provide at least 3 project references showing at least 3 years' experience installing moisture emission coatings.
- 1.08 DELIVERY, STORAGE, AND HANDLING
- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
 - B. Deliver materials in manufacturer's packaging; include installation instructions.
 - C. Keep materials from freezing.
- 1.09 FIELD CONDITIONS
- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
 - B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.
 - C. Comply with MVE-control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
 1. Store system components in a temperature-controlled environment and protected from weather and at ambient temperature of not less than 65 deg F (18 deg C) and not more than 85 deg F (29.4 deg C) at least 48 hours before use.
 2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE-control system manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29.4 deg C) and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
 3. Install MVE-control systems where concrete surface temperatures will remain a minimum of 5 deg F (3 deg C) higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
 - 1. Sealants shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
- C. Remedial Floor Coating: ASTM F 3010-qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
 - 1. Thickness: 1/8 inch (3.2 mm), maximum.
 - 2. If testing agency recommends any particular products, use one of those.
 - 3. Acceptable Products:
 - a. ARDEX Engineered Cements; ARDEX MC ULTRA with ARDEX FEATHERFINISH: www.ardexamericas.com.
 - b. Koster American Corporation; Koster VAP I 2000 with Koster SL Premium overlay: www.kosterusa.com.
 - 4. Substrate Primer: Provide MVE-control system manufacturer's concrete-substrate primer if required for system indicated by substrate conditions.
 - 5. Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE-control system manufacturer's primer to ensure adhesion of products to MVE-control system.

2.02 ACCESSORIES

- A. Patching and Leveling Material: Moisture-, mildew-, and alkali-resistant product recommended in writing by MVE-control system manufacturer and with minimum of 3000-psi (20.68-MPa) compressive strength after 28 days when tested according to ASTM C 109/C 109M.
- B. Crack-Filling Material: Resin-based material recommended in writing by MVE-control system manufacturer for sealing concrete substrate crack repair.
- C. Cementitious Underlayment: If required to maintain manufacturer's warranty, provide MVE-control system manufacturer's gypsum cement-based underlayment.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

- A. Follow recommendations of testing agency.

- B. Preinstallation Testing:
1. Testing Agency: Engage a qualified testing agency to perform tests.
 2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Install MVE-control system in areas where pH readings are less than 7.0 and in areas where pH readings are greater than 8.5.
 3. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Install MVE-control system in locations where concrete substrate MVER exceeds 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Internal Relative Humidity Test: Using in situ probes, ASTM F 2170. Install MVE-control system in locations where concrete substrates exhibit relative humidity level greater than 75 percent.
 4. Tensile-Bond-Strength Testing: For typical locations indicated to receive installation of MVE-control system, install minimum 100-sq. ft. (9.29-sq. m) area of MVE-control system to prepared concrete substrate and test according to ASTM D 7234.
 - a. Proceed with installation only where tensile bond strength is greater than 200 psi (1.38 MPa) with failure in the concrete.
- C. Remediations: Provide at no additional cost to Owner.
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
 2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
 3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.
- D. Concrete Substrates: Prepare and clean substrates according to MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
1. Remove coatings and other substances that are incompatible with MVE-control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE-control system manufacturer. Do not use solvents.
 2. Provide concrete surface profile complying with ICRI 310.2R CSP 3 by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 3. After shot blasting, repair damaged and deteriorated concrete according to MVE-control system manufacturer's written instructions.
 4. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
 5. Fill surface depressions and irregularities with patching and leveling material.
 6. Fill surface cracks, grooves, control joints, and other nonmoving joints with crack-filling material.

7. Allow concrete to dry, undisturbed, for period recommended in writing by MVE-control system manufacturer after surface preparation, but not less than 24 hours.
 8. Before installing MVE-control systems, broom sweep and vacuum prepared concrete.
- E. Protect walls, floor openings, electrical openings, door frames, and other obstructions during installation.

3.02 PREPARATION

- A. See individual floor covering sections for additional requirements.
- B. Comply with recommendations of testing agency.
- C. Comply with requirements and recommendations of floor covering manufacturer.
- D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- E. Do not fill expansion joints, isolation joints, or other moving joints.

3.03 ADHESIVE BOND AND COMPATIBILITY TESTING

- A. Comply with requirements and recommendations of floor covering manufacturer.

3.04 APPLICATION OF REMEDIAL FLOOR COATING

- A. General: Install MVE-control system according to ASTM F 3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fish eyes, and voids.
 1. Install primers as required to comply with manufacturer's written instructions.
- B. Do not apply MVE-control system across substrate expansion, isolation, and other moving joints.
- C. Apply system, including component coats if any, in thickness recommended in writing by MVE-control system manufacturer for MVER indicated by preinstallation testing.
- D. Cure MVE-control system components according to manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.
- E. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies according to manufacturer's written instructions.
- F. Install cementitious underlayment over cured membrane if required to maintain manufacturer's warranty and in thickness required to maintain the warranty.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests.
- B. Installation Inspections: Inspect substrate preparation and installation of system components to ensure compliance with manufacturer's written instructions and to ensure that a complete MVE-control system is installed without deficiencies.
 1. Verify that surface preparation meets requirements.
 2. Verify that component coats and complete MVE-control-system film thicknesses comply with manufacturer's written instructions.

3. Verify that MVE-control-system components and installation areas that evidence deficiencies are repaired according to manufacturer's written instructions.

C. MVE-control system will be considered defective if it does not pass inspections.

3.06 PROTECTION

A. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.

B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

END OF SECTION 090561

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 092116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Cementitious backing board.
- F. Gypsum wallboard.
- G. Abuse-resistant wallboard.
- H. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 061053 - Miscellaneous Rough Carpentry.
- C. Section 078400 - Firestopping: Top-of-wall assemblies at fire rated walls.
- D. Section 079200 - Joint Sealants: Sealing gaps in construction other than gypsum board or plaster work.
- E. Section 079219 - Acoustical Joint Sealants.
- F. Section 092700 - Glass-Fiber Reinforced Gypsum Fabrications.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ANSI A108.11-SystemDeleted - American National Standard for Interior Installation of Cementitious Backer Units; 2010 (Revised).
- C. ANSI A118.9-SystemDeleted - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units; 1999 (Reaffirmed 2010).
- D. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2009a.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- G. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2009).

- H. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2010.
 - I. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
 - J. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
 - K. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
 - L. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
 - M. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2015.
 - N. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
 - O. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
 - P. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units; 2014.
 - Q. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
 - R. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.
 - S. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
 - T. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
 - U. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
 - V. GA-216 - Application and Finishing of Gypsum Board; 2013.
 - W. GA-600 - Fire Resistance Design Manual; 2015.
 - X. ICC (IBC) - International Building Code; 2015.
 - Y. UL (FRD) - Fire Resistance Directory; current edition.
- 1.04 ADMINISTRATIVE REQUIREMENTS
- A. Coordination:
 - 1. Coordinate with mechanical and electrical work. Do not attach or support metal framing to ducts, pipes, conduit, or similar items.
 - 2. Coordinate installation of ceiling suspension system with installation of overhead structural systems to ensure that inserts and other structural anchorage provisions

have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.

3. Coordinate with installation of sprayed-on fireproofing to minimize or eliminate damage to that work due to gypsum board systems installation.
4. Coordinate gypsum board work with requirements of Section 078400 to maintain integrity of fire-rated and smoke-rated partitions required to comply with specified regulatory requirements.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing, acoustic seals, and control joints.
- C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 4. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.
- B. Copies of Documents at Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Stud Framing: Products that do not comply with ASTM C645 or C754 are not permitted.

1.08 ~~MOCK UP~~

- A. ~~Comply with general mock-up requirements specified in Section 014000.~~
- B. ~~Mock-up: Construct gypsum board system mock-up for each wall and ceiling textures as directed by Architect, incorporating all components specified for the location.~~
 1. ~~Minimum size of mock-up is 10 feet by full height of wall.~~

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Store and protect products in accordance with referenced standards.
- B. Handle gypsum boards to prevent damage to ends, edges, and surfaces.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 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.
- D. Maintain ambient temperatures at not less than 40 degrees F for non-adhesive attachment of gypsum board, and not less than 50 degrees F for adhesive attachment.
- E. Maintain ambient temperatures at not less than 50 degrees F for a period 48 hours before gypsum board finishing, during installation, and after installation of board materials.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
 - 1. Construct assemblies identical to those indicated by reference to GA 600 or to design designations listed by Factory Mutual, Underwriters Laboratories, Warnock Hersey, or listing of other agencies acceptable to authorities having jurisdiction.
 - 2. Provide partition head assemblies for fire-rated full height partitions that have been successfully tested to accommodate deck deflection.
- B. Provide completed assemblies complying with ASTM C840 and GA-216.
- C. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
 - 2. Provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- D. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
 - 1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.

2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- E. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft (0.24 kPa) with maximum mid-span deflection of L/240.
 2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- F. Fire Rated Assemblies: Provide completed assemblies specified on Drawings.
1. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
 2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
 3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).
 4. Where any specified rated assembly requires the use of proprietary gypsum board system products, installation methods or procedures, comply with specified rated assembly requirements including requirements associated with assembly options which may be selected by Contractor.

2.02 METAL FRAMING MATERIALS

- A. Metal Framing - General: Provide framing materials complying with specified standards and tested assemblies; galvanized sheet steel, 20 gage unless specified, noted, scheduled, or detailed otherwise.
- B. Metal Stud Framing System Components - Non-Loadbearing: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/360 at 10 psf (480 Pa).
1. Protective Coating: ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized unless otherwise indicated.
 2. Studs: "C" shaped with flat or formed webs.
 - a. Type 25:
 - b. Return flange lip minimum dimension: 3/16 inches.
 - c. Flange width minimum dimension: 1-1/4 inches.
 - d. Uncoated sheet steel thickness: 0.0179 inches.
 - e. Type 22:
 - 1) Return flange lip minimum dimension: 3/16 inches.
 - 2) Flange width minimum dimension: 1-1/4 inches.
 - 3) Uncoated sheet steel thickness: 0.0270 inches.
 - 4) Type 20:
 - (a) Return flange lip minimum dimension: 3/16 inches.
 - (b) Flange width minimum dimension: 1-1/4 inches.
 - (c) Uncoated sheet steel thickness: 0.0329 inches.
 3. Runners: U shaped, sized to match studs.
 4. Ceiling Channels: C-shaped.
 5. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
 - a. Depth: 7/8 inch.

- b. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
 - c. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
 6. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm), ASTM C 645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 7. Resilient Furring Channels: 1/2 inch (12 mm) depth, for attachment to substrate through one leg only.
 - a. Acceptable Manufacturers - Resilient Furring Channels:
 - 1) Dietrich; RC Deluxe.
 - 2) No substitutions
 8. Use minimum 20 gage studs at door jambs, tile backing support, and other locations indicated.
 - C. Load-Bearing Metal Stud Framing (Cold Formed Metal Framing) for Application of Gypsum Board: Specified in Section 054000.
 - D. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
 - E. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 - F. Stud System Accessories: Manufacturer's standard clips, shoes, ties, reinforcements, fasteners, and other accessories as required for a complete stud framing system.
 - G. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI SG02-1.
 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
 3. Deflection and Firestop Track:
 - a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
 - b. Acceptable Products:
 - 1) ClarkDietrich Building Systems ; SLP-TRK Slotted Deflection Track.
 - 2) Fire Trak Corp; Posi Clip.
 - 3) MBA Building Supplies; Slotted Deflecto Track.
 - 4) Steel Network, Inc. (The); VertiClip SLD.
 - 5) Telling Industries; Vertical Slip Track.
 - 6) Substitutions: See Section 016000 - Product Requirements.
 4. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on Drawings; minimum track length of 12 feet (3660 mm).
- 2.03 CEILING SUSPENSION SYSTEM COMPONENTS
- A. Gypsum Board Interior Ceiling Suspension System:
 1. Ceiling Hangers: Type and size as specified in ASTM C754 for conditions and spacing required.

2. Ceiling Hanger Wire: ASTM A641/A641M, Class 1 coating; soft temper, pre-stretched, yield stress load at least three times design load, but not less than 12 gage.
 3. Ceiling Hanger Angles: Not less than 7/8 x 7/8 inch x 16 gage galvanized steel formed angles; ASTM A653/A653M, G90 coating, with minimum 5/16 diameter bolted connections.
 4. Ceiling Hanger Anchors: Size for three times imposed loads, as determined by ASTM E488/E488M; corrosive resistant materials with loops or holes for attachment of hanger wires.
- B. Ceiling Attachment Devices:
1. General:
 - a. Size devices for 5 times load imposed by completed system as determined in accordance with ASTM E488.
 - b. Powder-actuated fasteners in concrete: Size devices for 10 times load imposed by completed system as determined in accordance with ASTM E1190.
 - C. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock, Fire Rated.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Chicago Metallic Corporation;650 Fire Front Drywall Furring System.
 - b. United State Gypsum Company;Rigid X fire-rated.
 - c. Worthington Steel, DFR-Series Fire-Rated Drywall Furring System.

2.04 BOARD MATERIALS

- A. Acceptable Manufacturers - Gypsum-Based Board:
1. CertainTeed Corporation: www.certainteed.com.
 2. Georgia-Pacific Building Products: www.gpgypsum.com.
 3. National Gypsum Company: www.nationalgypsum.com.
 4. PABCO Gypsum: www.pabco gypsum.com.
 5. USG Corporation: www.usg.com.
- B. Board Materials - General:
1. Maximize use of recycled or synthetic gypsum with minimum of 10 percent.
 2. Comply with ASTM C1396.
 3. Type X or manufacturer's proprietary fire rated core for fire rated assemblies and locations where indicated; regular type at other assemblies.
 4. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.
 5. Thickness: 5/8 inch, except where indicated otherwise
- C. Gypsum Board: Gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Applications: Use for vertical surfaces, unless otherwise indicated.
 2. Thickness: As indicated on Drawings.
 - a. Vertical Surfaces: 1/2 inch (13 mm).
 - b. Multi-Layer Assemblies: Thicknesses as indicated on Drawings.
 3. Acceptable Mold-Resistant Paper-Faced Products:
 - a. Locations:
 - 1) Toilet Room areas without tile.
 - b. Acceptable Products:

- 1) Certainteed, Proroc Moisture And Mold Resistant With M2tech.
 - 2) National Gypsum Company; XP Wallboard.
 - 3) USG, Sheetrock Brand Mold Tough.
 - 4) Prior approved equal.
- D. Gypsum Board Type X: Gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Applications: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Thickness: As indicated on Drawings.
 - a. Vertical Surfaces: 5/8 inch (16 mm).
 - b. Ceilings: 5/8 inch (16 mm).
 - c. Multi-Layer Assemblies: Thicknesses as indicated on Drawings.
- E. Abuse-Resistant Wallboard:
1. Applications: As indicated on Drawings.
 2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
 3. Indentation: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
 4. Soft Body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
 5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 6. Type: Fire-resistance rated Type X, UL or WH listed.
 7. Thickness: 5/8 inch (16 mm).
 8. Edges: Tapered.
 9. Acceptable Products:
 - a. Georgia-Pacific Gypsum; DensArmor Plus Abuse-Resistant.
 - b. National Gypsum Company; Gold Bond Hi-Abuse XP Gypsum Board.
 - c. United States Gypsum FIBEROCK Abuse Resistant VHI.
 - d. Prior approved equal.
- F. Backing Board For Wet Areas:
1. Applications: Surfaces behind tile in wet areas including toilet rooms.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. ANSI Cement-Based Backing Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
 - a. Thickness: 5/8 inch (1.58 mm).
 - b. Acceptable Products:
 - 1) Custom Building Products Wonderboard: www.custombuildingproducts.com
 - 2) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com/#sl.
 - 3) USG Corporation; Durock Cement Board: www.usg.com.
- G. Ceiling Board: Special sag-resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Applications: Ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch (12 mm).
 3. Edges: Tapered.

2.05 ACCESSORIES

- A. Acoustic Insulation - General: Use type of acoustical insulation to comply with indicated assembly requirements.
 - 1. Where any specified rated assembly requires the use of proprietary acoustical insulation products, installation methods or procedures, comply with specified rated assembly requirements including requirements associated with assembly options which may be selected by Contractor.
- B. Acoustic Insulation: 1; preformed glass fiber, friction fit type, unfaced.
 - 1. Thickness: Full thickness of indicated wall framing, and 3-1/2 inches thick to comply with specified floor/ceiling assembly rating requirements.
 - 2. Density: Minimum 0.5 pounds per cubic foot where used in rated floor/ceiling assembly and specified wall assemblies.
 - 3. Acceptable Manufacturers:
 - a. CertainTeed Corporation CertaPro AcustaTherm Batts
 - b. Johns Manville; Sound Control Batts.
 - c. Owens Corning; Sound Attenuation Batts.
 - d. Prior approved equal.
- C. Acoustic Sealant: As specified in Section 079219 - Acoustical Joint Sealants.
- D. Finishing Accessories: ASTM C1047, galvanized steel, unless otherwise indicated.
 - 1. Types: As detailed or required for finished appearance.
 - 2. Special Shapes: In addition to conventional corner bead and control joints, provide L-bead and LC-bead at exposed panel edges.
 - 3. Acceptable Manufacturers:
 - a. Same manufacturer as framing materials.
 - 4. Control Joints: One-piece, v-grooved control joint with integral perforated flanges; removable tape to protect v-groove during finishing.
 - a. Applications: Internal corners, wall locations at re-entrant soffit corners, and ceiling locations at re-entrant soffit corners whether or not specifically noted on Drawings.
 - 5. Expansion Joints: Two-piece control joint with compression seal one side.
 - a. Acceptable Product: "2-Piece" manufactured by Fry Reglet Corporation; www.fryreglet.com.
- E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Tape: 2 inch (50 mm) wide, coated glass fiber tape for joints and corners at glass mat panels.
 - 2. Tape: 2 inch (50 mm) wide, creased paper tape for joints and corners, except as otherwise indicated.
 - 3. Board manufacturer's standard ready-mixed joint compounds low-VOC joint compounds with no detectable amounts of crystalline silica based on NIOSH Method 7500.
 - 4. Compounds specifically manufactured for topping coats are not permitted for first coat on metal trim and taping.
 - 5. Ready-mixed vinyl-based joint compound at indicated applications.

6. Joint Compound for Wet and Exterior Locations: Chemical quick-setting type for first 2 coats, and vinyl type top coat specially formulated for finishing topping.
 7. Joint Treatment for Cementitious Backer Board: Minimum 2 inch wide open mesh glass fiber tape acceptable to board manufacturer and tile manufacturer.
- F. High Build Drywall Surfer: 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. Products: Subject to compliance with requirements, provide one of the following products:
 - a. Hamilton Drywall Products; Prep-Coat Plus.
 - b. Sherwin Williams; Builders Solution System Interior Latex Primer/Surfer, A63W100.
 - c. USG Corporation; SHEETROCK Primer-Surfaces Tuff-Hide.
- G. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- H. Adhesive: ASTM C557.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20.
- J. Cementitious Tile Backer Units Accessories:
1. Fasteners: Corrosion resistant type required by board manufacturer for securing units.
 2. Joint Reinforcement Tape:
 - a. 2 inch nominal width.
 - b. Polymer coated fiberglass mesh of type recommended by board manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this Section before commencing work of this Section.
- B. 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.
- C. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- D. Verify rough-in utilities and blocking are in proper position.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Furnish concrete inserts, steel deck hanger clips, and similar devices to other trades for installation well in advance of time needed for coordination with other work.

3.03 SHAFT WALL INSTALLATION

- A. Shaft Wall Stud Framing: Install in accordance with GA-600 requirements.
 - 1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches (600 mm) on center.
 - 2. Install studs at spacing required to meet performance requirements.
- B. Shaftwall Coreboard: Cut panels to accurate dimension and install sequentially between special friction studs.
 - 1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.
 - 2. Seal perimeter of shaft wall and penetrations with acoustical sealant.
- C. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- D. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- E. At elevator shafts where shaft system cannot be positioned within 2 inches of structural beams, floor edges and similar projections into shaft, provide 5/8 inch gypsum board cants to cover tops of projections. Slope not more than 15 degrees from vertical. Set base edge in drywall adhesive and secure top with screws at 24 inches on center maximum.
- F. Seal perimeter of shaftwall work where it abuts other work following requirements of Section 078400 - Firestopping for firestopping and fire-resistive joint sealant as applicable. Use exposed acoustic sealant at joints exposed to view on finished side.

3.04 FRAMING INSTALLATION

- A. Framing Systems: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits:
 - 1. Level ceiling and soffit system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
 - 3. Install bracing as required at exterior locations to resist wind uplift.
 - 4. Space ceiling framing and furring members 16 inches (400 mm) on center, except as otherwise indicated.
 - 5. Space ceiling framing and furring members at water-resistant gypsum board locations not to exceed 12 inches (300 mm) on center.
- C. Metal Stud Framing: Space studs as permitted by standard, or as specified below:
 - 1. Space studs 16 inches on center, except as otherwise indicated or required by specified tested assemblies, and secure to floor and ceiling runners with screws.
 - 2. Provide supplemental framing matching primary wall framing to support cut edges of gypsum boards not supported by primary vertical wall framing members.
 - 3. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 4. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling framing in accordance with details.
 - 5. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using

- specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
6. Isolate stud system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support free from axial loading. Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from plane of faces of adjacent framing.
 7. At partitions supported by on-grade slabs, provide top slip joint to accommodate 1-1/2 inch vertical movement. Provide deflection tracks or firestop tracks at slip joints where specified, or detailed on Drawings.
 8. Where walls are indicated to extend to overhead surfaces (ceilings, deck construction, and structural elements), to prevent deflection transfer of structural loads or movements to walls provide either:
 - a. Insert studs into runner tracks with minimum 1/2 inch gap between end of stud and inside surface of top and bottom runner. Maintain minimum of 1/2 inch engagement between end of stud and end of legs of top and bottom runners.
 - b. Slip joint between walls and structure using top runner nested within 3 inch long segment of extended leg ceiling runner positioned at stud spacing and fastened to overhead surface. Do not fasten top runner to extended leg ceiling runner.
 9. Brace stud framing rigid which is not clad on both sides with gypsum board. Fasten horizontal stud or 1-1/2 inch wide 20 gage galvanized steel straps vertically spaced no more than 36 inches apart with top strap no more than 6 inches from top of wall.
 10. Horizontally align openings in stud webs.
 11. Use full length studs vertically positioned between runner tracks.
 12. Minimum Jamb Stud Framing at Door Openings:
 - a. Walls laterally braced by ceiling framing or structure at 9'-0" above finish floor:
 - 1) Single Doors not Larger than 3'-6" by 9'-0" and not Weighing more than 275 Pounds: 2 Type 20 studs or 1 Type 20 stud.
 - 2) Paired Doors not Larger than 3'-6" by 9'-0" per leaf and not Weighing more than 275 Pounds per Leaf: 2 Type 20 studs or 1 Type 18 stud.
 - b. Walls Laterally Braced by Ceiling Framing or Structure at 12'-0" above Finish Floor:
 - 1) Single Doors not Larger than 3'-6" by 9'-0" and not Weighing More than 275 Pounds: 2 Type 20 studs or 1 Type 18 stud.
 - 2) Paired doors not larger than 3'-6" by 9'-0" per leaf and not weighing more than 275 Pounds per leaf: 2 Type 18 studs.
 - c. At welded frames with fixed anchor clips, secure studs to jamb anchors clips with not less than two self tapping screws per clip.
 - d. Provide wall framing above door openings to match wall framing adjoining the opening.
 - e. Provide one additional stud not more than 6 inches from jamb studs.
 - f. At fire-rated doors use minimum thickness of Type 20 studs, unless otherwise indicated.
 - g. Comply with GA-219 for fire-rated doors.
 13. Minimum Sidelight Framing:
 - a. Provide 2 Type 25 studs at each jamb or provide 1 Type 20 stud at each jamb.
 - b. Provide wall framing above and below window and wall openings with wall framing to match wall framing adjoining the opening.
 - c. Provide 1 additional stud not more than 6 inches from jamb studs.
 14. Fabricate corners with a minimum of three studs.

15. Provide additional studs and framing to support wall intersections, termination of walls, at openings and cut-outs and to support built-in anchorage and attachment devices for other work.
 16. Locate studs no more than 2 inches from abutting walls, wall corners and other construction. Start typical wall studs 6 inches either side of stud reinforcing or frames.
 17. Install electrical outlets and similar junction boxes at indicated locations. Provide additional blocking and straps for proper locations; do not mount on "nearest" stud.
 18. Install steel studs so that flanges point in the same direction and so that leading edges or ends of each gypsum board can be attached to open (unsupported) edges of stud flanges first.
- D. Backer Plates:
1. Provide backer plate for securing surface mounted fittings, fixtures, accessories, and furnishings, including, but not limited to handrails, grab bars, toilet walls, towel bars, wall mounted door stops, and similar screw- and bolt-fastened items.
 2. Secure with sufficient quantity of self-tapping sheet metal screws to sustain loads imposed by items attached to backer plates.
- E. Direct Furring:
1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
1. Where walls terminate at ceiling plane, extend vertical door jamb studs through suspended ceiling and attach to underside of structure above.
- G. Isolate non-load-bearing partitions located on slabs on grade at intersection with exterior walls and fixed structural abutments. Isolate partition studs from exterior wall or structural abutment framing to allow differential vertical movement.
1. At window sill locations, extend isolated stud joint vertically and in alignment with joint below, to full height of partition.
- H. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches (100 mm) from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches (600 mm) on center.
1. Orientation: Vertical.
- 3.05 DIRECT HUNG CEILING SUSPENSION SYSTEM INSTALLATION
- A. Attach perimeter wall track or angle where support system meets vertical surfaces.
 - B. Space main runners at 48 inches (1200 mm) on center and cross tees at 24 inch (600 mm) on center, except as otherwise indicated.
 - C. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - D. Hangers: 48 inches (1219 mm) o.c.
 - E. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
 - F. Furring Channels (Furring Members): 16 inches o.c.

- G. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- H. Suspend hangers from building structure as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to steel roof deck.
 - 6. Do not connect or suspend steel framing from ducts, pipes, or conduit.
 - 7. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
 - 8. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
 - 9. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
 - 10. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.06 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Install acoustical sealing in accordance with Section 079219.

3.07 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
 - 1. Space fasteners in accordance with ASTM C840 and manufacturer's recommendations, unless fastener spacing is otherwise specified on structural Drawings for structural load-bearing walls.
 - 2. Install interior wall and partition boards horizontally, except where fire or sound rating requires a particular direction; comply with the method stated in the tested assembly data.

3. Locate exposed end-butt joints as far from center of walls and ceilings as possible, and stagger not less than 24 inches (600 mm) in alternate courses of board.
- B. 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.
 - C. Single-Layer Non-Rated Applications: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
 1. Exception: Tapered edges to receive joint treatment at right angles to framing.
 2. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 3. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 4. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 5. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
 - D. Double-Layer and Tripple-Layer Non-Rated Applications: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Place second layer perpendicular to framing or furring members. Offset joints of second and third layer from joints of first layer.
 1. 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.
 - E. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
 1. Limit annular space between gypsum wall board edges and electrical device boxes to maximum 1/8 inch (3 mm), or as limited by applicable Code.
 - F. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
 - G. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.
 - H. Cementitious Backing Board Applications: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
 1. Use cementitious tile backer board for wall surfaces in shower and tub areas, high water or humidity exposure areas, and other locations indicated for use behind thin-set tile.
 2. Install board with long edge perpendicular or parallel to framing. Hold bottom edge 1/4 inch above floor or fixture lip.
 3. Maintain manufacturer's required space between board edges.
 - I. Installation on Metal Framing: Use screws for attachment of all gypsum board, except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

- J. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- K. Isolate perimeter of non-load-bearing wallboard partitions on slabs on grade at intersection with exterior walls and fixed structural abutments. Provide 1/4 inch (6 mm) space to allow differential vertical movement and trim edges with L-type edge trim. Seal joints with acoustical sealant.
 - 1. At window sill locations, extend gypsum board joint vertically and in alignment with joint below, to full height of partition.
- L. Floating Construction: Where feasible, including where recommended by manufacturer, install gypsum board with floating internal corner construction, unless isolation of the intersecting boards is indicated, or unless control or expansion joints are indicated.
- M. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
- N. 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.

3.08 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated and locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.
 - 1. Apply level 5 finishes at locations where board extends beyond tile.
- B. Cementitious Backer Units: ANSI A108.11, at showers and where indicated.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.09 INSTALLATION OF TRIM AND 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: Place control joints consistent with lines of building spaces as indicated on Drawings; if not specifically indicated, provide control joints as follows:
 - 1. Spacing: In accordance with GA 234.
 - 2. The maximum recommended control joint spacing for walls and ceilings without perimeter relief is 30 feet. With perimeter relief maximum recommended control joint spacing is 50 feet.

3. Do not bridge building control and expansion joints with gypsum board.. Utilize details shown in referenced standard.
 4. Terminate gypsum board on each side of joints.
 5. Extend control joints from both corners of door frames to top of wall where doors occur in long runs of wall.
 6. Comply with manufacturer requirements for constructing control and expansion joints in fire-rated assemblies.
 - a. Locate studs on both sides of joints. Attach two layers of gypsum board strips to back of one stud to fill area behind joint; provide continuous fire barrier behind joint without restricting movement.
 7. Locate in ceilings with area exceeding 900 square feet, where framing or furring changes direction, and spaced apart not more than 30'-0".
 8. Locate in ceilings where wings of "L", "U", and "T" shaped areas are joined.
 9. Provide mineral fiber acoustical insulation or gypsum panel backing at control joints in fire-rated assemblies to maintain fire rating.
 10. Architect to review and approve joint location.
- C. Corner Beads: Install at external corners, using longest practical lengths.
1. Attach with screws.
- D. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- E. Fasteners:
1. Attachment Methods:
 - a. Attach board to framing and furring with screws.
 - b. Attach board to board with screws.
 2. Except where indicated otherwise or where required for fire rated assemblies, space fasteners in compliance with more restrictive requirements of referenced installation standards or manufacturer's requirements.
 3. Attach board to supplementary framing and blocking which provide additional support at openings and cutouts

3.10 JOINT TREATMENT

- A. Glass-Mat-Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, bedded and finished with chemical hardening type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 1. Level 5:
 - a. Location: Accent walls and as indicated.
 - b. Embed joints and interior angles in joint compound. Apply 3 coats joint compound over joints, angles, fastener heads, and accessories.
 - c. Joint Compound: Smooth and free of tool marks and ridges.
 - d. Skim coat (spray and roller-applied finish is not acceptable): Use for all other areas to be painted.
 2. Level 4:
 - a. Walls and ceilings to receive paint finish or wall coverings other than accent walls, unless otherwise indicated to receive Level 5.

- b. Embed joints and interior angles in joint compound. Apply 3 coats joint compound over joints, angles, fastener heads, and accessories.
 - c. Joint Compound: Smooth and free of tool marks and ridges.
 - d. Surface to be coated texture as indicated.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - a. Embed joints and interior angles in joint compound. Apply one coat joint compound over joints, angles, fastener heads, and accessories.
 - b. Surface: Free of excess joint compound.
 - 4. Level 1: Wall areas above finished ceilings, whether or not accessible in the completed construction.
 - a. Embed joints and interior angles in joint compound. Apply 2 coats joint compound over joints, angles, fastener heads, and accessories.
 - b. Surface: Free of excess joint compound.
 - 5. Level 0: Use for first layer of multiple layer construction and gypsum board ledge guards in elevator shafts.
 - D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch (0.8 mm).
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile.
 - E. High Build Gypsum Board Surfer: Where approved by Architect, at locations indicated to receive Level 5 finish spray apply high build drywall surfer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
 - F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.
- 3.11 ADJUSTING
- A. Adjust and align metal framing to properly receive final finishes in accordance with required tolerances.
 - B. Correct damages, defects, and leave work ready for decoration. Clean compounds from trim. Visible cracks, nail heads, tool marks, waves, distortions, or other similar defects shall not appear in finished work.
- 3.12 CLEANING
- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.
 - B. Promptly remove joint compound from surfaces not intended to receive compound.
- 3.13 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.

3.14 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

END OF SECTION 092116

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 092236.23 - METAL LATH

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal lath for Portland cement plaster.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 061643 - Gypsum Sheathing.
- C. Section 072500 - Weather Barriers: Weather barrier under exterior plaster and stucco.
- D. Section 092400 - Portland Cement Plastering.

1.03 REFERENCE STANDARDS

- A. ASTM C841 - Standard Specification for Installation of Interior Lathing and Furring; 2003 (Reapproved 2013).
- B. ASTM C847 - Standard Specification for Metal Lath; 2014a.
- C. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- D. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2015a.
- E. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.; 2011.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on furring and lathing components, structural characteristics, material limitations, and finish.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 2. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 3. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each specified installation standard on site throughout the duration of lathing and plastering work.

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

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers - Metal Lath:
1. CEMCO; California Expanded Metal Products Co.
 2. ClarkDietrich Building Systems.
 3. Dietrich
 4. Niles Building Products.
 5. Worthington Industries.

2.02 LATH ASSEMBLIES

- A. Provide completed assemblies with the following characteristics:
1. Maximum Deflection of Vertical Assemblies: 1:360 under lateral point load of 100 lbs (445 N).
 2. Maximum Deflection of Horizontal Assemblies: 1:240 deflection under dead loads and wind uplift.

2.03 FRAMING MATERIALS

- A. Furring Members: Specified in Section 054000.

2.04 LATH MATERIALS

- A. Diamond Mesh Metal Lath: ASTM C847, galvanized; self-furring.
1. Weight: To suit application, comply with deflection criteria, and as specified in ASTM C841 or ASTM C1063 for framing spacing.
 - a. Minimum Weight: 3.4 lb/sq yd (1.8 kg/sq m).
 2. Backed with treated paper complying with requirements of ICC-ES AC38 Grade D.
 3. Applications: Use at vertical wall surfaces at masonry substrate locations.
- B. Flat Rib Metal Lath: ASTM C847, galvanized; 1/8 inch (3 mm) thick.
1. Weight: To suit application _____ and as specified in ASTM C841 or ASTM C1063 for framing spacing.
 - a. Minimum Weight: 3.4 lb/sq yd (1.8 kg/sq m).
 2. Backed with treated paper complying with requirements of ICC-ES AC38 Grade D.
 3. Applications: Use at soffits and other horizontal surfaces.
- C. Beads, Screeds, Joint Accessories, and Other Trim: Depth governed by plaster thickness, and maximum possible lengths.
1. Material: Formed sheet steel with rust inhibitive primer, expanded metal flanges.
 2. Casing Beads: Square edges.
 - a. Basis of Design Product: No. 66X Expanded Flange Casing Bead manufactured by Clark Western.
 3. Corner Beads: Square corners.
 - a. Basis of Design Product: No. 1A Expanded Corner Bead manufactured by Clark Western.

4. Interior Corners: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized-zinc coating.
 - a. Basis of Design Product: Cornerite manufactured by Clark Western.
5. Base (Weep) Screeds: Square edges; minimum 3-1/2 inch vertical attachment flange.
 - a. Basis of Design Product: No. 36X Expanded Base Screed manufactured by Clark Western.
6. Expansion Joints: Two-piece sliding type with reveal, 4 inch (101.6 mm) wide expanded flanges.
 - a. Basis of Design Product: No. 40 Expansion Joint manufactured by Clark Western.
7. Control Joints: Accordion profile with protective tape, 2 inch (50 mm) flanges.
 - a. Basis of Design Product: manufactured by .
 - 1) Clark Western; No. 15 and No. 30 (corner) Control Joint.
 - 2) CEMCO; XJ15.

2.05 ACCESSORIES

- A. Reveal Trim:
 1. Aluminum extrusions; size and configuration as indicated on Drawings.
 2. Include required intersection, corners, and termination trim accessories to be factory formed.
 3. Provide aluminum alignment splices as required.
 4. Basis of Design Manufacturer:
 - a. Flannery, Inc.
 5. Other Acceptable Manufacturers:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.; www.gordonceilings.com.
 - c. MM Systems Corporation: www.mmsystemscorp.com.
 - d. Pittcon Industries: www.pittconindustries.com.
 - e. Prior approved equal.
- B. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.
- C. Fasteners: ASTM C1002 self-piercing tapping screws; length required to penetrate minimum 3/4 inch into framing or solid backing, or as required by ASTM C1063, whichever is greater length.
- D. Weather Barrier: Specified in Section 072500.
- E. Tie Wire: Annealed galvanized steel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that substrates are ready to receive work and conditions are suitable for application.
- C. For exterior plaster and stucco on stud walls, verify that weather barrier has been installed over sheathing substrate completely and correctly.
- D. Do not begin until unacceptable conditions have been corrected.

- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION - GENERAL

- A. Install interior lath and furring for gypsum plaster in accordance with ASTM C841.
- B. Install lath for Portland cement plaster in accordance with ASTM C1063.
 - 1. Fastener Spacing: Space fasteners 6 inch on center vertically, or as otherwise required by reference standard requirements.
- C. Install lath and furring for fire-rated assemblies in accordance with requirements of assembly as indicated.

3.03 CEILING AND SOFFIT FRAMING INSTALLATION

3.04 CONTROL AND EXPANSION JOINTS

- A. Locate joints as indicated on Drawings.
 - 1. Control Joint Spacing: Maximum 12 feet (4 m) on center.
 - 2. Expansion Joint Spacing: Maximum 30 feet (10 m) on center.
- B. Install control and expansion joints using specified accessories, where indicated.
 - 1. Cut primary lath continuously along centerline of expansion joints.
 - 2. Wire-tie expanded flanges of accessories to primary lath; screw fasteners not permitted for this purpose.

3.05 ACCESS PANELS INSTALLATION

- A. Install access panels and rigidly secure in place.
- B. Install frames plumb and level in opening. Secure rigidly in place.
- C. Position to provide convenient access to concealed work requiring access.

3.06 LATH INSTALLATION

- A. Apply lath taut, with long dimension perpendicular to supports.
- B. Lap ends minimum 1 inch (25 mm). Secure end laps with tie wire where they occur between supports.
- C. Attach metal lath to concrete using wire loops. Attach anchors to backup surface; space at maximum 24 inches (600 mm) on center.
- D. Continuously reinforce internal angles with corner mesh, except where the metal lath returns 3 inches (75 mm) from corner to form the angle reinforcement; fasten at perimeter edges only.
- E. Place corner bead at external wall corners; fasten at outer edges of lath only with wire ties.
- F. Place base screeds at termination of plaster areas; secure rigidly in place.
- G. Place 4 inch (100 mm) wide strips of lath centered over junctions of dissimilar backing materials, and secure rigidly in place.

- H. Place lath vertically above each top corner and each side of door frames to 6 inches (150 mm) above ceiling line.
- I. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- J. Place additional strip mesh diagonally at corners of lathed openings. Secure rigidly in place.

3.07 TOLERANCES

- A. Maximum Variation from True Lines and Levels: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from True Position: 1/8 inch (3 mm).

END OF SECTION 092236.23

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 092400 - PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Portland cement plaster (stucco) for installation over metal lath and solid surfaces.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 054000 - Cold-Formed Metal Framing: Structural metal framing for plaster.
- C. Section 072500 - Weather Barriers.
- D. Section 092236.23 - Metal Lath: Metal furring and lathing for plaster.

1.03 REFERENCE STANDARDS

- A. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- B. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- C. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster; 2015b.
- D. ICC (IBC) - International Building Code; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate components of fire rated assemblies with materials specified for support of plaster in other Sections.
- B. Preinstallation Conference: Conduct conference at Project site.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data on plaster materials, characteristics and limitations of products specified.
- C. Samples: Submit two samples, 12 by 12 inch (305 by 305 mm) in size illustrating finish color and texture.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. A5.405.1 Regional materials. Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site, meeting the criteria listed in Section A5.405.1.
 - 4. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.

1.07 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this Section with minimum three years documented experience.
- B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.08 MOCK-UP

- A. Comply with general mock-up requirements specified in Section 014000.
- B. Mock-up: Construct mock-up of exterior wall, 10 feet (3 m) long by 10 feet (3 m) wide, illustrating surface finish of stucco.
 - 1. Locate where directed.
 - 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. Mock-up may remain as part of the Work.

1.09 FIELD CONDITIONS

- A. Do not apply plaster when substrate or ambient air temperature is under 50 degrees F (10 degrees C) or over 80 degrees F (27 degrees C) within 24 hours before and after application.
- B. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) during installation of plaster and until cured.
- C. Do not apply cement plaster systems during inclement weather without appropriate weather protection as directed by system manufacturer.
- D. Do not use frozen or previously frozen materials; do not apply cement plaster to frozen surfaces or surfaces with frost present.
 - 1. Protect installation from freezing minimum 24 hours after initial set.
- E. Do not install cement plaster in direct sunlight for extended periods of time to prevent uneven or premature evaporation.

PART 2 PRODUCTS

2.01 PLASTER MATERIALS

- A. Portland Cement, Aggregates, and Other Materials: In accordance with ASTM C926, Type S.
- B. Premixed Plaster for Stucco Scratch and Brown Coats: Factory mixed and packaged, complying with material requirements of ASTM C926.
 - 1. Basis of Design Product:
 - a. Parex USA, Inc.; Fiber 47 Armour Wall Scratch & Brown: www.parex.com.
 - b. Other Acceptable Product:
 - 1) Amerimix, an Oldcastle brand; AMX 700 SBF: www.amerimix.com.
 - 2) BMI Products; BMI 690 Standard with Fibers
 - 3) The QUIKRETE Companies; QUIKRETE® Base Coat Stucco Pump Grade: www.quikrete.com.

- C. Reinforcing Mesh: Flexible fiberglass, alkali-resistant mesh; 4 oz/sq yd, minimum.
 - 1. Acceptable Products:
 - D. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, and proprietary ingredients.
 - 1. Basis of Design Products:
 - a. LaHabra Stucco Solutions; Parex USA; Platinum Plus.
 - b. Other Acceptable Products:
 - 1) California Stucco Products Corp.; Conventional Cement Stucco.
 - 2) El Rey Stucco Solutions; a Parex USA, Inc. brand; Premium Stucco Finish.
 - 3) Omega Products International, Inc.; ColorTek Exterior Stucco.
 - 4) Prior approved equal.
 - 2. Integral Color:
 - a. CP-1: X-18052 (Parex 10400L).
 - b. CP-2: X-18675 (Parex T016L).
 - E. Portland Cement: ASTM C150/C150M, Type I.
 - F. Aggregate: Natural sand, within the following sieve sizes and percentage retained limits:
 - 1. No. 8 (2.36 mm): 0 to 5.
 - 2. No. 30 (0.60 mm): 30 to 65.
 - 3. No. 100 (0.15 mm): 90 to 100.
 - G. Water: Clean, fresh, potable and free of mineral or organic matter that could adversely affect plaster.
 - H. Color Pigment: Mineral oxide type, color as selected by Architect.
- 2.02 METAL LATH AND REINFORCING
- A. Metal Lath and Accessories: As specified in Section 092236.23.
 - B. Beads, Screeds, and Joint Accessories: As specified in Section 092236.23.
- 2.03 PLASTER MIXES
- A. Over Solid Bases: Three-coat application, mixed and proportioned in accordance with manufacturer's instructions.
 - B. Over Metal Lath: Three-coat application, mixed and proportioned in accordance with manufacturer's instructions.
 - C. Premixed Plaster Materials: Mix in accordance with manufacturer's instructions.
 - D. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.
 - E. Finish Coat: Premixed.
 - 1. Add color pigments to finish coat in accordance with manufacturer's instructions.
 - F. Mix only as much plaster as can be used prior to initial set.

- G. Install reinforced leveling coat according to manufacturer's requirements for specified system.
- H. Mix materials dry, to uniform color and consistency, before adding water.
- I. Protect mixtures from freezing, frost, contamination, and excessive evaporation.
- J. Do not retemper mixes after initial set has occurred.

2.04 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Sealant: As specified in Section 079200 - Joint Sealants.
- E. Provide other materials not specifically described but required for a complete and proper installation as selected by the Contractor subject to the approval of the Architect.
- F. Fasteners for Attaching Metal Lath to Substrates: ASTM C 1063.
- G. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.
- H. Fiber Reinforcement: Nylon or polypropylene monofilament fibers conforming to ASTM C 1116 Type III (synthetic fiber-reinforced concrete or shotcrete). AR chopped glass fiber strands are not permitted.

2.05 ACCESSORIES

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify the suitability of existing conditions before starting work. Inspect for contamination of substrates or other conditions that will adversely affect cement plaster system installation, including residual moisture.
- B. Masonry: Verify joints are cut flush and surface is ready to receive work of this Section. Verify no bituminous or water repellent coatings exist on masonry surface.
- C. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.
- D. Mechanical and Electrical: Verify services within walls have been tested and approved.

3.02 PREPARATION

- A. Dampen masonry surfaces to reduce excessive suction.
- B. Clean concrete surfaces of foreign matter. Clean surfaces using acid solutions, solvents, or detergents. Wash surfaces with clean water.

- C. Roughen smooth concrete surfaces and apply bonding agent in accordance with manufacturer's instructions.
- D. Install EPS special shapes in accordance with manufacturer's instructions.

3.03 PLASTERING (STUCCO)

- A. Apply plaster in accordance with ASTM C926, PCA and CBC Chapter 25.
 - 1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
 - 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 - 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Three-Coat Application Over Metal Lath:
 - 1. Apply first coat to a nominal thickness of 3/8 inch (9 mm).
 - 2. Apply second coat to a nominal thickness of 3/8 inch (9 mm).
 - 3. Apply finish coat to a nominal thickness of 1/8 inch (3 mm).
- C. Three-Coat Application Over Solid Bases:
 - 1. Apply first coat to a nominal thickness of 3/8 inch (9 mm).
 - 2. Apply second coat to a nominal thickness of 3/8 inch (9 mm).
 - 3. Apply finish coat to a nominal thickness of 1/8 inch (3 mm).
- D. In exterior work, scribe contraction joints through entire plaster application at 10 feet (3 m) on center each way.
- E. Moisture cure base coats by misting with clean water for 48 hours following application; air cure an additional 5 days before application of finish coat.
- F. Moist Curing:
 - 1. Follow procedures for each coat as recommended by ASTM C926 and PCA and as required based on environmental conditions.
 - 2. Prevent premature dry-out.
 - a. Cure each coat minimum 48 hours;
 - 1) Allow minimum 48 hour interval between application of scratch and brown coat.
 - 2) Allow minimum 7 day interval between application of brown and finish coat.
 - 3) Keep scratch and brown coat uniformly moist during curing period by applying fine fog spray of water. Apply fog spray at least twice daily in morning and evening. Exercise care to avoid eroding scratch coat.
- G. Finish Texture: Smooth trowel to a consistent finish.
- H. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.
- I. Moisture cure finish coat for minimum period of 48 hours.

3.04 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.05 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

3.06 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m).

END OF SECTION 092400

SECTION 093000 - TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Waterproofing membranes.
- D. Ceramic Tiling.
- E. Stone thresholds.
- F. Ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 079200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- C. Section 092116 - Gypsum Board Assemblies: Tile backer board.
- D. Division 22 - Plumbing: Plumbing fixtures.

1.03 REFERENCE STANDARDS

- A. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2013.1.
 - 1. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive; 2009 (Revised).
 - 2. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).
 - 3. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2012.
- B. ASTM C499 - Standard Test Method for Facial Dimensions and Thickness of Flat, Rectangular Ceramic Wall and Floor Tile; 2009.
- C. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 DEFINITIONS

- A. Module Size: Actual tile size, with minor facial dimension as measured by ASTM C499, plus joint width indicated.
- B. Facial Dimension: Actual tile size, with minor facial dimension as measured by ASTM C499.
- C. Large Format Tile: Any tile unit that maintains an edge of 15 inches or greater in any dimension.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate location of tiling movement joints on concrete floor substrates with locations of concrete floor expansion and control joints; align substrate joints and tiling system joints where required by specified reference standards.
- B. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this Section; require attendance by all affected installers.
 - 1. Convene under general provisions of Section 017000.
 - 2. Review installation procedures and coordination requirements.
 - 3. Meeting Agenda includes but is not Limited to:
 - a. Acceptance of substrate.
 - b. Surface preparation.
 - c. Tile and installation material compatibility.
 - d. Elastomeric membrane.
 - e. Crack isolation techniques.
 - f. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Samples: Submit three 4 by 4 inch samples of each tile type, noting actual tile size.
 - 1. Include samples of specified accessories per Finish Schedule.
 - 2. Submit three samples of each grout color per Finish Schedule.
- E. Samples: Submit manufacturer's color boards consisting of actual tiles showing full range of colors, textures, and patterns available for each type and composition of tile specified.
 - 1. Include samples of specified accessories requiring color selection.
 - 2. Submit manufacturer's color samples of available grout consisting of actual sections of grout showing full range of colors available for each type of grout specified.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
 - 1. Submit for each type of tile, signed by the tile manufacturer and tile installer.
- G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Tile: 2 percent of each size, color, and surface finish combination, but not less than 10 square feet of each type.

1.07 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:

1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
- 2.

1.08 QUALITY ASSURANCE

- A. Maintain one copy of and ANSI A108/A118/A136.1 and TCNA (HB) on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this Section, with minimum 5 years of documented experience.
- C. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.
- D. Provide materials obtained from only one manufacturer for each type and color of tile, and for each type of mortar, grout, adhesive, and sealant.

1.09 ~~MOCK-UP~~

- A. ~~Comply with general mock-up requirements specified in Section 014000.~~
- B. ~~Mock-up: Construct tile mock-up as directed by Architect, incorporating all components specified for the location.~~
 1. ~~Architect to review tile layout prior to installation.~~

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

1.11 FIELD CONDITIONS

- A. Comply with referenced standards and manufacturer's recommendations for protection and maintenance of environmental conditions during and after installation.
- B. Do not install solvent-based products in an unventilated environment.
- C. Maintain ambient and substrate temperature of 50 degrees F (10 degrees C) during installation, and for at least seven days after installation. Maintain higher temperatures for proprietary mortars and grouts when recommended by manufacturer.
- D. Vent temporary heaters to the exterior to prevent damage to tile work due to carbon dioxide accumulation.

PART 2 PRODUCTS

2.01 TILING MATERIALS

- A. Refer to Finish Schedule for selected products and finishes.
- B. Ceramic tile flooring shall be stable, firm, and slip resistant. CBC 11B-302.1

2.02 TRIM AND ACCESSORIES

- A. Trim Shapes:
 - 1. Base, caps, returns and other trim accessories as required; same characteristics as tile.
 - 2. If base is cut from full-size tile, bevel top edge and polish to match face.
- B. Metal Trim: Style, configuration, and dimensions as indicated on drawings, for setting using tile mortar or adhesive.
 - 1. Applications: As indicated on Drawings
 - a. Wall corners inside.
 - b. Transition from floor to wall and as indicated on drawings.
 - c. Floor to wall joints, where specified floor and wall tile do not have manufactured coved units.
 - 2. Basis of Design Manufacturers:
 - a. Schluter-Systems: www.schluter.com.
 - 1) Products:
 - (a) Schluter-DILEX-AHK.
 - (b) Schluter-DILEX-AHKA.
 - (c) Carpet Transition Strip: Scheine, AE100.
 - (d) Tile to Resilient Flooring: Reno-V AEV100B20.
 - (e) Tile to Resilient Flooring: Reno-TK AETK100.
 - b. Prior approved equal.
- C. Thresholds - General: Provide thresholds that are uniform in color and finish, fabricated to sizes and profiles indicated to provide transition between tile surfaces and adjoining finished floor surfaces. Fabricate thresholds to heights indicated, but not more than 1/2 inch above adjoining floor surfaces, with transition edges beveled on a slope not exceeding 1:2.
- D. Thresholds: Marble, gray, honed finish; 2 inches (51 mm) wide by full width of wall or frame opening; 1/2 inch thick (12.7 mm thick); beveled one long edge with radiused corners on top side; without holes, cracks, or open seams.
 - 1. Fabricate in single lengths, full width of wall or frame opening, beveled one side, both sides, radiused edges from bevel to vertical face.
- E. Primers: As recommended by manufacturer of mortar, grout, crack isolation, and sealant materials.

2.03 SETTING MATERIALS

- A. Setting Materials - General:
 - 1. Use only the types of mortar bed materials to set the types of tile for which the mortar is labeled.
- B. Latex Additive: Manufacturer's standard styrene butadiene rubber or acrylic resin formulation which replaces a portion or all of the gaging water, type specifically recommended by latex additive manufacturer for use with job-mixed Portland cement aggregate mortar beds.
 - 1. Acceptable Products:
 - a. Custom Building Products; CustomCrete Latex Mortar Admix.
 - b. LATICRETE International, Inc.; 333 Super Flexible Additive.
 - c. Mapei Corporation; 310 Keralastic.

- d. Prior approved equal.
- C. Polymer Modified Thinset Dryset Mortar Bond Coat: ANSI A118.4 or ANSI A118.15.
 - 1. Applications: Use this type of bond coat where indicated .
 - a. Acceptable Products:
 - 1) Custom Building Products; MegaFlex Crack Prevention Mortar: www.custombuildingproducts.com.
 - 2) LATICRETE International, Inc.; Laticrete 4237 Mortar Admix with Laticrete 211 Crete Filler: www.laticrete.com.
 - 3) Mapei Corporation: Kerabond and Keralastic.
 - 4) Prior approved equal.
- D. Latex-Portland Cement Mortar Bond Coat: 1, 1, or ____.
 - 1. Applications: For floor and wall applications in new construction, provide high-bond Portland cement mortar for large format tile, medium bed. Provide product that is approved by manufacturer for application thickness of 5/8 inch.
 - a. Acceptable Products:
 - 1) Custom Building Products; ProLite Crack Prevention Large Format Tile Mortar.
 - 2) LATICRETE International, Inc.; Laticrete 4-XLT with 101.
 - 3) Mapei Corporation; Grani/Rapid with Ker 318.
 - 4) Prior approved equal.

2.04 GROUTS

- A. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
 - 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
 - 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
 - 3. Polymer Type: As recommended by manufacturer in liquid-latex form for addition to prepackaged dry-grout mix.
 - 4. Color(s): As indicated on Finish Schedule.
 - 5. Basis of Design Products:
 - a. Custom Building Products; Polyblend Sanded Grout
 - b. LATICRETE International, Inc.; Laticrete 1500 Sanded Grout with Laticrete 1776 Grout Admix.
 - c. Mapei Corporation; Keracolor S.

2.05 MAINTENANCE MATERIALS

- A. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
 - 1. Composition: Water-based colorless silicone.
 - 2. Use sealers that comply the more stringent VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113 and Cal GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
 - 3. Acceptable Products:
 - a. Aquamix; Grout Sealer.
 - b. Laticrete 190 Grout Sealer.
 - c. Merkrete, by Parex USA, Inc; Merkrete Grout Sealer: www.merkrete.com/sle.

2.06 ACCESSORY MATERIALS

- A. Adhesives & Sealants (including grouts): Only use adhesives and sealants (grouts) in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
 - 1. Current requirement refers to the date on which the materials are installed in the building.
 - 2. SCAQMD Rule #1168 referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
 - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
 - 4. Adhesives shall meet or exceed the VOC and chemical component limits of CAL-Green Table 5.504.4.1 Adhesive VOC Limit requirements.
 - 5. Sealants shall meet or exceed the VOC and chemical component limits of CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
- B. Sealant: As specified in Section 079200 - Joint Sealants.
 - 1. Color: Match grout.
 - 2. Ensure sealant is chemically compatible with tile, mortar, and grout.
 - 3. Ensure sealant can physically and chemically withstand environmental conditions normally expected at installation areas.
- C. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- 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. Crack Isolation Sheet: Fabric-reinforced, modified-bituminous sheet, self-adhering, modified-bituminous sheet with fabric reinforcement facing; 40 mils nominal thickness.
 - 1. Acceptable Products:
 - a. Custom Building Products; Crack Buster Mat Underlayment .
 - b. Laticrete International, Inc.; Laticrete 150 Sound N Crack Isolation Mat.
 - c. MAPEI Corporation; Mapelastic SM.
 - d. Prior approved equal.
- F. Backing Board: Specified in Section 092116.

2.07 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

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor has cured for 30 days minimum without curing agents.
- E. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- F. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for tile flooring installation by testing for moisture and pH.
 - 1. Test in accordance with Section 090561.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- G. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- E. 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 toward drains.
- F. 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.
- G. Install crack isolation membrane to comply with ANSI A118.10 and membrane manufacturer's written instructions for full floor coverage.

3.03 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

3.04 INSTALLATION - GENERAL

- A. Architect to review tile layout prior to installation.
- B. 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 100 percent mortar coverage:
 - a. Tile floors consisting of tiles 8 by 8 inches or larger.
 - 2. Tolerances:
 - a. Lippage: Set top of tiles flush with each other. Exposed face offset between adjacent tiles (lippage); 3/64 inch maximum.
 - b. Joint Width: 1/8 inch, +/- 1/32 inch, unless noted otherwise.
- C. Blending: For tile exhibiting color or pattern variations within the ranges of accepted submittals, verify that tile has been blended in the packages so that tile units taken from one package show same range in colors or patterns as those taken from other packages. If not blended in the packages, blend tile in the field before installation.
- D. Floor System Coverage: Where specified for individual setting methods, install floor tile units with 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile units in referenced ANSI A108 specifications.
- E. Wall System Coverage: Where specified for individual setting methods, install wall tile units with 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile units in referenced ANSI A108 specifications.
- F. Movement Joints: Comply with TCNA EJ171 requirements for locations, spacing, and installation of applicable movement joints, whether or not specifically indicated or detailed on Drawings, and as follows:
 - 1. Spacing - Interior: Maximum 24 feet on center in each direction; reduce spacing to maximum 10 feet on center in areas exposed to direct sunlight or moisture.
 - 2. Joint Width: Match adjacent grouted joint widths, unless TCNA EJ171 requires a specific joint width based on joint location or joint service conditions.
 - 3. Apply sealant joint to junction of tile and dissimilar materials and junction of dissimilar planes, including but not limited to floor to wall joints, corners, and metal trim and non-ceramic accessory items.
 - 4. Keep movement joints free of setting adhesive and grout.
 - 5. Form internal angles and corners square, not grouted, with sealant joint.
 - 6. Form external angles and corners square, not grouted, with sealant joint.
 - 7. Apply specified sealant to joints.
- G. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

- H. 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.
- I. 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.
- J. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- K. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- L. 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.
- M. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Joint widths in subparagraphs below are examples only and are based on widths recommended by American Olean for its products. Retain one width for each tile type below, or revise after verifying widths with tile manufacturers for products selected. Coordinate joint widths with grout selections and module sizes specified in "Tile Products" Article.
 - 2. Porcelain Mosaic Tile: 1/8 inch, or less.
 - 3. Wall Tile: 1/8 inch, or less.
 - 4. Porcelain Tile: 1/8 inch.
- N. 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.
- O. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. Do not extend crack isolation membrane under thresholds set in dry-set portland cement mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane with elastomeric sealant.
- P. Metal Edge Strips: Install at locations indicated.

- Q. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors 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. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
 - S. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
 - T. Sound tile after setting. Replace hollow sounding units.
 - U. Keep expansion joints free of adhesive or grout. Apply sealant to joints.
 - V. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
 - W. Grout tile joints, except where movement joints are indicated or specified. Use standard grout unless otherwise indicated.
 - X. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.
 - Y. Allow completed tiling assemblies to cure full 72 hours before allowing heavy foot or equipment traffic on final installations.
- 3.05 TILE BACKING BOARD:
- A. Refer to Section 092116 - Gypsum Board Assemblies for installation of tile backing board.
 - B. Verify tile backing board installed for wall surfaces in shower and tub areas, high water or humidity exposure areas, and other locations indicated for use behind thin-set tile.
 - C. Fill joints by applying tile setting material and joint reinforcement.
 - D. Set top of tiles flush with each other.
- 3.06 THIN-SET METHOD:
- A. Apply mortar with notched trowel using scraping motion to work material into good contact with surface to be covered.
 - B. Apply only as much mortar as can be covered within 20 to 30 minutes or while surface is still tacky.
 - C. Trowel small quantity of mortar onto back (back-butter) of each tile.
 - D. Set tiles in place and rub or beat with small beating block.
 - E. Beat or rap tile to ensure proper bond and also to level surface of tile.
 - F. Align tile to show uniform joints and allow to set until firm.
 - G. Clean excess mortar from surface of tile with wet cloth or sponge while mortar is fresh.
 - H. Shower and Floor Drains: Coordinate installation of drains with Division 22.
- 3.07 GROUTING AND POINTING:
- A. After tile has set sufficiently, fill joints with grout until flush with surrounding tile.

- B. Point joints full and remove excess grout. Clean tile thoroughly.
 - C. Install sealant in vertical wall joints at interior corners.
 - D. Install tile with maximum 25 percent variation of specified grout joint width.
- 3.08 EXPANSION JOINTS:
- A. Keep expansion joints free of mortar and grout.
 - B. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCNA EJ171 Expansion Joint requirements.
 - C. Install sealant in expansion joints.
 - D. Provide sealant material at items penetrating tile work, unless otherwise indicated.
 - E. Provide sealants and related materials in accordance with cited ANSI and TCNA requirements.
- 3.09 INSTALLATION - FLOORS - THIN-SET AND MEDIUM-BED SET METHODS
- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, latex-Portland cement bond coat, with polymer modified grout, unless otherwise indicated.
 - 1. Provide 100 percent coverage of setting mortar over tile back surfaces.
- 3.10 INSTALLATION - WALL TILE
- A. On exterior walls install in accordance with TCNA (HB) Method W244, medium-set over mold-resistant backer units.
- 3.11 ADJUSTING
- A. Sound tile after setting. Replace hollow sounding units.
- 3.12 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.
 - C. Leave finished installation clean and free of cracked, chipped, broken, un-bonded, or otherwise defective tile work.

3.13 PROTECTION

- A. A. Protect installed tile work with masonite 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. Do not permit traffic over finished floor surface for 7 days after installation.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.14 SCHEDULES

- A. Floor Tile Installation Schedule:
 - 1. Thin Bed Floor Tile System:
 - a. Description: Thin set.
 - b. Tile: Porcelain
 - c. Mortar: Polymer Modified Thinset Dryset Mortar.
 - d. Grout: High-performance sanded.
 - e. TCNA system: F-113.
 - 2. Large Format Floor Tile System:
 - a. Description: Medium bed set with crack isolation membrane.
 - b. Tile: Porcelain
 - c. Mortar: Medium-bed, modified dry-set Mortar.
 - d. Grout: High-performance sanded.
 - e. TCNA system: F-125 Full, except where partial coverage is indicated.
- B. Wall Tile Installation Schedule:
 - 1. Interior Wall Tile System:
 - a. Description: Interior partitions using cementitious tile backing board.
 - b. Tile: Porcelain
 - c. Mortar: Polymer Modified Thinset Dryset Mortar.
 - d. Grout: High-performance sanded.
 - e. TCNA System: W244C.
 - 2. Interior Wall Tile System:
 - a. Description: Interior partitions with large heavy tile (large format) using cementitious tile backing board.
 - b. Tile: Porcelain
 - c. Mortar: Large Heavy Tile Dryset Mortar.
 - d. Grout: High-performance sanded.
 - e. TCNA System: W244C.

END OF SECTION 093000

SECTION 095100 - ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

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

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green
- B. Section 072100 - Thermal Insulation: Acoustical insulation.
- C. Section 079219 - Acoustical Joint Sealants: Acoustical sealant.

1.03 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2012.
- D. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2014.
- E. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

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

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit three samples 4 by 4 inch (102 by 102 mm) in size illustrating material and finish of acoustical units.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Sealants.
 - 2. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.07 QUALITY ASSURANCE

- A. System Installer Qualifications: Company specializing in the installation of products specified in this Section with minimum three years documented experience.
- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

1.08 ~~MOCK-UP~~

- A. ~~Comply with general mock-up requirements specified in Section 014000.~~
- B. ~~Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.~~
 - 1. ~~Indicate portion of ceiling represented by mockup on Drawings or draw mockup as separate element.~~
 - 2. ~~Build mockup of typical ceiling area as shown on Drawings.~~

1.09 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. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.11 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 20 to 40 percent prior to, during, and after acoustical unit installation.
- B. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Refer to Finish Schedule for selected products and finishes.
- B. Acceptable Manufacturers - Suspension Systems:
 - 1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

- A. Installed System: Conform UL ratings for floor/ceiling, roof/ceiling, and designated ceiling assemblies; tested in accordance with ASTM E119.
- B. Acoustical Units - General: ASTM E1264, Class A.
 - 1. Provide units with manufacturer's proprietary anti-humidity, sag-resistant composition and anti-microbial treatment to inhibit the propagation of mold and mildew.

2.03 MATERIALS - GENERAL

- A. Refer to Finish Schedule for selected products.
- B. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.

2.04 SUSPENSION SYSTEMS

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with splices and perimeter moldings as required.
 - 1. Comply with regionally-sourced, recycled content, and adhesives and sealants product requirements.
- B. Exposed Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Profile: Tee; 9/16 inch (14 mm) wide face.
 - 2. Construction: Double web.
 - 3. Finish: White painted.
 - 4. Products:
 - a. Armstrong World Industries, Inc.; Interlude XL 9/16 Inch Exposed Tee.
 - b. Prior approved equal.

2.05 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing

- according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
- a. Type: Cast-in-place or Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633, Class SC 1 (mild) service condition.
2. 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 hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- B. Support Channels and Hangers: Galvanized steel; size for five times design load indicated in ASTM C635, Table 1, direct hung; type to suit application, to rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of L/360.
1. Clips for Attachemet to Concrete over Steel Deck:
 - a. Clip: Steel angle, ASTM A653M grade SS275, with a minimum Z180 coating; or DIN EN 10346 S320GD with Z200-N-A-C coating, 3/4 inch (19.05 mm) long by 1-1/8 inch (28.57 mm) by 0.0728 inch (1.85 mm) thick. The 1-1/8 inch (28.57 mm) leg has 0.22 inch (5.6 mm) diameter hole for powder-actuated fastener, 1/32 inch (0.79 mm) leg with 0.43 inch (11 mm) diameter hole for ceiling wire attachment.
 - 1) Product:
 - (a) Hilti Inc.; X-CC-27.
 - (1) Approval: ICC - ESR 2184.
- C. Wire Hangers, Braces, and Ties: Provide wires as follows:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 12 gage, 0.106 inch (2.69-mm) diameter wire.
- D. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.
- 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 seismic forces.
- G. Perimeter Trim Profiles: Same material and finish as grid.
1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
 - a. Products:
 - 1) Armstrong; Shadow Molding No. 7877.
 2. Knife-Edge Profile Trim: Extruded aluminum.
- H. Acoustical Sealant For Perimeter Moldings: Specified in Section 079219.
- I. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Verify existing conditions before starting work.
- C. Verify that layout of hangers will not interfere with other work.
- D. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.03 INSTALLATION - GENERAL

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. CISCA Recommendations for Acoustical Ceilings: Comply with CISCA "Recommendations for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings."

3.04 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this Section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size unless noted otherwise on Drawings.
- D. Suspension system main beams to run parallel to linear light fixtures.
- E. Locate system on room axis according to reflected plan.
- F. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- G. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

- H. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
 - I. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
 - J. 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.
 - K. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to structure, 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.
 - L. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
 - M. Support fixture loads using supplementary hangers located within 6 inches (150 mm) of each corner, or support components independently.
 - 1. Support all fixtures weighing greater than 56 lb by at least two supplementary No. 12 gage hangers if required by applicable building code; hangers may be slack.
 - N. Do not eccentrically load system or induce rotation of runners.
 - O. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - P. 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.
 - Q. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - R. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Install in bed of acoustical sealant.
 - 2. Use longest practical lengths.
 - 3. Overlap and rivet corners.
 - 4. Do not use exposed fasteners, including pop rivets, on moldings and trim.
 - S. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch (25 mm) movement. Maintain visual closure.
- 3.05 INSTALLATION - ACOUSTICAL UNITS
- A. Install acoustical units in accordance with manufacturer's instructions.
 - B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

- C. Lay directional patterned units as indicated on Drawings, unless otherwise indicated or directed.
- D. Fit border trim neatly against abutting surfaces.
- E. Install units after above-ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. Cutting Acoustical Units:
 - 1. Cut to fit irregular grid and perimeter edge trim.
 - 2. Make field cut edges of same profile as factory edges.
- H. Where round obstructions occur, provide preformed closures to match perimeter molding.

3.06 FIELD QUALITY CONTROL

- A. Authority Having Jurisdiction to perform tests and inspections.
- B. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
 - 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels 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.
- C. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.

3.07 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

3.08 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095100

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 096500 - RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Installation accessories.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 090561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F150 - Standard Test Method for Electrical Resistance of Conductive and Static Dissipative Resilient Flooring; 2006 (Reapproved 2013).
- C. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.
- D. ASTM F2034 - Standard Specification for Sheet Linoleum Floor Covering; 2008 (Reapproved 2013).
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Verification Samples: Submit three samples, full size illustrating color and pattern.
- E. Submit following Informational Submittals:
 - 1. Certifications specified in Quality Assurance article.
 - 2. Qualification Data: Installer's qualification data.
 - 3. Manufacturer's Instructions:
 - a. Application temperature and humidity range.
 - b. Floor moisture content range.
 - c. Bond and moisture test procedures including frequency and duration.
 - d. Special procedures.
 - e. Perimeter conditions requiring special attention.
- F. Closeout Submittals: Include polishing/waxing information.

- G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Furnish not less than 5-percent, in roll form of each different composition, wearing surface, color, and pattern of resilient sheet floor covering installed.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.07 MOCKUPS

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for floor floor tile and accessories.
 - a. ~~Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.~~
 - b. The mockup shall be the complete installation in Classroom Svcs Rm 120. Approval required before proceeding with the rest of the installation.
 - 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.

1.08 SEQUENCING

- A. Sequence work under provisions of Section 013000.
- B. Install products after other finishing operations, including painting, have been completed.
- C. Do not install resilient products on top of concrete slabs until they are cured and are sufficiently dry to achieve bond with adhesive as determined by resilient material manufacturer's recommended bond and moisture test.
- D. Coordinate installation of resilient base, reducer strips with installation of:
 - 1. Tile Carpeting specified in Section 096813 - Tile Carpeting.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project Site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color, and design.
- B. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

- C. Store all materials off of the floor in an acclimatized, weather-tight space.
- D. Store flooring materials within installation location for minimum of 7 days prior to commencing installation to allow materials to acclimatize.
- E. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- F. Protect roll materials from damage by storing on end.
- G. Do not double stack pallets.

1.10 FIELD CONDITIONS

- A. Maintain air and subfloor temperatures in installation area and storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C), in spaces to receive resilient products during the following time periods:
 - 1. 72 hours before installation.
 - 2. During installation.
 - 3. After installation.
- B. Maintain minimum air and subfloor temperature required by adhesive manufacturer in spaces to receive products for at least 72 hours prior to installation, during installation, and for not less than 48 hours after installation.
- C. Do not install products until they are at same air and subfloor temperature as space where they are to be installed.
- D. After installation, maintain minimum air and subfloor temperature of 55 degrees F and under 50% relative humidity in areas where work is completed.

1.11 WARRANTY

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Resilient Flooring: Provide manufacturer's warranty, as follows:
 - 1. Materials: Minimum 5 years from Date of Substantial Completion.
 - 2. Installation: Minimum 5 years from Date of Substantial Completion; warrant entire installation against loss of adhesion to substrates.

PART 2 PRODUCTS

2.01 MANUFACTURERS - GENERAL

- A. Refer to Finish Schedule for selected products.

2.02 PERFORMANCE REQUIREMENTS

- A. Fire Resistance Ratings:
- B. Flooring shall be stable, firm, and slip resistant. CBC 11B-302.1
- C. Provide resilient flooring which complies with fire resistance ratings for locations scheduled on Drawings.
 - 1. Critical radiant flux:
 - a. Test method: ASTM E648.

- b. Value: Not less than 0.22 watts per square centimeter.
2. Flame spread:
 - a. Test method: ASTM E84.
 - b. Index: 25 or less.
3. Flooring, base, and related elements shall not continue to propagate fire.
4. Smoke generated:
 - a. Test method: ASTM E662.
 - b. Index: 450 or less.

2.03 SHEET FLOORING

- A. Linoleum Sheet Flooring: Homogeneous wear layer bonded to backing, with color and pattern through wear layer thickness.
 1. Minimum Requirements: Comply with ASTM F2034, Type corresponding to type specified.
 2. Backing: Jute fabric.
 3. Thickness: 0.100 inch (2.5 mm), minimum, excluding backing.

2.04 TILE FLOORING

- A. Vinyl Tile: Printed film type, with transparent or translucent wear layer.
 1. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
 2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
 3. Wear Layer Thickness: 0.020 inch (0.50 mm).
 4. Total Thickness: 0.125 inch (3 mm).

2.05 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient sheet flooring manufacturer for applications indicated.
- C. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
 1. Static-Control Adhesive: Adhesive product of floor covering manufacturer that produces conductive continuity of floor covering system.
 2. Materials required by resilient product manufacturer for particular product and substrate moisture content and condition.
 3. Removable adhesive with antimicrobial additive; approved by resilient product manufacturer.
 4. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and CAL-Green Table 5.504.4.1 Adhesive VOC Limit requirements.
- D. Seamless-Installation Accessories:
 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Colors and Patterns: Match flooring

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to Architect and flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Ensure concrete has cured 60 days minimum.
 - 2. Test in accordance with Section 090561.
 - 3. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.
- C. Verify that required floor-mounted utilities are in correct location.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 090561.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive:
 - 1. Apply at rate and in pattern required by manufacturer.
 - 2. Apply to provide continuous bond between resilient material and substrate. Do not allow adhesive to bleed through joints.
 - 3. Spread only enough adhesive to permit installation of materials before adhesive's initial set.
 - 4. Embed grounding strips in static-control adhesive for static dissipative tiles. Extend strips beyond perimeter of static-control resilient floor covering surfaces to ground points.
- D. Fit joints and butt seams tightly.
- E. Scribing:
 - 1. Produce tight hairline joints.
 - 2. Scribe to walls, columns, cabinets, floor outlets, floor penetrations, and other appurtenances.
 - 3. Scribe, cut and fit exposed edges at adjoining construction and neatly abut.
- F. Set flooring in place, press with heavy roller to attain full adhesion.
- G. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

- I. Set in place, press with roller to attain full adhesion and eliminate air bubbles and wrinkles. Use roller of weight required by resilient flooring manufacturer.
- J. Extend unexposed edges under set-on bases and similar trim work.
- K. Install in pan type floor access covers; maintain pattern of surrounding flooring.
- L. Extend into closets and offsets and under movable equipment of rooms and spaces indicated or scheduled to receive flooring, including recessed covers within those spaces.

3.04 INSTALLATION - SHEET FLOORING

- A. Comply with manufacturer's written instructions for installing resilient sheet flooring.
- B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.
- C. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- D. Double cut sheet at seams.
- E. Lay out resilient sheet flooring as follows:
 - 1. Maintain uniformity of flooring direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in flooring substrates.
 - 3. Match edges of flooring for color shading at seams.
 - 4. Avoid cross seams.
- F. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- G. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.
- H. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- I. Adhere resilient sheet flooring 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.
- J. Seamless Installation:
 - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless flooring. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.

3.05 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

- C. Install tile to indicated pattern. Allow minimum 1/2 full size tile width at room or area perimeter.

3.06 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions. Do not use materials and methods which may damage finish and surrounding construction.
- C. Replace scuffed, scratched, broken, and discolored products.
- D. Re-install loose products.

3.07 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.
- B. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).
- C. Cover resilient sheet flooring until Substantial Completion.
- D. Protect work from damage from subsequent construction operations so there will be no indication of use and damage at time of acceptance.

END OF SECTION 096500

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient base.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green
- B. Section 096500 - Resilient Flooring.
- C. Section 096813 - Tile Carpeting.

1.03 REFERENCE STANDARDS

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- B. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012)e1.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Verification Samples: Submit three samples, 12 inch (304.8 mm) in size illustrating color and pattern for each resilient flooring product specified.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Wall Base: 10 linear feet (3 linear meters) of each type and color.
 - 3. 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.
 - 4. Clearly identify each package.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store materials in manufacturer's original unopened containers, with brand names and production lot numbers clearly marked.
- B. 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).

1.07 FIELD CONDITIONS

- A. Maintain air and wall temperature in installation area and storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C), in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. After installation.
- B. Install resilient base and accessories after other finishing operations, including flooring and painting have been completed.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Resilient Base and Accessories: Provide manufacturer's warranty, as follows:
 - 1. Materials: Minimum 2 years from Date of Substantial Completion.
 - 2. Installation: Minimum 2 years from Date of Substantial Completion, warrant entire installation against loss of adhesion to substrates.

PART 2 PRODUCTS

2.01 RESILIENT BASE

- A. Refer to Finish Schedule for selected products.
- B. General: Comply with adhesives and sealants and flooring system product requirements specified in Section 016000.
- C. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set , and as follows:
 - 1. Style:
 - a. Style A, Straight: Carpeted areas.
 - b. Style B, Coved: Other flooring.
 - 2. Height: 4 inch (100 mm).
 - 3. Length: Roll.
 - 4. Color: Color as selected from manufacturer's standards or as indicated on Finish Schedule.
 - 5. Accessories: Premolded external corners and end stops.
 - 6. Acceptable Manufacturers:
 - a. Burke Flooring: www.burkemercer.com.
 - b. Johnsonite, a Tarkett Company: www.johnsonite.com.
 - c. Roppe Corp.: www.roppe.com.
 - d. Prior approved equal.

2.02 ACCESSORIES

- A. Adhesive: Water based type, zero (0) VOC content, spray application, water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Comply with regionally-sourced, urea-formaldehyde prohibition, adhesives and sealants, and volatile organic compound (VOC) product requirements specified in Section 016116.
- B. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
 - 1. Adhesives shall meet or exceed the VOC and chemical component limits of CAL-Green Table 5.504.4.1 Adhesive VOC Limit requirements.
 - 2. Current requirement refers to the date on which the materials are installed in the building.
 - 3. SCAQMD Rule #1168 referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.
- C. Verify that gypsum board is finished to the floor and that gaps do not exist.

3.02 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 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 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.

- E. Clean substrate.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.

- B. Install in accordance with manufacturer's instructions.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Fit joints tightly.
- E. Set base in place, press with heavy roller to attain full adhesion.

3.04 RESILIENT BASE

- A. 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.
- B. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
 - 1. Pieces less than 10 feet long are not permitted. Seams are not permitted between wall corners spaced less than 10 feet apart.
- C. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- D. Fit joints straight, tight, and vertical.
- E. Install on solid substrate backing.
- F. Bond tight to wall and floor surfaces.
- G. Scribe to door frames and other interruptions.
- H. Do not stretch resilient base during installation.
- I. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- J. Preformed Corners: Install preformed corners before installing straight pieces.
- K. Job-Formed Corners:
 - 1. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - a. Miter or Cope corners to minimize open joints.
- L. Fit joints tightly and make vertical. Install in longest lengths possible; maintain minimum dimension of 18 inches (45 mm) between joints.
- M. Align tops of adjacent sections.
- N. Change from cove base to straight base at flooring transition strips.
- O. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.05 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Immediately remove excess adhesive from surfaces without damage.
- C. Replace scuffed, scratched, broken, and discolored products.
- D. Re-install loose products.

- E. Clean surfaces in accordance with manufacturer's requirements. Do not use materials and methods which may damage finish and surrounding construction.

3.06 PROTECTION

- A. Protect work from damage from subsequent construction operations so there will be no indication of use and damage at time of acceptance.

END OF SECTION 096513

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 096813 - TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered.

1.02 RELATED REQUIREMENTS

- A. Section 017419 - Construction Waste Management and Disposal: Reclamation/Recycling of new carpet tile scrap.
- B. Section 018114 - Sustainable Design Requirements - CAL-Green.
- C. Section 090561 - Common Work Results for Flooring Preparation: Independent agency testing of concrete slabs, removal of existing floor coverings, cleaning, and preparation.

1.03 REFERENCE STANDARDS

- A. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.
- B. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org; current edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout of joints, direction of carpet pile, and location of edge moldings.
- C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- D. Samples: Submit three carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.
 - 3. Overrun: Where carpet tile is supplied from custom run at mill, produce five percent overrun on calculated yardage. Provide required overrun exclusive of carpet tile needed for proper installation, waste, and usable scraps.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

2. 5.504.4.4. Carpet.
3. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.
- C. Product Recyclability:
 1. Product must meet FTC guides for recyclability and must be one hundred percent (100%) closed-loop recyclable back into carpet. Products containing both recyclable and non-recyclable components, manufacturer must adequately report which portions of the product are recyclable per FTC guides 16 CFR section 260.7(d). Note: A manufacturer cannot claim that a product or any portion of a product that is incinerated is recyclable, even if incineration is used to produce heat and power (i.e. waste-to-energy) per FTC guides 16 CFR section 260.7 (d) example 3.
 2. Recyclability of product installed must be the same as that claimed by manufacturer and required by Project requirements.
- D. Certifications:
 1. Manufacturer's certification that products furnished for project meet or exceed regulatory and performance requirements included as part of Carpet Tile Materials article.
 2. Contractor's and installer's certification that products are installed in accordance with Contract Documents.
 3. Manufacturer's certification that carpet furnished for project meets one of following requirements:
 - a. Indoor Air Quality Carpet Testing, Carpet and Rug Institute, include CRI Certification number (Green Label).
 - b. EPA Guidelines for Total Volatile Organic Emissions.
 4. Antimicrobial: Environmental Protection Agency registration numbers for antimicrobial agent in products furnished.

1.07 MOCKUPS

- 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 at locations and in sizes shown on Drawings.~~
 2. ~~Review loose tiles and tile layout with Architect prior to installation.~~

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard" 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. Deliver carpeting materials in original mill protective wrapping, with mill register numbers and tags attached.
 - E. Store inside, in well ventilated area, protected from weather, moisture, and soiling.
- 1.09 FIELD CONDITIONS
- A. Stage materials in area of installation for minimum period of 24 hours prior to installation.
 - B. Maintain minimum 70 degrees F (21 degrees C) ambient temperature 24 hours prior to, during and 24 hours after installation.
 - C. Ventilate installation area during installation and for 72 hours after installation.
 - D. Do not commence with carpet installation until painting and finishing work is complete and ceilings and overhead work has been tested, approved, and completed.

PART 2 PRODUCTS

2.01 GENERAL

- A. Comply with CAL-Green Section 5.504.4.4. All carpet installed in the building interior shall meet the testing and product requirements of one of the following:
 - 1. Carpet and Rug Institute's Green Label Plus Program.
 - 2. California Department of Public Health Standard Practice for the testing of VOCs (Specification 01350).
- B. Carpet shall be securely attached and shall have a firm cushion, pad, backing or no cushion or pad. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be 1/2 inch maximum. CBC 11B-302.2
- C. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length. Carpet edges shall comply with CBC 11B-302.2

2.02 CARPET TILE MATERIALS

- A. Refer to Finish Schedule for selected products.
- B. General: Comply with recycled content, adhesives and sealants, volatile organic compound (VOC), and flooring system product requirements.

2.03 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Adhesives:

1. Adhesives: Only use adhesives in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168, CAL-Green Table 5.504.4.1 Adhesive VOC Limit.
 - a. Current requirement refers to the date on which the materials are installed in the building.
 - b. A copy of SCAQMD Rule #1168 is referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
 2. Compatible with materials being adhered; maximum VOC content of 50 g/L; CRI (GLP) certified; in lieu of labeled product, independent test report showing compliance is acceptable.
- C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.
- D. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.
 1. Contact Adhesive: Compatible with carpet material; releasable type.
- E. Miscellaneous Materials: Provide other items recommended by carpet manufacturer and installer for the indicated conditions of carpet use, and as required for complete installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 1. Test in accordance with Section 090561.
 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare floor substrates for installation of flooring in accordance with Section 090561.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

- E. Lay carpet tile in indicated pattern, with pile direction alternating to next unit, set parallel to building lines unless otherwise indicated on Drawings.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING AND PROTECTION

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Remove yarns that protrude from carpet tile surface.
- C. Vacuum carpet tile using commercial machine with face-beater element
- D. Clean and vacuum carpet surfaces.
- E. Protect installed carpet tile to comply with CRI's "CRI Carpet Installation Standard," Section 20, "Protecting Indoor Installations."
- F. 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.

END OF SECTION 096813

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 097733 - FIBER GLASS REINFORCED PLASTIC (FRP) PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass fiber reinforced plastic panels.
- B. Accessories and trim.

1.02 REFERENCE STANDARDS

- A. 9 CFR 416.2 - Regulatory Requirements Under the Federal Meat Inspection Act and the Poultry Products Inspection Act, Part 416-Sanitation; current edition.
- B. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
- C. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of Barcol Impressor; 2013a.
- D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- E. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels; 2012.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.03 SUBMITTALS

- A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- B. Samples: Submit two samples 4 by 4 inch (102 by 102 mm) in size illustrating material and surface design of panels.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.04 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 MANUFACTURERS - GENERAL

- A. Refer to Finish Schedule for finish material selections.

2.02 PANEL SYSTEMS

- A. Wall Panels:
 - 1. Panel Size: 4 by 8 feet (1.2 by 2.4 m).
 - 2. Panel Thickness: 0.10 inch (2.5 mm).
 - 3. Surface Design: Smooth.
 - 4. Color: As indicated on Materials & Specifications Legend.
 - 5. Attachment Method: Adhesive only, with trim and sealant in joints.

2.03 MATERIALS

- A. Panels: Glass fiber reinforced plastic (FRP), complying with ASTM D5319.
 - 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
 - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 3. Scratch Resistance: Barcol hardness score greater than 35, when tested in accordance with ASTM D2583.
 - 4. Impact Strength: Greater than 6 ft lb force per inch (320 J per m), when tested in accordance with ASTM D256.
 - 5. Sanitation and Cleanability: Comply with 9 CFR 416.2.
 - 6. Wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Trim: Vinyl; color coordinating with panel.
- C. Adhesive: Type recommended by panel manufacturer.
 - 1. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 2. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168, CAL-Green Table 5.504.4.1 Adhesive VOC Limit, and CAL-Green Table 5.504.4.2 Sealant VOC Limit requirements.
 - a. Current requirement refers to the date on which the materials are installed in the building.
 - b. A copy of SCAQMD Rule #1168 is referenced in Section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.

- D. Sealant: Mildew-resistant, single-component, neutral-curing or acid-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 - Joint Sealants.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- B. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- C. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- D. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches (300 mm) wide.
 - 1. Mark plumb lines on substrate at panel joint locations for accurate installation.
 - 2. Locate panel joint to allow clearance at panel edges according to manufacturer's written instructions.

3.03 INSTALLATION - WALLS

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
 - 1. Mop Sinks: Locate 12 inches beyond mop sink on both sides, 48 inches above sink.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

END OF SECTION

DLR GROUP
Project NO. 75-15238-00
7/31/17

Compton Community College District
Instructional Building #1
DSA Submittal

SECTION 099123 - INTERIOR PAINTING

PART 1 GENERAL

1.01 SUMMARY

- A. Surface preparation and field painting of exposed items and surfaces.
 - 1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
 - 2. Field finish coating of shop or factory primed and prefinished items. Refer to individual Sections for priming requirements.
 - 3. Finish coatings schedule.
 - 4. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
 - 5. Paint all other items unless specifically indicated not to be painted.

1.02 RELATED REQUIREMENTS:

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 051200 - Structural Steel Framing for shop priming of metal substrates with primers specified in this Section.
- C. Section 055000 - Metal Fabrications for shop priming of metal substrates with primers specified in this Section.
- D. Section 055100 - Metal Stairs for shop priming of metal substrates with primers specified in this Section.
- E. Section 055213 - Pipe and Tube Railings for shop priming of metal substrates with primers specified in this Section.
- F. Section 057300 - Decorative Metal Railings for shop priming of metal substrates with primers specified in this Section.
- G. Division 21 – Fire Suppression: Piping identification.
- H. Division 22 – Plumbing: Piping identification.
- I. Division 23 – Heating, Ventilating, and Air Conditioning: Mechanical identification.
- J. Division 26 – Electrical: Electrical identification.

1.03 DEFINITIONS

- A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
- B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.
- C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.
- D. Inaccessible Spaces: Spaces not intended for human use.

1. Standard terms used by the coatings industry are defined in ASTM D 16.

E. Gloss Levels

1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
5. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
6. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
7. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

F. System DFT: Dry film thickness of entire coating system unless otherwise noted.

1.04 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples 8 inches (200 mm) square.
2. Label each Sample for location and application area.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. VOC content.

D. 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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.05 SUSTAINABILITY SUBMITTALS

A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:

1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
3. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.06 QUALITY ASSURANCE

- A. Field Samples: Apply field samples of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on field samples.
 - 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 field samples 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.

1.07 MOCKUPS

- A. ~~Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.~~
 - 1. ~~Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.~~
 - a. ~~Vertical and Horizontal 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 Architect specifically approves such deviations in writing.~~

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Add other requirements to suit Project.
 - 2. Product name or title of material.
 - 3. Product description (generic classification or binder type).
 - 4. Manufacturer's stock number and date of manufacture.
 - 5. Contents by volume, for pigment and vehicle constituents.
 - 6. Thinning instructions.
 - 7. Application instructions.
 - 8. Color name and number.
 - 9. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.09 FIELD CONDITIONS

- A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.
 1. Provide enclosed water tight building.
 2. Provide continuous ventilation during application of coatings to exhaust hazardous fumes.
 3. Provide heating necessary to maintain surface and ambient temperatures within specified limits.
 4. Maintain temperature and humidity conditions for minimum 24 hours before, during, and 48 hours after application of finishes, unless longer times are required by manufacturer.
 5. Do not permit wide variations in ambient temperatures which might result in condensation on freshly coated surfaces.
 6. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
 7. Apply water reducible coatings only when ambient and surface temperatures are between 50 degrees F and 90 degrees F.
 8. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 degrees F and 90 degrees F.
 9. Do not apply coatings under any of following conditions:
 - a. When surfaces are damp or wet.
 - b. During snow, rain, fog, or mist.
 - c. When relative humidity is less than 20 percent or exceeds 85 percent.
 - d. When temperature is less than 5 degrees F above dew point.
 - e. When dust may be generated before coatings have dried.
 - f. In direct sunlight.
 - g. When wind velocity is above 20 mph.
 10. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

1.10 WARRANTY

- A. Warrant installation to be free from defects in material and workmanship for 5 years.
- B. Repair or replace defects occurring during warranty period.
 1. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Benjamin Moore & Co.
 2. Dunn-Edwards Corporation.
 3. PPG Industries.

4. Sherwin-Williams Company (The).

2.02 PAINT, GENERAL

- A. Material Compatibility:
 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Coatings:
 1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
 2. Use manufacturer's appropriate base materials to achieve required colors.
 3. Fully grind pigments to maintain soft paste consistency in vehicle.
 4. Capable of being dispersed into uniform, homogeneous mixture.
 5. Possess good flowing and brushing properties.
 6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
 7. VOC content of field applied coatings shall comply with local governing authorities.
- D. CAL-Green requirements for typical paint coatings:
 1. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
 2. Flats: 50 grams per liter of product minus water
 3. Non-flats: 100 grams per liter of product minus water
 4. Non-flat High Gloss: 150 grams per liter of product minus water
 5. Dry-Fog Coatings: 150 g/L.
 6. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 7. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.
- E. Colors: As selected by Architect from manufacturer's full range.

2.03 BLOCK FILLERS

- A. Interior Concrete Block Filler: Factory-formulated interior and exterior concrete block filler. PDCA Level 2.
 1. Benjamin Moore and Company: Super Spec Masonry Int/Ext HI-Build Block Filler 206. Applied at a dry film thickness of not less than 8.5 mil.
 2. Dunn-Edwards Corporation; SBSL00 Smooth Blocfil Select, Interior / Exterior Concrete Block Filler:
 3. PPG Industries; Speedhide Interior Exterior Latex Block Filler 6-7
 4. Sherwin-Williams: Prep-Rite Block Filler B25W25.

2.04 PRIMERS/SEALERS

- A. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.
 - 1. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Dunn-Edwards Corporation; VNSL00-1 Vinylastic Select Low Odor / Zero VOC Interior Wall Sealer: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. PPG Industries; Speedhide zero Interior Latex Primer/Sealer 6-4900XI. Applied at a dry film thickness of not less than 1.4 mils
 - 4. Sherwin-Williams; S-W ProMar 200 Zero VOC Primer, B28W02600. Applied at a dry film thickness of not less than 1.0 mil.

- B. Interior Wood Primer for Acrylic-Enamel and Semigloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.
 - 1. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Dunn-Edwards Corporation; Dunn-Edwards Corporation; IKPR00-1 Inter-Kote Premium Low Odor / Zero VOC Interior Undercoater: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. PPG Industries; Seal Grip Interior Primer/Finis 17-951. Applied at a dry film thickness of not less than 1.2 mils
 - 4. Sherwin-Williams; Premium Wall and Wood Primer B28W08111 Series: Applied at a dry film thickness of not less than 1.6 mils.

- C. Interior Wood Primer for Full-Gloss Alkyd-Enamel Finishes: Factory-formulated alkyd- or acrylic-latex-based interior wood primer.
 - 1. Benjamin Moore and Company: Ultra Spec 500 Interior Latex Primer #N534 Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Dunn-Edwards Corporation; IKPR00-1 Inter-Kote Premium Low Odor / Zero VOC Interior Undercoater: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. PPG Industries; Seal Grip Interior Primer/Finis 17-951. Applied at a dry film thickness of not less than 1.2 mils.
 - 4. Sherwin-Williams; S-W PrepRite ProBlock® Latex Primer/Sealer B51 Series. Applied at a dry film thickness of not less than 1.4 mil.

- D. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
 - 1. Benjamin Moore and Company: Super Spec HP Alkyd Metal Primer #P06. Applied at a dry film thickness of not less than 1.7 mil.
 - 2. Dunn-Edwards Corporation; BRPR00-1 Bloc-Rust Premium, Ultra Low VOC, Interior / Exterior, Red Oxide or White, Waterborne Alkyd Rust Preventative Metal Primer: Applied at a dry film thickness of not less than 2.0 mils.
 - 3. Dunn-Edwards Corporation; ULDM00 Ultrashield, Low Odor / Zero VOC, Interior / Exterior DTM Gray Primer: Applied at a dry film thickness of not less than 2.0 mils.
 - 4. PPG Industries; Pitt Tech Plus DTM Acrylic Primer 90-912. Applied at a dry film thickness of not less than 2.0 mils.
 - 5. Sherwin-Williams; Kem Kromik Universal Metal Primer B50NZ6/B50WZ1: Applied at a dry film thickness of not less than 3.0 mils.

- E. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
 - 1. Benjamin Moore and Company: Super Spec HP Acrylic Metal Primer #P04. Applied at a dry film thickness of not less than 1.7 mils.
 - 2. Dunn-Edwards Corporation; UGSL00-1 Ultra-Grip Select, Low Odor / Zero VOC, Interior / Exterior Acrylic Multi-Surface Primer: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. PPG Industries; Pitt Tech Plus DTM Acrylic Primer 90-912. Applied at a dry film thickness of not less than 2.0 mils
 - 4. Sherwin-Williams: Pro-Cryl universal primer/finish, B66-310. Applied at a dry film thickness of not less than 3.0 mils.

2.05 FINISH COATS

- A. High-Performance Architectural Latex System - Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
 - 1. Benjamin Moore and Company: Ultra Spec 500 Interior Flat Finish N536. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Dunn-Edwards Corporation; SZRO10 Spartazero Low Odor / Zero VOC Interior Flat Paint: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. PPG Industries; Speedhide zero Interior Latex Flat 6-4110XI. Applied at a dry film thickness of not less than 1.3 mils
 - 4. Sherwin-Williams; S-W ProMar 200 Zero VOC Flat, B30W02651. Applied at a dry film thickness of not less than 1.6 mil.
- B. High-Performance Architectural Latex System - Flat Latex-Emulsion Size: Factory-formulated flat latex-based interior paint.
 - 1. Benjamin Moore and Company: Ultra Spec 500 Interior Flat Finish N536. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Dunn-Edwards Corporation; SZRO10 Spartazero Low Odor / Zero VOC Interior Flat Paint: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. PPG Industries; Speedhide zero Interior Latex Flat 6-4110XI. Applied at a dry film thickness of not less than 1.3 mils
 - 4. Sherwin-Williams; S-W ProMar 200 Zero VOC Flat, B30W02651. Applied at a dry film thickness of not less than 1.6 mil.
- C. High-Performance Architectural Latex System - Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel.
 - 1. Benjamin Moore and Company: Ultra Spec 500 Interior Eggshell Finish N538. Applied at a dry film thickness of not less than 1.8 mil.
 - 2. Dunn-Edwards Corporation; SZRO20 Spartazero Low Odor / Zero VOC Interior Velvet Paint: Applied at a dry film thickness of not less than 1.5 mils.
 - 3. PPG Industries; Speedhide zero Interior Latex Eggshell 6-4310XI. Applied at a dry film thickness of not less than 1.5 mils
 - 4. Sherwin-Williams; S-W ProMar 200 Zero VOC EgShel, B20W02651. Applied at a dry film thickness of not less than 1.6 mil.
- D. High-Performance Architectural Latex System - Semigloss Acrylic Enamel: Factory-formulated semigloss acrylic-latex enamel for interior application.
 - 1. Benjamin Moore and Company: Ultra Spec 500 Interior Semi-Gloss Finish N539. Applied at a dry film thickness of not less than 1.8 mil.

2. Dunn-Edwards Corporation; SZRO50 Spartazero Low Odor / Zero VOC Interior Semi-Gloss Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. PPG Industries; Speedhide zero Interior Latex Semi-Gloss 6-4510XI. Applied at a dry film thickness of not less than 1.3 mils
 4. Sherwin-Williams; ProMar 200 Zero VOC Sem-Gloss, B31W02651. Applied at a dry film thickness of not less than 1.7 mil.
- E. High-Performance Architectural Latex System - Full-Gloss Acrylic Enamel: Factory-formulated full-gloss acrylic-latex interior enamel.
1. Benjamin Moore and Company: Ultra Spec 500 Interior Gloss Finish N540. Applied at a dry film thickness of not less than 1.8 mil.
 2. Dunn-Edwards Corporation; (ULSH60) Ultrashield Low Odor / Zero VOC Interior / Exterior Gloss Paint: Applied at a dry film thickness of not less than 2.0 mils.
 3. PPG; 6-8534 SpeedHide Interior Latex 100 Percent Acrylic Gloss Enamels: Applied at a dry film thickness of not less than 1.2 mil.
 4. Sherwin-Williams; Solo 100% Acrylic Interior/Exterior Gloss: Applied at a dry film thickness of not less than 1.5 mils.
- F. Interior Semigloss Alkyd Enamel: Factory-formulated semigloss alkyd enamel for interior application.
1. Benjamin Moore and Company: Advance Waterborne Interior Waterborne Interior Alkyd Satin Finish #792. Applied at a dry film thickness of not less than 1.35 mil.
 2. Dunn-Edwards Corporation; AWLL50 Aristowall, Ultra-Low VOC, Interior, Waterborne Alkyd, Semi-Gloss Paint: Applied at a dry film thickness of not less than 1.5 mils.
 3. PPG Industries; Speedhide Interior Alkyd Semi-Gloss Enamel 6-1110XI. Applied at a dry film thickness of not less than 2.1 mils
 4. Sherwin-Williams; ProMar 200 Interior Alkyd Semi-Gloss EnamelB34W00251 Series: Applied at a dry film thickness of not less than 1.7 mils.
- G. Interior Full-Gloss Alkyd Enamel for Gypsum Board and Plaster: Factory-formulated full-gloss alkyd interior enamel.
1. Benjamin Moore and Company: Advance Waterborne Interior Waterborne Interior/Exterior Alkyd High Gloss Finish #794. Applied at a dry film thickness of not less than 1.5 mil.
 2. Dunn-Edwards Corporation; AWLL60 Aristowall, Ultra-Low VOC, Interior, Waterborne Alkyd, Gloss Paint. Apply at a dry film thickness of not less than 1.5 mils.
 3. PPG Industries; Speedhide Alkyd Gloss Enamel 6-282 Series. Applied at a dry film thickness of not less than 2.3 mils
 4. Sherwin-Williams; ProMar 200 Alkyd Gloss Enamel B35W00251Series: Applied at a dry film thickness of not less than 1.6 mils.
- H. Interior Full-Gloss Alkyd Enamel for Wood and Metal Surfaces: Factory-formulated full-gloss alkyd interior enamel.
1. Benjamin Moore and Company: Advance Waterborne Interior Waterborne Interior Alkyd Satin Finish #792. Applied at a dry film thickness of not less than 1.35 mil.
 2. Dunn-Edwards Corporation; AWLL60 Aristowall, Ultra-Low VOC, Interior, Waterborne Alkyd, Gloss Paint. Apply at a dry film thickness of not less than 1.5 mils.
 3. PPG Industries; Speedhide Alkyd Gloss Enamel 6-282 Series. Applied at a dry film thickness of not less than 2.3 mils

4. Sherwin-Williams; ProMar 200 Alkyd Gloss EnamB35W00251Series: Applied at a dry film thickness of not less than 1.6 mils.

2.06 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint 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 shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
 1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- C. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Masonry (Clay and CMU): 12 percent.
 2. Wood: 15 percent.
 3. Gypsum Board: 12 percent.
- D. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Plaster Substrates: Verify that plaster is fully cured.
- F. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- G. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- H. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.02 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. 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.
- E. 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."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- F. 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.
- G. 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.
- H. 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.

3.03 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. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. 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.

3.04 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.

3.05 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.
- E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.06 INTERIOR PAINTING SCHEDULE

- A. Sheen: Sheen as indicated on Finish Schedule.
- B. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, flat (Gloss Level 1).
- C. Steel Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Shop primer specified in Section where substrate is specified.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss (Gloss Level 5).
- D. Galvanized-Metal Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer, galvanized, water based.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss (Gloss Level 5).
- E. Gypsum Board and Plaster Substrates:
 - 1. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer sealer, latex, interior.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat - Walls and Ceilings in Wet Areas: Latex, interior, semi-gloss (Gloss Level 5).
 - d. Topcoat - Typical Wall Areas: Latex, interior, low sheen (Gloss Level 3-4).
 - e. Topcoat - Typical Ceiling: Latex, interior, flat (Gloss Level 1) except as restroom ceilings.

- f. Topcoat - Accent Areas: Latex, interior, low sheen (Gloss Level 3-4).

END OF SECTION 099123

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High performance coatings.
- B. Surface preparation.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 055000 - Metal Fabrications.
- C. Section 055100 - Metal Stairs.
- D. Section 055213 - Pipe and Tube Railings.
- E. Section 057013 - Decorative Metal.
- F. Section 057300 - Decorative Metal Railings.

1.03 REFERENCE STANDARDS

- A. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- B. SSPC V1 (PM1) - Good Painting Practice: Painting Manual, Volume 1; Fourth Edition.
- C. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual, Volume 2; Fourth Edition.
- D. SSPC-PA 1 - Shop, Field, and Maintenance Painting of Steel; 2004.
- E. SSPC-SP 1 - Solvent Cleaning; 2015.
- F. GreenSeal GS-11 - Paints; 2011.
- G. SSPC-SP 6 - Commercial Blast Cleaning; 2007.
- H. SSPC-SP 7 - Brush-Off Blast Cleaning; 2007.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
 - 3. Manufacturer's installation instructions.
- C. Product Data: Provide data indicating coating materials .

- D. Samples: Submit two samples 8 by 8 inch (203 by 203 mm) in size illustrating colors available for selection.
- E. Certification: By manufacturer that all paints and coatings comply with VOC limits specified.
- F. Certification: By manufacturer that all paints and coatings do not contain any of the prohibited chemicals specified; GreenSeal GS-11 certification is not required but if provided shall constitute acceptable certification.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Coating Materials: 1 gallon (4 liters) of each type and color.
 - 3. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 2. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 3. 5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document that applies to application on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this Section with minimum three years documented experience.

1.07 ~~MOCK-UP~~

- A. ~~See Section 014000 - Quality Requirements, for general requirements for mock-up.~~
- B. ~~Comply with general mock-up requirements specified in Section 014000.~~
- C. ~~Mockup: Mock-up of product to receive high-performance coating 10 feet long by full width as directed by Architect, illustrating coating, color, and surface sheen, for each specified coating.~~
 - 1. ~~Locate where directed.~~

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

- C. Coating Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Do not apply coatings when relative humidity is outside the humidity ranges required by the coating product manufacturer.
- C. Do not install materials when temperature is below 55 degrees F (13 degrees C) or above 90 degrees F (32 degrees C).
- D. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.
- F. Restrict traffic from area where coating is being applied or is curing.

1.10 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide high performance coating products from the same manufacturer to the greatest extent possible.
- B. Basis of Design Manufacturers:
 - 1. Tnemec Company, Inc.: www.tnemec.com.
 - 2. Prior approved equal.

2.02 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Material Quality: Provide manufacturer's best-quality coating material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Coating-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Coatings:

1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
 2. Use manufacturer's appropriate base materials to achieve required colors.
 3. Fully grind pigments to maintain soft paste consistency in vehicle.
 4. Capable of being dispersed into uniform, homogeneous mixture.
 5. Possess good flowing and brushing properties.
 6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
 7. VOC content of field applied coatings shall comply with local governing authorities.
- D. Paint Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building, and Cal-GREEN Table 5.504.4.3 for VOC Content Limits for Architectural Coatings.
1. CAL-GREEN Requirements for typical paint coatings:
 - a. Primers, Sealers, and Undercoaters: 100 grams per liter of product minus water
 - b. Flats: 50 grams per liter of product minus water
 - c. Non-flats: 100 grams per liter of product minus water
 - d. Non-flat High Gloss: 150 grams per liter of product minus water
 - e. Dry-Fog Coatings: 150 g/L.
 - f. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - g. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - h. Floor Coatings: 100 g/L.
 - i. Shellacs, Clear: 730 g/L.
 - j. Shellacs, Pigmented: 550 g/L.
- E. Colors: As selected by Architect from manufacturer's full range.
1. 10 percent of surface area will be painted with deep tones.
- 2.03 TOP COAT MATERIALS
- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
- B. (PT-1) Fluoropolymer: 2 part thermoset solution fluoropolymer
1. Locations: Exterior steel.
 2. Basis of Design Product:
 - a. Tnemec Company, Inc., Fluoronar Series 1071V, 3.0 mils total dry film thickness
 - b. Prior approved equal.
 3. Color Coat: Solid color; SILVER 41 MT color.
- 2.04 PRIMERS
- A. Primers: Provide the following unless other primer is required or recommended by coating manufacturer:
1. Organic Zinc-Rich Primers:
 - a. Basis of Design Products:
 - 1) Tnemec Company, Inc.: 94H2O Hydro-Zinc, 4.0 to 6.0 mils total dry film thickness.
 - b. Physical Requirements:
 - 1) Solids content by volume: 63 percent minimum.
 - 2) Metallic zinc content: 83 percent minimum.
 - 3) VOC Content (Unthinned): 96 g/L.

c. Performance Requirements:

- 1) General: Tests are based on one coat at manufacturer's recommended DFT.
- 2) Adhesion: ASTM D4541, not less than 1500 psi pull, average of three trials.
- 3) Salt Spray (Fog): ASTM B117, no blistering, cracking, softening, or delamination of film. No more than 1 percent rust on plane and no more than 1/4 inch rust creepage at scribe and no rusting at edges after 20,000 hours exposure.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.
- B. Cleaners:
 1. General: Mildewcide, TSP (tri-sodium phosphate), acidic-detergent, zinc sulfate, sodium metasilicate, and solvents:
 2. Commercially available.
 3. Non-damaging to surface being cleaned
 4. Complying with PDCA Specification Manual.
 5. Acceptable to coating manufacturer.
- C. Metal Conditioner: Proprietary phosphoric acid based, etching type solution; acceptable to coating manufacturer.
- D. Rust Inhibitor:
 1. Water containing 0.32 percent by weight of sodium nitrite and 1.28 percent by weight of secondary ammonium phosphate (dibasic).
 2. Water containing 0.2 percent by weight of chromic acid, sodium chromate, sodium dichromate, or potassium dichromate.
- E. Spackling compound, putty, fillers, liquid de-glosser, patching plaster, thinners, and materials not indicated but required to achieve finishes. Compatible with coating system and acceptable to coating manufacturer.
- F. Do not use products of different manufacturers in combination, unless approved by each manufacturer of products involved.

2.06 MIXING

- A. Use factory prepared colors matching approved samples. Site tinting will not be permitted.
- B. Thoroughly mix and stir coating components before use to ensure homogeneous dispersion of ingredients. Prior to application, blend multiple containers of same material and color by pouring from one container to another several times to ensure uniform consistency, color, and smoothness.
- C. Mix in clean pails of material recommended by manufacturer to avoid contamination.
- D. Mix only enough of multi-part coatings to allow application within pot life of mixture.
- E. Remove film which may form on surface of material in containers and strain material before using. Stir frequently during use to maintain pigments in suspension. Do not stir film into material.
- F. Apply coatings of consistency instructed by manufacturer.

- G. Thinning:
 - 1. Provide thinners approved by coating manufacturer.
 - 2. Add thinners within manufacturer recommended limits.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Cementitious Substrates: Do not begin application until substrate has cured 28 days minimum and measured moisture content is not greater than 12 percent.
 - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
- G. Proceed with coating application only after unacceptable conditions have been corrected.
 - 1. Commencing coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

- A. Protect completed construction from damage. Furnish drop cloths, shields, and protective methods to prevent spray, splatter or droppings from disfiguring other surfaces.
- B. Remove surface hardware, mechanical diffusers, escutcheons, registers, electrical plates, light fixture trim, fittings, fastenings and similar items prior to preparing surfaces for finishing. Provide surface-applied protective masking for non-removable items. Carefully store removed items for reinstallation.
- C. Remove mildew by scrubbing with mildewcide. Rinse thoroughly with clean water.
- D. Before beginning application of coatings, ensure surfaces are clean, dry, and free of dirt, dust, rust, and rust scale, oil, grease, mold, mildew, algae, efflorescence, release agents and other harmful materials which could adversely affect coating adhesion and finished appearance.
- E. Clean surfaces of loose foreign matter.
- F. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.
- G. Remove finish hardware, fixture covers, and accessories and store.

- H. General:
 - 1. Correct minor defects.
 - 2. Remove temporary labels, wrappings, and protective coverings from surfaces to be coated.
 - 3. Seal stains, marks, and other imperfections which may bleed through surface finishes.
- I. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.
- J. Steel - Unprimed:
 - 1. Remove weld spatter by chipping or grinding.
 - 2. Clean interior and weather protected steel in accordance with SSPC SP7, "Brush-Off Blast Cleaning".
 - 3. Clean exterior steel permanently exposed to elements in accordance with SSPC SP6 "Commercial Blast Cleaning".
 - 4. Apply primer, or metal conditioner to bare surfaces in accordance with coating schedule, paying particular attention to abrasions, welds, bolts, and nuts. Allow to set as recommended by manufacturer.
- K. Steel - Shop Prime Coated:
 - 1. Remove loose shop primer and rust; sand to feather-edge at adjacent sound primer by cleaning in accordance with SSPC SP2 "Hand Tool Cleaning" and SP3 "Power Tool Cleaning".
 - 2. Apply primer or metal conditioner to abrasions, welds, bolts, and nuts in accordance with coating schedule. Allow to set as instructed by manufacturer. Rinse with clean water with rust inhibitor mixed-in or applied primer or metal conditioner immediately following rinse. Allow to dry.
 - 3. Prime coat bare areas immediately.
 - 4. Apply specified primer to bare steel and previously primed steel surfaces scheduled to receive high performance coatings.
- L. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).
- M. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

3.03 PRIMING

- A. General:
 - 1. Coat surfaces specified, scheduled, illustrated, and otherwise identified unless specifically noted otherwise.
 - 2. Apply coatings of type, color, and sheen as specified.

3. Apply products in accordance with manufacturer's instructions. Use application materials, equipment, and techniques as instructed by coating manufacturer and best suited for substrate and type of material being applied.
 4. Do not apply finishes to surfaces that are improperly prepared.
 5. Quantify of coats specified are minimum quantify acceptable.
 6. Apply coating systems to achieve scheduled total dry film thickness.
 7. Apply material at not less than manufacturer's instructed spreading rate.
 8. Do not exceed maximum single coat thickness instructed by coating manufacturer.
 9. Ensure that edges, corners, crevices, welds, and exposed fasteners, receive dry film thickness equivalent of flat surfaces.
 10. Finish edges of coatings adjoining other materials and colors sharp and clean manner, without overlapping.
- B. Apply initial coat to surfaces as soon as practical after preparation and before subsequent surface deterioration.
- C. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.
- D. Concrete: Prior to priming, patch with masonry filler to produce smooth surface.
- E. Concrete Masonry: Apply masonry filler to thickness required to fill holes and produce smooth surface; minimum thickness of 30 mils (0.8 mm).

3.04 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified.
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.
- C. Allow previously applied coat to dry before next coat is applied.
- D. Sand and dust lightly between coats as recommended by coating manufacturer.
- E. Replace trim, fittings, and other items removed for finishing.

3.05 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection.
- B. Periodically test film thickness of each coat with wet film gage to ensure coatings are being applied to proper thickness in presence of IOR.
- C. Request review of each applied coat by Architect and manufacturer's representative before application of successive coats. Only reviewed coats will be considered in determining number of coats applied.
- D. Immediately prior to Substantial Completion, perform detailed inspection of coated surfaces and repair or refinish abraded, stained, and otherwise disfigured surfaces.
- E. 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 recommendations, and specified thickness, Contractor shall pay for retesting and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations, and specified thickness.

3.06 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.
- D. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

3.07 PROTECTION

- A. Protect finished work from damage.
- B. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to Architect.
- C. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.

END OF SECTION 099600

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 101101 - VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Markerboards.
- B. Tackboards.

1.02 RELATED REQUIREMENTS

- A. Section 092116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

1.03 REFERENCE STANDARDS

- A. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.
- B. ASTM F793 - Standard Classification of Wall Covering by Use Characteristics; 2010a.
- C. FS L-P-1040 - Plastic Sheets and Strips (Polyvinyl Fluoride); Federal Specifications and Standards; Revision B, 1977.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on markerboard and accessories.
- C. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.
- D. Samples: Submit color charts for selection of color and texture of markerboard.
- E. Manufacturer's printed installation instructions.
- F. Maintenance Data: Include data on regular cleaning, stain removal, and other pertinent data.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. A5.405.1 Regional materials. Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site, meeting the criteria listed in Section A5.405.1.
 - 4. 5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 5. 5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.
 - 6. 5.504.4.5 Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with CAL-Green Table 5.504.4.5 - Formaldehyde Limit requirements.

1.06 QUALITY ASSURANCE

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

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide 15-year warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers - Visual Display Boards: Mooreco 96" Interactive Projector Board.

1. Epson; 100" Whiteboard for Projection and Dry-erase:
www.epson.com.

- 2. Other Acceptable Manufacturers - Visual Display Boards:
 - a. ADP Lemco, Inc.: www.adplemco.com.
 - b. Claridge Products and Equipment, Inc.: www.claridgeproducts.com.
 - c. Ghent Manufacturing, Inc.: www.ghent.com.
 - d. Polyvision Corporation (Nelson Adams): www.polyvision.com.
 - e. Visual Specialties, Inc.: www.academicsspecialties.com.
 - f. Prior approved equal.

2.02 VISUAL DISPLAY BOARDS

- A. Markerboards: Porcelain enamel on steel, laminated to core, combination projection/white board.
 - 1. Color: White.
 - 2. Steel Face Sheet Thickness: 24-gauge, 0.0239 inch (0.61 mm).
 - 3. Core: Fiberboard, manufacturer's standard thickness, laminated to face sheet.
 - 4. Backing: Aluminum foil, laminated to core.
 - 5. Size: As indicated on Drawings.
 - 6. Height: 54.6 inches.
 - 7. Length: 86.6 inches, in one piece.
 - 8. Frame: Extruded aluminum, with concealed fasteners.
- B. Tack boards: Fine-grained, homogeneous natural cork.
 - 1. Cork Thickness: 1/4 inch (6 mm).
 - 2. Backing: plywood, 3/4 inch (19.05 mm) thick, laminated to tack surface.
 - Size: As indicated on Drawings.
 - 4. Frame Profile: Manufacturer's standard.
 - 5. Frame Finish: Anodized, natural.

C. Unframed Tack Boards

1. Forbo Bulletin Board Cork: 1/4" thick self-healing, burlap backed cork fully adhered to wall.

2. Size and Color: As indicated on drawings and color board.

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2.03 MATERIALS

- A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.
- B. Vinyl Coated Fabric: ASTM F793 Category VI; clear top overcoat of polyvinyl fluoride in accordance with FSL-P-1040 Type 1, Grade B, Class 2, 0.0005 inch (0.01 mm) thick.

2.04 ACCESSORIES

- A. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install boards in accordance with manufacturer's instructions.
- B. Install with top of chalk tray at 30 inches (760 mm) above finished floor.
- C. Secure units level and plumb.
- D. Butt Joints: Install with tight hairline joints.

3.03 CLEANING

- A. Clean board surfaces in accordance with manufacturer's instructions.
- B. Remove temporary protective cover at Date of Substantial Completion.

END OF SECTION

DLR GROUP
Project NO. 75-15238-00
7/31/17

Compton Community College District
Instructional Building #1
DSA Submittal

SECTION 101413 - REGULATORY SIGNAGE

PART 1- GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Regulatory signage posted at the following permanent locations.
 - a. Restroom doors.
 - b. Egress Stairway Doors.
 - c. Exit Passageway Doors.
 - d. Exit Discharge Doors.
 - 2. Supplementary components and accessories necessary for a complete installation.

1.02 REFERENCES

- A. Abbreviations and Acronyms:
 - 1. ABA: Architectural Barriers Act.
 - 2. ADA: Americans with Disabilities Act.
 - 3. ABS: Acrylonitrile Butadiene Styrene.
 - 4. CBC: California Building Code.
 - 5. PVC: Polyvinyl Chloride.

1.03 ADMINISTRATIVE REQUIREMENTS:

- A. Sequencing: Complete all finishing operations, including painting, before beginning installation of signage systems.

1.04 SUBMITTALS

- A. Product Data.

1.05 QUALITY ASSURANCE

- A. California DSA Regulatory Requirements:
 - 1. Raised characters shall comply with CBC Section 11B-703.2:
 - a. Depth: It shall be 1/32 inch (0.8 mm) minimum above their background and shall be sans serif uppercase and be duplicated in Braille.
 - b. Height: It shall be 5/8 inch (15.9 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I". CBC Section 11B-703.2.5
 - c. Finish and Contrast: Characters and their background shall have a non-glare finish. Character shall contrast with their background with either light characters on a dark background or dark characters on a light background. CBC Section 11B-703.5. 1.
 - d. Proportions: It shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I". Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character. CBC Sections 11B-703.4 and 11B-703.6.
 - e. Character Spacing: Spacing between individual tactile characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8.
 - f. Format: Text shall be in a horizontal format. CBC Section 118-703.2.9

- g. Braille: It shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4. Braille dots shall have a domed and rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
 - h. Mounting height: A tactile sign shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface.
 - i. Mounting location: A tactile sign shall be located per CBC Section and Figure 11B-703.4.2 as follows:
 - 1) Alongside a single door at the latch side.
 - 2) On the inactive leaf at double doors with one active leaf.
 - 3) To the right of the right hand door at double doors with two active leaves.
 - 4) On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leaves.
 - 5) So that a clear floor space of 18 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. Visual characters shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.
 - 3. Pictograms shall comply with CBC Section 11B-703.6.
 - 4. Symbol of accessibility shall comply with CBC Section 11B-703.7.
 - 5. Variable message signs shall comply with CBC Section 11B-703.8.
- B. Source Limitations: Obtain each size type color pattern and variety of regulatory sign used for the Project through one source from the same manufacturer.

PART 2 - PRODUCTS

2.01 SIGN MATERIALS

- A. Acrylic Plastic: "Plexiglas" by Rohm & Haas, or equal.
 - 1. Provide non-glare with fine sanded edges.
 - 2. Exterior grade acrylics and finishes must be used for all exterior room sign conditions.
- B. Specialty Acrylic: Blue tinted acrylic - Finish and thickness as indicated on the Drawings. Manufacturer: Cyro - Acrylite, GP-FL #6157-0 Blue, or equal.
- C. Vinyl: Computer cut with a minimum five year exterior and seven year interior guarantee. Sizes, spacing and fonts as indicated on the drawings. Vinyl shall be premium grade unless otherwise specified as manufactured by 3M, Gerber or equal.

2.02 WALL-MOUNTED PHOTOPOLYMER (ONE-PIECE) PANEL SIGNS

- A. Description: Single-piece construction, permanent identification signs consisting of moisture resistant, non-glare photopolymer bonded to sign base material.
- B. Products: Design is based on interior grade photopolymer panels by Jet USA.
- C. Comply with the Following:
 - 1. Sizes:
 - a. Restroom Signs:
 - 1) Women's Room: 12 inch diameter circle.

- 2) Men's Room: Equilateral triangle with 12 inch long edges and vertex pointing upward.
- 3) Unisex Room: Equilateral triangle superimposed within a 12 inch diameter circle.
- b. Egress Stairway Doors: 12 inches square.
- c. Exit Passageway Doors: 12 inches square.
- d. Exit Discharge Doors: 12 inches square.
2. Thickness: Between 1/8 inch minimum and 1/4 inch maximum.
3. Edge Condition: Square cut.
4. Corner Condition: Square.
5. Mounting: Wall mounted with mechanical fasteners.
6. Materials:
 - a. Photopolymer Layer: 0.040-inch acrylic photopolymer.
 - b. Base Material:
 - 1) Interior Locations: "Jet 388" 0.120-inch phenolic base.
 - 2) Interior Locations: "Jet 388 EX" exterior grade photopolymer applied to a 0.120-inch phenolic base.
 - c. Colors: As selected by Architect from Manufacturer's full range.
7. Sign Text:
 - a. Copy: Copy must follow the dimensions and spacing indicated on the Design Drawings and/or approved copy patterns.
 - 1) Letter spacing must conform to standards shown and kerned optically to the acceptance of the Owner.
 - 2) Lines of copy must be straight and parallel to the sign format, unless otherwise specified.
 - 3) Edges of letters, numbers, and symbols must be smooth and continuous, with straight and curved portions reproducing the original forms exactly, with corners sharp and true.
 - 4) All form shall be free of ticks, line waiver, discontinuous curves and other imperfections.
 - b. Font: As selected by Architect.

2.03 ACCESSORIES

- A. Fasteners: Non-removable mechanical fasteners and anchors suitable for secure attachment to substrate and placed through predrilled holes as recommended in writing by the sign manufacturer.
- B. Adhesives: As furnished, required, recommended, approved or accepted by the sign manufacturer for a secure and permanent installation.
- C. Signs Mounted on Glass: Provide blanks on opposite side of glass, match sign.
- D. Other Accessories: Provide other accessories and similar secondary items, including and cleaning agents selected by the Contractor, as furnished, required, recommended, approved or accepted by the sign manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean substrate prior to the start of installation in order to remove dust, debris and loose particles

3.03 INSTALLATION

- A. General:
 - 1. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer-prepared instructions.
 - 2. Install signage systems level and plumb at the height indicated on the drawings.
 - 3. Install signs on walls adjacent to latch side of door where applicable.
 - a. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls.
 - b. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

3.04 CLEANING

- A. Cleaning Installed Work:
 - 1. Clean exposed metal surfaces of substances that might interfere with uniform oxidation and weathering.
 - 2. Leave work areas around Project site free of debris and related items after completion of the Work of this Section.

3.05 PROTECTION

- A. Protect installed signs in place against damage until Substantial Completion.
- B. Remove protection when no longer needed and prior to Substantial Completion.

END OF SECTION 101413

SECTION 101416 - DIMENSIONAL LETTER SIGNAGE

PART 1- GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Dimensional characters used for exterior building signage.
 - 2. Supplementary components and accessories necessary for a complete installation.

1.02 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate placement of anchorage devices with templates for installing signs.
 - 2. Provide heavy paper template to establish character spacing and to locate holes for fasteners.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports, and accessories.
 - 2. Provide message list, type styles, graphic elements and layout for each sign.
- C. Samples: Submit full size sample of each type of dimensional character (letter, number, and graphic element) in the texture, and sign material indicated.
- D. Warranty: Special warranty specified in this Section.

1.04 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which 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 deterioration of metal finishes beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 DIMENSIONAL CHARACTERS

- A. Description: Provide cutout characters with square-cut, smooth, eased edges. Comply with the following requirements:
- B. Products: As indicated on Drawings.
- C. Material: Stainless steel plate complying with ASTM A 666, annealed, Type 304 or Type 304L.
- D. Items must conform to the following:
 - 1. Thickness: 1/4 inch thick.
 - 2. Finish: No. 4 directional textured finish.
 - 3. Mounting: Projected with concealed non-corroding studs for substrates encountered.

4. Sign size, character size and spacing, and text/message: As indicated on the Drawings.

2.02 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
- B. Other Accessories: Provide other components, accessories and similar secondary items as furnished, required, recommended, approved or accepted by the sign manufacturer.

2.03 FABRICATION

- A. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
- B. Mill joints to tight, hairline fit.
- C. Preassemble signs in the shop to greatest extent possible.
 1. Disassemble signs only as necessary for shipping and handling limitations.
 2. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
- D. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.04 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: 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

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's instructions.
- B. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
- C. Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Mount characters at projection distance from wall surface indicated.

3.03 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101416

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 102113.17 - PHENOLIC CORE TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Solid phenolic core toilet compartments.
- B. Urinal screens.

1.02 RELATED SECTIONS

- A. Section 055000 - Metal Fabrications: Concealed steel support members.
- B. Section 102800 - Toilet, Bath, and Laundry Accessories.

1.03 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2009.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- C. Product Data: Provide data on panel construction, hardware, and accessories.
- D. Samples: Submit three samples of partition panels, 2 x 3 inch (50 by 76 mm) in size illustrating panel finish, color, and sheen.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 5.405.1 Regional materials. Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site, meeting the criteria listed in Section A5.405.1.
 - 4. 5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.
 - 5. 5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.
 - 6. 5.504.4.5 Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with CAL-Green Table 5.504.4.5 - Formaldehyde Limit requirements.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.08 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard 25 year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers:
 - 1. Bobrick Washroom Equipment, Inc.; SierraSeries 1090: www.bobrick.com.
- B. Other Acceptable Manufacturers:
 - 1. Global Steel Products Corp.: www.globalpartitions.com.
 - 2. Bradley Corp.: www.bradleycorp.com.
 - 3. Prior approved equal.

2.02 PERFORMANCE REQUIREMENTS

- A. Wheelchair accessible compartment shall comply with CBC Section 11B-604.8.1.
- B. Toe clearance for at least one side partition of a wheelchair accessible compartment shall comply with CBC Section and Figure 11B-604.8.1.4. It shall be 9 inches high minimum above the finish floor and 6 inches deep minimum beyond the compartment side face of the partition, exclusive of partition support members. It shall be 12 inches high minimum above the finish floor for children's use. Partition components at toe clearances shall be smooth without sharp edges or abrasive surfaces. Toe clearance at the side partition is not required in a compartment greater than 66 inches wide.
- C. An ambulatory accessible compartment shall be provided where there are six or more toilet compartments, or where the combination of urinals and water closets totals six or more per CBC Section 11B-213.3.1. Such compartment shall comply with CBC Section 11B-604.8.2.
- D. Door and door hardware for accessible compartments shall be self-closing and shall comply with CBC Section 11B-404 except that pull-side clearance for ambulatory accessible compartments shall be minimum 44" clear, rather than 60". CBC Figure 11B-604.8.2.
- E. A door pull complying with CBC Section 11B-404.2.7 shall be placed on both sides of the door near the latch.
- F. Doors shall not swing into clear floor space or clearance required for any fixtures.
- G. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with CAL-Green Table 5.504.4.5 - Formaldehyde Limit requirements.

2.03 COMPONENTS

- A. Toilet Compartments: Solid phenolic core panels, floor-mounted overhead-braced.
- B. Phenolic Core Doors, Panels, and Pilasters: Solid phenolic core with multiple resin-impregnated kraft, color, and melamine surface sheets fused at high temperature and pressure to form a homogeneous, non-delaminating panel, with colored/patterned faces and black edges; stain resistant to domestic chemicals and cleaners.
 - 1. Face Color: Formica; FR-6 Greystone.
- C. Door and Panel Dimensions:
 - 1. Thickness: 3/4 inch (19 mm).
 - 2. Thickness of Pilasters: 1-1/4 inch (32 mm).
- D. Urinal Screens: Wall mounted with continuous panel brackets.
 - 1. Minimum Size: 24 inches wide x 48 inches high, bottom edge positioned 12 inches above floor surface.

2.04 ACCESSORIES

- A. Wall and Pilaster Brackets: Polished stainless steel.
- B. Attachments, Screws, and Bolts: Stainless steel, tamper proof type.
 - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts; tamper proof.
- C. Hardware: Polished stainless steel:
 - 1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
 - 2. Nylon bearings.
 - 3. Latch: Concealed bolt or surface mounted, equipped with accessible slide bolt, combination strike/keeper with rubber bumper, and emergency operation feature mounted at 34 to 44 inches above floor.
 - 4. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
 - 5. Coat hook with rubber bumper; one per compartment, mounted on door.
 - 6. Provide door pull for outswinging doors.
 - 7. Fasteners: Pin-in- head Torx internally-threaded through-bolt fasteners.

2.05 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 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. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- C. Maintain 3/8 to 1/2 inch (9 to 13 mm) space between wall and panels and between wall and end pilasters.
- D. Attach panel brackets securely to walls using anchor devices.
- E. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- F. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
- G. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.
- H. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch (6 mm).
- B. Maximum Variation From Plumb: 1/8 inch (3 mm).

3.04 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch (5 mm).
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 102113.17

SECTION 102601 - MANUFACTURED WALL AND CORNER GUARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Corner guards.

1.02 RELATED REQUIREMENTS

- A. Section 077253 - Fall Restraint System.
- B. Section 055000 - Metal Fabrications: Anchors for attachment of work of this section, concealed in wall.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

1.06 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. Corner Guard Covers: Full-size, of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 8-foot- (2.4-m-) long units.
- B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.07 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- C. Provide each type of wall and corner guard accessory by same manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of plastic and other materials beyond normal use.
 - 2. Verify available warranties and warranty periods for units and components with manufacturers listed in Part 2 articles.
 - 3. Warranty Period: Five years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Metal Corner Guards - Surface Mounted: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition..
 - 1. Material: Stainless steel, Type 304.
 - a. Finish: Directional satin, No. 4.
 - 2. Size: 1-1/2 by 1-1/2 inches by 14 gauge.
 - 3. Height: Full height of wall to ceiling.
 - 4. Corner: Square.
 - 5. Mounting: Adhesive.
 - 6. Length: One piece.
 - 7. Basis of Design Manufacturer:
 - a. IPC Door and Wall Protection Systems; Surface Mount Stainless Steel Corner Guard: www.inprocorp.com.
 - b. Prior approved equal.
 - c. Other Acceptable Manufacturer:
 - 1) Babcock-Davis: www.babcockdavis.com.
 - 2) Construction Specialties, Inc.: www.c-sgroup.com.
 - 3) Korogard Wall Protection Systems; a division of RJF International Corporation; www.korogard.com
 - 4) Wallguard; www.wallguard.com
 - 5) Prior approved equal.

2.02 ACCESSORIES

- A. Primers and Adhesives:
 - 1. Materials required by wall protection product manufacturer for particular product and substrate moisture content and condition.
 - a. Adhesive: Field applied heavy duty adhesive.
 - b. Product:
 - 1) IPC Door and Wall Protection Systems; PL Premium Heavy Duty Adhesive.
 - 2. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
 - a. Current requirement refers to the date on which the materials are installed in the building.
 - b. A copy of SCAQMD Rule #1168 is included in section 018114 that was current as of the date of this specification. Refer to www.aqmd.gov/rules for the actual current version of the rule that will be applicable at the date of installation during construction.
 - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material

2.03 FABRICATION

- A. Pre-drill holes for attachment.

2.04 METAL FINISHES

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

2.05 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of work.
- B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.

1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - C. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.
 - D. Verify that field measurements are as indicated on drawings.
 - E. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.02 PREPARATION
- A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
 - B. Before installation, clean substrate to remove dust, debris, and loose particles.
- 3.03 INSTALLATION
- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.
 1. Location: Locate as indicated on Drawings.
 - B. General: Locate the corner guard as indicated on the approved detail drawing for appropriate substrate and in compliance with the manufacturer's installation instructions. Install corner guard level and plumb at the height indicated on the drawings.
 1. Surface must be dry, clean and properly sealed.
 2. Adhesive Installation: Apply a bead of adhesive in a zigzag pattern over the back of each wing of the corner guard. Position corner guard on wall and apply pressure until a tight fit is achieved.
- 3.04 TOLERANCES
- A. Maximum Variation From Required Height: 1/4 inch (6 mm).
 - B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch (6 mm).
- 3.05 CLEANING
- A. Remove the protective plastic covering from the exposed surface of the corner guard.
 - B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102601

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Accessories for toilet rooms and utility rooms.
- B. Utility room accessories.
- C. Grab bars.

1.02 RELATED REQUIREMENTS

- A. Section 061053 - Miscellaneous Rough Carpentry: Wood blocking and backing.
- B. Section 092116 - Gypsum Board Assemblies: Metal backing.

1.03 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; 2009.
- D. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015.
- E. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.
- F. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2011.
- G. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).
- I. ASTM F446 - Standard Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area; 1985 (Reapproved 2009).

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate locations of accessories with other work to avoid interference, and to assure proper operation and servicing of accessory units.
 - 2. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.05 SUBMITTALS

- A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

- B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

1.06 QUALITY ASSURANCE

- A. Provide accessories by the same manufacturer for each type of accessory unit, and for units exposed in the same areas, to ensure matching of finishes.
- B. Comply with ASTM F446 for grab bars and accessories, anchorage, test methods, and performance.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver accessories to site until rooms in which they are to be installed are ready to receive them.
- B. Pack accessories individually in a manner to protect accessory and its finish.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Elements of Sanitary facilities shall be mounted at locations in compliance with CBC Sections 118-602 through 118-612.
- B. Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges. The space around the grab bars shall be as follows:
 - 1. 1-1/2 inches between the grab bar and the wall.
 - 2. 1-1/2 inches minimum between the grab bar and projecting objects below and at the ends. 12 inch minimum between the grab bar and projecting objects above.
- C. 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.

2.02 MATERIALS

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
 - 1. Grind welded joints smooth.
 - 2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.
- B. Keys: Provide two keys for each accessory to Owner.
- C. Stainless Steel Sheet: ASTM A666, Type 304.
- D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- E. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.
- F. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.03 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.
- C. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 TOILET ROOM ACCESSORIES

- A. Refer to Drawings for selected products.

2.05 UNDERLAVATORY GUARDS

- A. Underlavatory Guard:
 - 1. Plumberex Specialty Products, Inc.; Trap Gear.
 - 2. Truebro by IPS Corporation; Lav Guard 2 E-Z.
 - 3. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
 - 4. Material and Finish: Antimicrobial, molded plastic, white.

2.06 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch (1.3 mm) thick stainless steel, Type 304, with 1/2 inch (12 mm) returned edges, 0.06 inch (1.6 mm) steel wall brackets.
 - 1. Drying Rod: Stainless steel, 1/4 inch (6 mm) diameter.
 - 2. Hooks: 3, 0.06 inch (1.6 mm) stainless steel rag hooks at shelf front.
 - 3. Mop/Broom Holders: 4 spring-loaded rubber cam holders at shelf front.
 - 4. Length: 36 inches (900 mm).
 - 5. Length: Manufacturer's standard length for number of holders/hooks.
 - 6. Product: B-224 manufactured by Bobrick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on Drawings.

3.02 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.
- C. Before starting work notify Architect in writing of any conflicts detrimental to installation or operation of units.

- D. Verify with Architect exact locations of accessories.

3.03 INSTALLATION

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated on Drawings.
- D. Use concealed fasteners wherever possible.
- E. Where exposed mounting devices and fasteners are necessary, provide such devices finished to match accessory; use security type fasteners for all exposed accessory mountings.
- F. Unless otherwise indicated, align accessory units with adjacent fixtures and other elements within the same area. Conform to ANSI/ICC A117.1 for positions and mounting heights.

3.04 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.
- B. Protect adjacent or adjoining finished surfaces and work from damage during installation of work of this Section.
- C. Protect exposed accessory finishes from damage until final acceptance of the Work.

3.05 CLEANING AND ADJUSTMENT

- A. Clean and polish all exposed surfaces after installation, and after removal of labels and protective coatings or coverings.
- B. Test and adjust accessories for proper and smooth operation.

END OF SECTION 102800

SECTION 104116 - EMERGENCY ACCESS KEY BOXES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Fire department emergency access key boxes.

1.02 SYSTEM DESCRIPTION

- A. Emergency Access Key Boxes: High security key-locked vaults approved by Fire Department, sized and configured to house entrance keys to designated spaces and rooms, and accessed by single master key controlled by Fire Department to provide rapid emergency access to those designated spaces and rooms.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Conference: Before starting emergency access key box installation, conduct conference at Project site.
 - 1. Meet with Owner, Architect, and Fire Marshal.
 - 2. Agenda: Review products, installation procedures and coordination with related work. Coordinate location of emergency access key box with Fire Marshal.

PART 2 PRODUCTS

2.01 EMERGENCY ACCESS KEY BOXES

- A. Emergency Access Key Boxes: Heavy duty steel case with hinged door for recessed mounting.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Knox-Box 3200 Series Hinged Door.
 - a. Prior approved equal.
 - 2. Mounting: Recessed.
 - 3. Case: 1/4 inch thick welded steel plate; 30 cubic inch capacity capable of holding up to 10 keys and access cards.
 - 4. Size: 7 inches wide by 7 inches high by 3 inches deep.
 - 5. Recessed Mount Flange: Steel face flange secured to case; 7 inches wide x 7 inches high.
 - 6. Door: 1/2 inch thick solid plate steel with interior gasket seal and stainless steel hinge; 1/8 inch thick stainless steel lock cover with hole for tamper proof seal.
 - 7. Lock: Double-action rotating tumblers and hardened steel pins access by biased cut key; keyed to Fire Department master key.
 - 8. Finish: Manufacturer's Knox-Coat proprietary finishing process; color to match adjacent wall finish.

2.02 ACCESSORIES

- A. Recessed Mounting Kit: Provide manufacturer's standard shell housing and mounting hardware for casting into concrete or setting into masonry construction.
- B. Fasteners: Grade 5 zinc plated steel carriage screws with nuts; fabricated from quenched and tempered steel with minimum 120,000 psi tensile strength; coarse thread; thread

length at least 2 times screw diameter plus 1/4 inch; 3/8 inch diameter by lengths sufficient to secure emergency access key box to backing plates at recessed locations and through wall at surface mounted locations.

- C. Sealant: As specified in Section 079200 - Joint Sealants.

2.03 FABRICATION

- A. Form emergency access key boxes to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of emergency access key boxes to preclude binding, warping, or misalignment.
- B. Preassemble emergency access key boxes in shop to greatest extent possible to minimize field assembly.
- C. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
- D. Drill or punch holes required for fasteners and remove burrs. Use security fasteners where fasteners are exposed. If used, seal external rivets before finishing.
- E. Weld in concealed locations to greatest extent possible without distorting or discoloring exposed surfaces. Remove weld spatter and welding oxides from exposed surfaces.
- F. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

2.04 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" 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.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer and fire marshal present, for compliance with requirements for roughing-in openings, clearances, and other conditions affecting performance of the Work.
- B. Examine walls and other adjacent construction for suitable conditions before installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install emergency access key box in accordance with Fire Department requirements and with manufacturer's instructions and recommendations.
- B. Install emergency access key boxes level and plumb, according to manufacturer's written instructions.
 - 1. Install recess mounted emergency access key boxes flush in non-rated framed construction. Install surface mounted emergency access key boxes in fire-rated framed construction, concrete construction and masonry construction.
 - 2. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturer.
 - 3. Where aluminum contacts grout, concrete, masonry, or wood, protect against corrosion by painting contact surfaces with bituminous coating.
- C. Emergency Access Key Boxes: Install emergency access key boxes with centerline not more than 48 inches above finished floor.

3.03 FIELD QUALITY CONTROL

- A. Examine and test emergency access key boxes.

3.04 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as emergency access key boxes are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust doors, hardware, and moving parts to function smoothly, and lubricate as recommended by manufacturer. Verify that integral locking devices operate properly.
- C. Touch up marred finishes or replace emergency access key boxes that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by in-wall payment drop box manufacturer.
- D. Replace emergency access key boxes that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. On completion of emergency access key boxes installation, clean interior and exterior surfaces as recommended by manufacturer.

END OF SECTION 104116

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 104400 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 092116 - Gypsum Board Assemblies: Roughed-in wall openings.

1.03 REFERENCE STANDARDS

- A. Title 19 CCR, Chapter 3 - Standard for Portable Fire Extinguishers.
- B. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- C. Product Data: Provide extinguisher operational features.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

1.05 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 and other recessed and in wall items of potential conflict.

1.06 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Fabricate and label fire extinguishers to comply with Title 19 CCR, Chapter 3, "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.
- C. Provide fire extinguisher and cabinet from the same manufacturer.

2.02 FIRE EXTINGUISHER CABINETS

- A. Fire Extinguisher Cabinets must comply with CBC Sections 11B-307, 11B-308, 11B-309 and 11B-403.
- B. Fire Extinguisher Cabinets (FEC-1):
1. Basis of Design Product:
 - a. JL Industries, Inc.; Cosmopolitan 1730S21: www.jlindustries.com.
 - b. Other Acceptable Product:
 - 1) Larsen's Manufacturing Co: www.larsensmfg.com.
 - 2) Potter-Roemer: www.potterroemer.com.
 - 3) Prior approved equal.
 2. Fire Rating: Non-rated.
 3. Cabinet Type: SemiRecessed.
 4. Cabinet Material: Steel
 5. Cabinet Trim Material: Stainless steel sheet.
 6. Door Material: Steel sheet.
 7. Door Style: Solid flush panel with frame, square edge.
 8. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - a. Provide piano hinge permitting door to open 180 degrees.
 9. Accessories:
 - a. 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.
 - b. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - 1) Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER", on cabinet door, red text, vertical alignment.
 - (a) Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
- C. Fire Extinguisher Cabinets (FEC-2):
1. Basis of Design Product:
 - a. JL Industries, Inc; Cosmopolitan 1035S21: www.jlindustries.com.
 - b. Other Acceptable Product:
 - 1) Larsen's Manufacturing Co: www.larsensmfg.com.
 - 2) Potter-Roemer: www.potterroemer.com.
 - 3) Prior approved equal.
 2. Fire Rating: Fire-rated.
 3. Cabinet Type: Recessed.
 4. Cabinet Material: Steel
 5. Recessed Cabinet:
 - a. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as drywall bead.
 6. Cabinet Trim Material: Steel sheet.
 7. Door Material: Stainless steel sheet.

8. Door Style: Solid flush panel with frame, square edge.
9. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - a. Provide piano hinge permitting door to open 180 degrees.
10. Accessories:
 - a. 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.
 - b. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - 1) Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER", on cabinet door, red text, vertical alignment.
 - (a) Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.

2.03 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of Title 19 CCR, Chapter 3 and applicable codes, whichever is more stringent.
 1. Provide extinguishers labeled by UL for the purpose specified and indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage, with monoammonium phosphate-based dry chemical in enameled-steel container.
 1. Stored Pressure Operated: Deep Drawn.
 2. Class: 2-A:10-B:C.
 3. Size: 5 pound (2.27 kg).
 4. Finish: Baked polyester powder coat, red color.

2.04 MATERIALS:

- A. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 1. Finish: Baked enamel or powder coat.
 2. Color: White.
- B. Stainless Steel: ASTM A 666, Type 304.
 1. Finish: No. 4 directional satin finish.
- C. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.

2.05 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. Provide factory-drilled mounting holes.
 3. Install door locks at factory.
- 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 of one-piece construction with edges flanged.
 2. Miter and weld perimeter door frames.

- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

3.02 PREPARATION

- A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings as indicated on Drawings.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

3.04 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 104400

SECTION 107113 - EXTERIOR SUN CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fixed sun control devices for exterior applications.

1.02 RELATED REQUIREMENTS

- A. Section 084313 - Aluminum-Framed Storefronts: Mounting substrates.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing all profiles, sections of all components, finishes, fastening details, and manufacturer's technical and descriptive data. Include field dimensions of openings and elevations on shop drawings.
- D. Samples: Submit two samples, 12 inch (304.8 mm) long illustrating louver or slat materials and finish or color.
- E. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Specimen Warranty: Furnish a copy of manufacturer's standard warranty.
- G. Installer Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with no less than five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section.
 - 1. With minimum five years of documented experience.

1.06 ~~MOCK-UP~~

- A. ~~Mock-up: Full size by 3 feet long including two outriggers and mounting brackets.~~
 - 1. ~~Obtain Architect's approval before proceeding with installation of remaining work.~~

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site ready for erection.
- B. Package using methods that prevent damage during shipping and storage on site.
- C. Store materials under cover and elevated above grade.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Sun Control Devices: Correct defective work within a five year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's five year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sun Control Louvers:
 - 1. Basis of Design Manufacturers:
 - a. Arcadia, Inc.; Brise Soleil Design Series: www.arcadiainc.com.
 - b. Prior approved equal.
 - c. Substitutions: See Section 016000 - Product Requirements.
 - d. Other Acceptable Manufacturers:
 - 1) Kawneer Company Inc.: www.kawneer.com.
 - 2) Prior approved equal.

2.02 SUN CONTROL LOUVERS

- A. Description: Non-retractable, factory-finished rack arm assembly with operable louver tilt function; size and configuration as indicated on drawings.
- B. Description: Non-retractable, outrigger assembly with fixed blades; size and configuration as indicated on drawings.
- C. Sun Control Louver Type SF-5 Vertical.
 - 1. Outrigger: Square, length as indicated on Drawings.
 - 2. Blades: Aluminum, Solid panel.
 - 3. Mounting Brackets: Fixed, aluminum angle that attach to window wall system. or storefront framing.
 - 4. Finish/Color:
 - a. Louvers: Match storefront framing.
 - 5. Product: Arcadia, Inc; BSD011.
- D. Sun Control Louver Type SF-6 Horizontal.
 - 1. Outrigger: , length as indicated on Drawings.
 - 2. Blades: Aluminum, solid, bullnose.
 - 3. Mounting Brackets: Fixed, with aluminum angles that attach rack arm extrusion directly to building structure or storefront framing.
 - 4. Finish/Color:

- a. Louvers: Match storefront framing.
- 5. Product: Arcadia, Inc; BSD009.

2.03 MATERIALS

- A. Aluminum Extrusions: Not less than 0.070 inch wall thickness and complying with ASTM B 221: 6063-T6, 6105-T5, or 6061-T6 alloy and temper.
- B. Thermal Barrier: When applied on a thermally broken captured system, sunshade shall be thermally isolated from the interior aluminum mullions by a nominal 0.25" thick low conductance material.
- C. Sheet Aluminum: ASTM B209 (ASTM B209M).

2.04 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are 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. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Sunshade: Fabricate components for assembly following approved shop drawings and/or manufacturer's standard installation instructions.

2.05 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick.
 - 1. ~~Finish Color: Dark bronze.~~
- B. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
 - 1. ~~Color: Match storefront framing.~~
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and site area for conditions that might prevent satisfactory installation.
- B. Do not install until after adjacent painting, roofing and masonry work has been completed.
- C. Do not proceed with installation until related conditions are satisfactory.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Set units level, plumb, with uniform joints, and aligned with building elements.

- C. Do not install damaged components.
- D. Fit joints to produce hairline joints free of burrs and distortion.
- E. Rigidly secure non-movement joints.
- F. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
- G. Seal joints watertight where shown on approved shop drawings and/or manufacturer's standard installation instructions.
- H. Separate dissimilar metals using concealed bituminous paint or non-absorbent gasket.
- I. Anchor units to structure as indicated on the drawings.

3.03 TOLERANCES

- A. Maximum Variation from Level: Plus/minus 1/8 inch (3.175 mm).

3.04 CLEANING

- A. After Substantial Completion clean exterior surfaces units of dust and debris; follow manufacturer's cleaning instructions for the finish used.

3.05 PROTECTION

- A. Protect units after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION 107113

SECTION 107113.43 - FIXED SUN SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Modular, shop fabricated, extruded aluminum sun screens.
- B. Attachment hardware.

1.02 RELATED REQUIREMENTS

- A. Section 055000 - Metal Fabrications.
- B. Section 084313 - Aluminum-Framed Storefronts: Mounting substrates.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; American Society of Civil Engineers; 2011.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2010 (Reapproved 2015).
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate installation of sun control devices with Section 092400.
- B. Preinstallation Meeting: Convene one week before starting work of this Section.
 - 1. Convene under general provisions of Section 017000.
 - 2. Require attendance of sunshade manufacturer, installer, and other affected trades. Prior to fabrication, determine if the specified devices can be fabricated from "guaranteed dimensions" provided by Contractor, or if field dimensions taken by the installer will be applicable.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing all profiles, sections of all components, finishes, fastening details, and manufacturer's technical and descriptive data. Include field dimensions of openings and elevations on shop drawings.
- C. Samples: 10 inches (254 mm) by 10 inches (254 mm) minimum illustrating design, workmanship and finish color.
- D. Sample of Louver: For review of shape only.

1.06 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. 4.504.2.2 and 5.504.4.3 Paints and coatings.
 - 3. 4.504.2.3 and 5.504.4.3.1 Aerosol paints and coatings.
 - 4. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section, with no less than five years of documented experience.
 - 1. Provide sunshades manufactured by a single manufacturer.
- B. Installer Qualifications: Company specializing in performing the work of this Section.
 - 1. With minimum five years of documented experience.
 - 2. Approved by manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site ready for erection.
- B. Package using methods that prevent damage during shipping and storage on site.
 - 1. Protect finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings which bond to aluminum when exposed to sunlight or weather.
- C. Store materials under cover and elevated above grade.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Sun Screens: Correct defective work within a one year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's 20 years warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturer:
 - 1. Construction Specialties, Inc.: www.c-sgroup.com.
 - a. Type SS-1 Sun Control Device - Model: Aluminum sunshade system.
 - 1) Blade Style: 8 inch airfoil outer blade, 4 inch airfoil intermediate blades.
 - 2) Outrigger: Aluminum plate with outer end coped to match blade.
 - 3) Spacing: As indicated on Drawings.
 - 4) Configuration: As indicated on Drawings.

2.02 SUN SCREENS

- A. Sun Screens: Shop fabricated, shop finished, extruded aluminum outriggers, louvers, and fascia, free of defects impairing strength, durability or appearance.
 - 1. Configuration: As indicated on Drawings.
 - 2. Blade Type: Airfoil.
 - a. Material: Aluminum 8 inch, factory assembled to outriggers using stainless steel, type F, thread cutting screws through internal screw slots in blades.
 - b. Blades: Set at a 45 degree angle, and spaced per the contract documents details.
 - 3. Continuous formed aluminum trim cap to be provided and cover tops of aluminum angle outrigger and steel beam.
 - 4. Trellis Outriggers: Formed angles which when installed will rest on steel framing. Thickness determined by engineering and meet local codes requirements, but not be less than 3/16 inch.
 - 5. Design Criteria: Design and fabricate to resist the following loads without failure, damage, or permanent deflection.
 - a. Design Wind and Snow Loads: Comply with requirements of ASCE 7.
 - b. Thermal Movement: Plus/minus 1/8 inch (3.175 mm), maximum.
 - 6. Sizes: As indicated on Drawings.
 - 7. Exposed Aluminum Finish: Superior performing organic coatings.
 - 8. Provide a complete system ready for erection at project site.
 - 9. Shop fabricate to the greatest extent possible; disassemble if necessary for shipping.

2.03 MATERIALS

- A. Components: Fascia, blades and outrigger components 6063-T6 aluminum alloy.
- B. Aluminum Extrusions: ASTM B211, Alloy 6063-T5.
- C. Aluminum Coated Steel Sheet: ASTM A792/A792M.
- D. Mounting Hardware: 304 stainless steel, sunshade to steel framing designed and provided by sunshade manufacturer.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

2.04 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Exterior Aluminum Components: Type 304 stainless-steel fasteners.
 - 2. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
- 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 components and for attaching railings to other work unless otherwise indicated.
 - 1. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.

2.05 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by continuous welds.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Miter exposed joints.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- G. Weld in accord with AWS D1.1 for materials being welded.
- H. Ease exposed edges to a minimum, uniform radius of 1/32 inch.
- I. Fit and shop assemble sections in largest sizes practical for site delivery.
- J. Fabricate work to exclude rain and condensate or provide weep holes to divert water to the exterior.
- K. Form break metal corners to the smallest radius possible without distressing the finish surface.
- L. Cut, drill, punch, tap, reinforce and provide anchors to accommodate adjoining work and hardware.
- M. Provide anchors, bolts, rough hardware, fasteners and accessories required to incorporate and secure fabrications and to make the units functionally operational.
- N. Use countersunk, flat head screws and bolts at exposed joints requiring mechanical fasteners.
- O. At exposed work, use materials which are smooth, free of surface blemishes, pitting, seam marks, roller marks, trade names and roughness.

2.06 FINISHES - ALUMINUM

- A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates and site area for conditions that might prevent satisfactory installation.
- B. Verify that dimensions of supporting structure are within plus/minus 1/8 inch (3.175 mm) of dimensions indicated on shop drawings.
- C. Verify that all adjacent painting, roofing, masonry work, and other work that might damage sun screen finish has been completed prior to installation of sun screens.

- D. Do not install until after all adjacent painting, roofing and masonry have been completed.
- E. Do not proceed with installation until all conditions are satisfactory.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Set units level, plumb, with uniform joints, and aligned with building elements.
- C. Separate dissimilar metals using concealed bituminous paint or non-absorbent gasket.
- D. Anchor units to structure as indicated on drawings.
- E. Do not cut or trim aluminum members without approval of manufacturer; do not install damaged members.
- F. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.03 CLEANING

- A. Clean exterior surfaces units of dust and debris; follow manufacturer's cleaning instructions for the finish used.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- D. Remove excess sealant by method acceptable to sealant manufacturer.
- E. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.04 PROTECTION

- A. Protect units after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION 107113.43

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 122420 - ROLLER SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manually operated shades.

1.02 REFERENCE STANDARDS

- A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2009.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate roller shade system installation with size, location and installation of service utilities.
- B. Scheduling:
 - 1. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
 - 2. Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.04 SUBMITTALS

- A. Refer to Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.
 - 1. Location of controls.
 - 2. Detail drawings of special accessory components not included in manufacturer's product data.
 - 3. Detail drawings of head, jamb, and sill conditions for each type of opening and supporting structure, and conditions between adjacent shade units.
- D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.
- E. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shade cloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

1. Submit three 36 inch square samples of shade material in specified material, pattern, and color, indicating variations in color, weave, and texture.
 2. Submit three 6 inch samples of fascia aluminum material in specified color and finish indicating variation in color and finish.
- F. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.
- G. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Single Source Responsibility:
1. Furnish shade units from one manufacturer for entire Project, unless otherwise acceptable to Architect.
 2. Provide each shade as complete unit, including hardware, mounting brackets, fasteners, and accessory items.
- B. Regulatory Requirements: Ensure fabrics and plastic components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke development indices.
- C. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of 10 years experience in manufacturing products comparable to those specified in this Section.
- D. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of 5 years experience in installing products comparable to those specified in this Section.

1.06 ~~MOCK-UP~~

- A. ~~Comply with general mock-up requirements specified in Section 014000.~~
- B. ~~Mock-up: Provide a mock-up of one roller shade assembly for evaluation of mounting, appearance and accessories.~~
1. ~~Locate where directed.~~
 2. ~~Mock-up may remain as part of the Work.~~

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the window treatment schedule.
- B. Store shades in clean, dry area, laid flat and off ground to prevent sagging, twisting, or warping.
- C. Safeguard against damage by physical abuse or damage from harmful materials.

1.08 WARRANTY

- A. Refer to Section 017800 - Closeout Submittals, for additional warranty requirements.

- B. Roller Shade Hardware, Chain and Shadecloth: Manufacturer's standard non-depreciating twenty-five year limited warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Refer to Finish Schedule for selected products.
- B. Basis of Design Manufacturer(s):
 - 1. MechoShade Systems, Inc.
 - 2. Other Acceptable Manufacturer:
 - a. Draper Inc.
 - b. Prior approved equal.

2.02 APPLICATIONS

- A. Shade Type WT-1: Manual operating, chain drive, sunscreen roller shades in exterior windows of rooms and spaces as indicated on the Drawings.

2.03 SYSTEM REQUIREMENTS

- A. Anti-Microbial Characteristics: 'No Growth' according to ASTM G21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

2.04 SHADE CLOTH

- A. Visually Transparent Single-Fabric Shadecloth:
 - 1. Openess: 3 percent.
 - 2. Color: Slate 6016.

2.05 SHADE BAND

- A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
- B. Hem Pockets and Hem Weights: Provide fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Provide hem weights of appropriate size and weight for shade bands. Provide continuous hem weights inside a sealed hem pockets. Provide similar hem pocket construction and hem weights for all shades within one room or area.
- C. Shade Band and Shade Roller Attachment:
 - 1. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades, and less than 2.55 inch (64.77 mm) for motorized shades are not acceptable.
 - 2. Provide for positive mechanical engagement with drive/brake mechanism.
 - 3. Provide for positive mechanical attachment of shade band to roller tube. Provide for removable shade band with a snap-on/snap-off spline mounting, without having to remove shade roller from shade brackets.
 - 4. Mounting Spline: Use of adhesives, adhesive tapes, staples, or rivets is prohibited.

2.06 COMPONENTS

- A. Access and Material Requirements:
1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening, and without requiring end or center supports to be removed.
 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive, or operating support brackets.
- B. Manual Operated Chain Drive Hardware and Brackets:
1. Provide for universal, regular, and offset drive capacity allowing drive chain to fall at front, rear, or non-offset for all shade drive end brackets. Provide adjustable universal offsets.
 2. Provide shade hardware system that allows for removable regular and reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners.
 3. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not permitted.
 4. Provide shade hardware constructed of minimum 1/8 inch (3 mm) thick plated steel, or as required to support 150 percent of the full weight of each shade.
 5. Drive Bracket/Brake Assembly:
 - a. Fully integrate specified manufacturer's model M5 with all system accessories, including, fascia, room darkening side and sill channels, center supports and connectors for multi-banded shades.
 - b. Provide rotating model drive sprocket and brake assembly; supported on a welded 3/8 inch (9.5 mm) steel pin.
 - c. Brake: Over-running clutch design which disengages to 90 percent during the raising and lowering of a shade; designed to withstand a pull force of 50 lb (22 kg) in the stopped position.
 - d. Braking Mechanism: Designed to assure smooth operation in raising and lowering the shades; permanently lubricated. Products that require externally applied lubrication, or are not permanently lubricated are not permitted.
 - e. Mount entire assembly on steel support bracket, fully independent of the shade tube assembly. Design assembly so that it can be removed and reinstalled without effecting the roller shade limit adjustments.
- C. Drive Chain: No.10 qualified stainless steel chain rated to 90 lb (41 kg) minimum breaking strength. Nickel plate chain is not permitted.

2.07 SHADE BAND FABRICATION

- A. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
1. Concealed hemtube.
- B. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Assure width-to-height (W:H) ratios do not exceed

manufacturer's standards. Fabricate battens of roll-formed stainless steel or tempered steel, as required by manufacturer.

- C. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment. Locate seams symmetrically, or on shade unit centerlines; similarly located in each room or area. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards.
- D. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards.
- E. Provide blackout shadebands, when used in side channels, with horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Conceal battens in integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.
 - 1. Battens: Roll-formed of stainless steel or tempered steel; concave to match the contour of the roller tube.
 - 2. Batten Pockets: Self-colored fabric front and back, RF-welded into shadecloth. Provide self-color opaque liner front and back to eliminate Refer to through of batten pocket; liner not to exceed 1-1/2 inches (38 mm) high; totally opaque.

2.08 ACCESSORIES

- A. Roller Shade Pocket: For recessed mounting in acoustical tile, or gypsum board ceilings.
 - 1. Provide extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.

2.09 FABRICATION

- A. Prior to fabrication, field measure actual opening dimensions to ensure proper fit.
- B. Fabricate units for pocket mounting to completely fill openings from head to 1-3/4 inch below glass sight line at sill and from centerline to centerline of mullions. On single windows and at sides of end windows, allow for 1-3/4 inch overlap beyond glass sight line at jambs.
- C. Fabricate shades in longest possible lengths. Locate ends of adjacent shade units at window mullions or other defined vertical separations where single length shades are not practical.
- D. Fabricate roller tube with controls capable of being located at either end of tube.
- E. Fabricate shade fabric with top edge attached to removable spline designed to lock into roller tube. Fabricate bottom edge with concealed bottom bar sewn in hem. Hem, heat-set or otherwise treat edges of fabric to prevent raveling.
- F. Adjust limit controls to allow infinite positioning of shades from fully closed to fully open.
- G. Locate operating controls on right end of each shade as determined and indicated on shop drawings.

- H. Fabricate recessed ceiling pocket to hang above ceiling with face of shade opening slot aligned flush with ceiling grid. Provide perimeter trim to frame opening through ceiling. Install separate support members to suspend shade assembly independent of ceiling system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that openings in which shades will be installed are free of conditions that might interfere with shade installation or operation.
- C. Notify Contractor of unsatisfactory conditions before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer.

3.03 INSTALLATION

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Install shades with adequate clearance to permit smooth operation of shades and sash operators.
- C. Except at black out shades, maintain 1/4 inch clearance from each side of window openings on inside mounting conditions and 1/4 inch between adjacent shade units unless other clearance is indicated on approved shop drawings.
- D. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- E. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

3.04 CLEANING

- A. Wipe surfaces with clean damp cloth as recommended by manufacturer. Do not use steam, hot water, bleach, or abrasive or solvent based cleaners.

3.05 PROTECTION

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

3.06 CLOSEOUT ACTIVITIES

- A. Engage installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

END OF SECTION 122420

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 123600 - COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops for architectural cabinet work.

1.02 RELATED REQUIREMENTS

- A. Section 018114 - Sustainable Design Requirements - CAL-Green.
- B. Section 064116 - Plastic-Laminate-Faced Architectural Cabinets
- C. Division 22 - Plumbing: Sinks

1.03 REFERENCE STANDARDS

- A. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards; 2014.
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0; 2016.
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.
- F. WI (CCP) - Certified Compliance Program (CCP); current edition at www.woodworkinstitute.com/certification.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.
- D. Verification Samples: For each finish product specified, provide 3 samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installation Instructions: Manufacturer's installation instructions and recommendations.
- G. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.
 - 2. A5.405.1: Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site.
 - 3. A5.406.1, .2 and .3: Materials selected for longevity, reduced maintenance and recyclability.
 - 4. A5.405.4 Recycled content materials, equivalent in performance to virgin materials. Provide cost documentation showing value of recycled content using A5.405.02.

1.06 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. Shop is a licensee of WI's Certified Compliance Program.
- B. Fabricator Qualifications: Same fabricator as for cabinets on which tops are to be installed.
- C. Quality Certification:
 - 1. Provide labels or certificates indicating that the installed work complies with AWI/AWMA/WI (AWS) or AWMA/WI (NAAWS) requirements for grade or grades specified.
 - 2. Provide designated labels on shop drawings as required by certification program.
 - 3. Provide designated labels on installed products as required by certification program.
 - 4. Arrange and pay for inspections required for certification.
 - 5. Replace, repair, or rework all work for which certification is refused.
- D. Installer Qualifications: Fabricator of products and Licensee of WI's Certified Compliance Program.
- E. Fabrication and Installation Standards: Fabricate and install in accordance with Architectural Woodwork Standards, Edition 1 as listed below.
 - 1. Countertops: AWS Section 11.
- F. Woodwork Institute (WI) Certification:
 - 1. Millwork, casework and cabinetwork shall be manufactured in accordance with standards established in the Architectural Woodwork Standards, Latest Edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada, in grade or grades herein specified or as shown on Drawings.
 - 2. Before delivery to jobsite, woodwork supplier shall submit Woodwork Institute Certified Compliance Certificate indicating millwork products being supplied and certifying that products fully meet the requirements of Grade or Grades specified.
 - 3. At completion of installation, woodwork installer shall provide Woodwork Institute Certified Compliance Certificate indicating the products installed, and Certifying that the installation of these products fully meets the requirements of the Grade or Grades specified.

4. All fees charged by the Woodwork Institute for their Certified Compliance program are responsibility of millwork manufacturer and/or installer and shall be included in their bid.
5. The foregoing shall not be construed to limit power and authority of Owner to reject any millwork which does not in Owner's opinion meet with any one or more of the specifications of this Contract.

1.07 ~~MOCKUPS~~

- A. ~~Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.~~
 1. ~~Build mockups of typical countertops as indicated on Drawings.~~

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.09 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops 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. During and after installation of countertops, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.
- C. Field Measurements: Where countertops 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, and indicate measurements on Shop Drawings.

PART 2 PRODUCTS

2.01 COUNTERTOPS

- A. Refer to Finish Schedule for selected products.
- B. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS).
- C. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
 1. Laminate Sheet: NEMA LD 3, Grade HGS, 0.048 inch (1.2 mm) nominal thickness.
 - a. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
 - b. NSF approved for food contact.
 - c. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
 2. Edge Treatment: As indicated on Drawings.

3. Back and End Splashes: Same material, same construction.
 4. Fabricate in accordance with AWI/AWMAC/WI (AWS), Section 11 - Countertops, Custom Grade.
- D. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.
1. Configuration: Provide countertops with the following front and backsplash style:
 - a. Front: Straight, slightly eased at top.
 - b. Backsplash: Straight, slightly eased at corner.
 - c. Countertops: Quartz agglomerate with front edge built up with same material.
 2. Thickness: As indicated on Drawings.
 3. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - a. Fabricate with loose backsplashes for field assembly.
 4. Products:
 - a. SS-10: Caesarstone; 4001 Fresh Concrete, 3 cm thick.
 - b. SS-11: Pental Quartz; BS124P Costal Gray, 3/4 inch thick.
 - c. DalTile: One Quartz Surfaces; NQ29 Mango Grove, 3/4 inch thick.

2.02 ACCESSORY MATERIALS

- A. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
1. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 2. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
 3. Softwood Plywood: DOC PS 1.
- B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
1. Adhesives shall have a VOC content of 70 g/L or less
 2. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 3. Adhesives shall meet VOC and chemical component limits of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 and CAL-Green Table 5.504.4.1 Adhesive VOC Limit requirements.
- C. Joint Sealant: As specified in Section 079200 - Joint Sealants.

2.03 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
1. Join lengths of tops using best method recommended by manufacturer.
 2. Fabricate to overhang fronts and ends of cabinets as indicated on Drawings.

3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
- B. Provide back splash wherever counter edge abuts vertical surface unless otherwise indicated.
 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
 2. Height and Location: As indicated on Drawings.
- C. Quartz Agglomerate: Fabricate tops up to 144 inches (3657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
 1. Miter corners, polished finish.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 1. Install backsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 2. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- C. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch (16 mm).
- D. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.

- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.
- C. Field Joints: 1/8 inch (3 mm) wide, maximum.

3.05 CLEANING

- A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

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

END OF SECTION 123600

SECTION 124813 - ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Extruded aluminum entrance floor grilles.

1.02 SUBMITTALS

- A. Refer to Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data indicating properties of walk-off surface, component dimensions.
- C. Shop Drawings: Indicate dimensions and details for recessed frame.
 - 1. For recessed frames located within a dimensionally restricted area, show dimensions of space within which the frame will be installed.
- D. Samples: Submit two samples, 12 by 12 inch (300 by 300 mm) in size illustrating pattern, color, finish, edging.
- E. Maintenance Data: Include cleaning instructions, stain removal procedures.

1.03 SUSTAINABILITY SUBMITTALS

- A. CAL-Green documentation and verification data as specified in Section 018114 - Sustainable Design Requirements - CAL-Green, for the following measures:
 - 1. 4.504.2.1 and 5.504.4.1 Adhesives and sealants.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Manufacturers - Entrance Floor Grilles:
 - 1. Mats Inc.; Grate Mat XT foot grille: www.matsinc.com.
 - 2. Prior approved equal.
 - 3. Other Acceptable Manufacturers:
 - a. American Floor Mats: www.americanfloormats.com.
 - b. Arden Architectural Specialties, Inc.: www.ardenarch.com.
 - c. Nystrom, Inc; alumaGRIL: www.nystrom.com/sle.
 - d. Pawling Corporation; ___: www.pawling.com.
 - e. Reese Enterprises, Inc.: www.reeseusa.com.
 - f. Nystrom: www.nystrom.com.
 - g. Prior approved equal.

2.02 ENTRANCE FLOOR GRILLES AND GRATINGS

- A. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, vinyl support cushions, and other components needed to produce a complete installation.
- B. Entrance Floor Grilles: Recessed extruded aluminum grille assembly with nominal 1-1/2 inches (38 mm) wide tread strips running perpendicular to traffic flow, slots between treads, and perimeter frame forming sides of recess; grille hinged for access to recess.

1. Recess Depth: 3/4 inches (19 mm).
2. Tread Rails: Extruded aluminum.
 - a. Color: As selected by Architect from manufacturer's full range.
3. Tread Rail Spacing: 1-1/2 inches (38 mm) on center with 1/8 inch to 3/16 inch wide openings between treads.
4. Tread Surfaces: Heavy duty carpet.
 - a. Carpet shall meet the Carpet and Rug Institute's standard for indoor air quality. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch and colorfast, solution dyed nylon. Available in one of 11 standard colors as offered by manufacturer. Each carpet fiber and monofilament shall be fusion-bonded to a rigid two-ply backing to prevent fraying and supplied in continuous splice-free lengths. Carpet weight shall be 33 oz./sq. yd.
5. Colors: As selected by Architect from manufacturer's full range.
6. Size: As indicated on Drawings.
7. Frame: 6063-T5 aluminum alloy with 1/8 inch (3 mm) exposed surface and a depth of 1 inch (25 mm), with concrete anchors.
 - a. Mill finish.

C. Structural Capacity: Capable of supporting a rolling load of 500 pounds (226.8 kg) without permanent deformation or noticeable deflection.

D. Vibration Resistant Fabrication: All members welded, riveted, or bolted; no snap or friction connections.

2.03 SUPPORT SYSTEM

A. Drainage Pit Applications: 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.

2.04 FABRICATION

A. Fabricate mat in single unit sizes; fabricate multiple mats where indicated on Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor opening for grating are ready to receive work.

3.02 PREPARATION

A. Verify size of floor recess before fabricating grille.

B. Vacuum clean floor recess.

3.03 INSTALLATION

A. Install frames to achieve flush plane with finished floor surface.

3.04 TOLERANCES

A. Maximum Gap Formed at Recessed Frame From Mat Size: 1/4 inch (6 mm).

3.05 PROTECTION

- A. 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 124813

DLR GROUP
Project NO. 75-15238-00
4/10/18

Compton Community College District
Instructional Building #1
Revision C

SECTION 142400 - HYDRAULIC ELEVATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Complete hydraulic elevator systems.
 - 1. Passenger type.
- B. Elevator Maintenance Contract.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Includes elevator machine foundation, enclosed hoistway, elevator pit, divider beams, overhead hoist beams, grouting thresholds, and grouting hoistway entrance frames.
- B. Section 055000 - Metal Fabrications: Includes elevator pit ladder, sill supports, and overhead hoist beams.
- C. Section 077200 - Roof Accessories: Smoke venting hatch at top of hoistway.
- D. Section 092116 - Gypsum Board Assemblies: Gypsum shaft walls.
- E. Division 21: Sprinkler heads in hoistway.
- F. Division 22: Pit drain.
- G. Division 26: Electrical connections.
- H. Division 28: Fire and smoke detectors and interconnecting devices.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- C. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- D. ASME A17.1 - Safety Code for Elevators and Escalators; 2013.
- E. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks; 2014.
- F. ASME QEI 1 - Standard for the Qualification of Elevator Inspectors; 2013.
- G. ASME QEI-1 - Standard for the Qualification of Elevator Inspectors; 2013.
- H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- I. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- J. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

- K. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- N. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- P. ITS (DIR) - Directory of Listed Products; current edition.
- Q. NEMA MG 1 - Motors and Generators; 2014.
- R. NFPA 13 - Standard for the Installation of Sprinkler Systems; 2016.
- S. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2016.
- U. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- V. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with other installers to provide conduits necessary for installation of wiring including but not limited to:
 - a. Elevator equipment devices remote from elevator machine room or hoistway.
 - b. Remote group automatic panel in lobby from controller cabinet.
 - c. To elevator pit for lighting and sump pump.
 - d. Automatic transfer switch from controller cabinet.
 - e. Fire alarm panel from controller cabinet.
 - 2. Coordinate work with other installers for equipment provisions necessary for proper elevator operation, including but not limited to, the following:
 - a. Automatic transfer switches with auxiliary contacts for emergency power transfer status indication.
 - b. Shunt trip devices for automatic disconnection of elevator power prior to fire suppression system activation.
 - c. Overcurrent protection devices selected to achieve required selective coordination.
- B. Preinstallation Meeting: Convene meeting at least one week prior to start of this work.
 - 1. Review schedule of installation, proper procedures and conditions, and coordination with related work.

2. Review use of elevator for construction purposes, hours of use, scheduling of use, cleanliness of car, employment of operator, and maintenance of system.

C. Construction Use of Elevator: Not permitted.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit data on following items:

1. Signal and operating fixtures, operating panels, and indicators.
2. Car design, dimensions, layout, and components.
3. Car and hoistway door and frame details.
4. Electrical characteristics and connection requirements.

C. Shop Drawings: Submit drawings and details on following items:

1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
2. Hoistway Components: Size and location of car guide rails, buffers, jack unit and other components.
3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
4. Clearances and over-travel of car.
5. Locations in hoistway and machine room of traveling cables and connections for car lighting and telephone.
6. Location and sizes of hoistway and car doors and frames.
7. Calculated heat dissipation of elevator equipment in machine room.
8. Interface with building security system.
9. Electrical characteristics and connection requirements.
10. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.

D. Samples: Submit samples illustrating car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of samples.

E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

F. Maintenance Contract: Submit proposal to Owner for standard one year continuing maintenance contract agreement in accordance with ASME A17.1 and requirements as indicated, starting on date initial maintenance contract is scheduled to expire.

1. Indicate in proposal the services, obligations, conditions, and terms for agreement period and for renewal options.

G. Operation and Maintenance Data:

1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
2. Operation and maintenance manual.
3. Schematic drawings of equipment and hydraulic piping, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each quality standard document on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.
- C. Installer Qualifications: Trained personnel and supervisor on staff of elevator equipment manufacturer.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- E. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
- F. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's warranty for elevator operating equipment and devices for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Hydraulic Elevators:
 - 1. ThyssenKrupp Elevator Twinpost Above-ground: www.thyssenkruppelevator.com.
 - 2. Prior approved equal.

2.02 HYDRAULIC ELEVATORS

- A. Hydraulic Passenger Elevator:
 - 1. Hydraulic Elevator Equipment:
 - a. Twin post holeless telescopic 2-stage.
 - 2. Drive System:
 - a. Variable voltage variable frequency (VVVF) to modulate motor speed.
 - 3. Interior Car Height: 88 inches (2235.20 mm).
 - 4. Electrical Power: 480 volts; alternating current (AC); three phase; 60 Hz.
 - 5. Rated Net Capacity: 3500 lbs (1590 kgs).
 - 6. Rated Speed: 150 ft per minute (0.75 m per second).
 - 7. Hoistway Size: 100 inch wide by 83 inch deep (2540 mm wide by 2108.08 mm deep).
 - 8. Car Platform Size: 84 inch wide by 75 inch deep (2133.60 mm wide by 1905 mm deep).
 - 9. Car Clear Inside Size: 80 inch wide by 64 inch deep (2032 mm wide by 1651 mm deep).
 - 10. Elevator Pit Depth: 48 inch (1219 mm).
 - 11. Overhead Clearance at Top Floor: 152 inch (3860.80 mm).
 - 12. Travel Distance: As indicated on Drawings.

13. Number of Stops: 2.
14. Number of Openings: 2 Front.

2.03 COMPONENTS

A. Elevator Equipment:

1. Motors, Hydraulic Equipment, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70. Refer to Section 260583
2. Guide Rails, Cables, Buffers, Attachment Brackets and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1.
3. Buffers:
 - a. Oil type for elevators with speed greater than 200 feet per minute (1 m per second).
4. Lubrication Equipment:
 - a. Provide grease fittings for periodic lubrication of bearings.
 - b. Lubrication Points: Visible and easily accessible.

B. Electrical Equipment:

1. Motors: NEMA MG 1.
2. Boxes, Conduit, Wiring, and Devices: As required by NFPA 70. Refer to Sections 260533.13 and 260583.
3. Spare Conductors: Provide ten percent in extra conductors and two pairs of shielded audio cables in traveling cables.
4. Include wiring and connections to elevator devices remote from hoistway and between elevator machine room. Provide additional components and wiring to suit machine room layout. Refer to Division 26 - Electrical.

2.04 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).
- B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- C. Elevators provided for passengers shall comply with CBC11B-407.
 1. Call Controls: Where elevator call buttons or keypads are provided, they shall comply with CBC 11B-407.2.1 and 11B-309.4.
 - a. Height: Call buttons and keypads shall be located within one of the reach ranges specified in CBC 11B-308, measured to the centerline of the highest operable part.
 - b. Size and Shape: Call buttons shall have square shoulders, be 3/4 inch minimum in the smallest dimension and shall be raised 1/8 inch plus or minus 1/32 inch above the surrounding surface. The buttons shall be activated by a mechanical motion that is detectable.
 - c. Clear floor or ground space - A clear floor or ground space complying with CBC 11B-305 shall be provided at call controls.
 - d. Location: The call button that designates the up direction shall be located above the call button that designates the down direction.

- e. Signals - Call buttons shall have visible signals that will activate when each call is registered and will extinguish when each call is answered. Call buttons shall be internally illuminated with a white light over the entire surface of the button.
- f. Keypads - Keypads, where provided, shall be in a standard telephone keypad arrangement and shall comply with CBC 11B-407.4.7.2.
2. Hall signals - Hall signals, including in-car signals, shall comply with CBC 118-407.2.2.
 - a. Visible and Audible Signals: A visible and audible signal shall be provided at each hoistway entrance to indicate which car is answering a call and the car's direction of travel. Where in-car signals are provided, they shall be visible from the floor area adjacent to the hall call buttons.
 - b. Visible Signals - Visible signal fixtures shall be centered at 72 inches minimum above the finish floor or ground. The visible signal elements shall be a minimum 2-1/2 inches high by 2-1/2 inches wide. Signals shall be visible from the floor area adjacent to the hall call button.
 - c. Audible signals - Audible signals shall sound once for the up direction and twice for the down direction, or shall have verbal annunciators that indicate the direction of elevator car travel. Audible signals shall have a frequency of 1500 Hz maximum. Verbal annunciators shall have a frequency of 300 Hz minimum and 3000 Hz maximum. The audible signal and verbal annunciator shall be 10 dB minimum above ambient, but shall not exceed 80 dB, measured at the hall call buttons.
3. Hoistway signs - Signs at elevator hoistways shall comply with CBC 11B-407.2.3.
 - a. Floor designation - Floor designations complying with CBC 11B-703.2 and 11B-103.4.1 shall be provided on both jambs of elevator hoistway entrances. Floor designations shall be provided in both raised characters and Braille. Raised characters shall be 2 inches high. A raised star, placed to the left of the floor designation shall be provided on both jambs at the main entry level. The outside diameter of the star shall be 2 inches and all points shall be of equal length. Raised characters, including the star, shall be white on a black background. Braille complying with 118-703.3 shall be placed below the corresponding raised characters and the star. The Braille translation for the star shall be "MAIN". Applied plates are acceptable if they are permanently fixed to the jamb.
4. Elevator Door Requirements - CBC 11B-407.3:
 - a. Duration - Door reopening devices shall remain effective for 20 seconds minimum.
 - b. Door and Signal Timing: The minimum acceptable time from notification that a car is answering a call until the doors of that car start to close shall be calculated from the following equation:
 - 1) $T = D / (1.5 \text{ ft/s})$ or $T = D / (457 \text{ mm/s}) = 5$ seconds minimum where T equals the total time in seconds and D equals the distance {in feet or millimeters} from the point in the lobby or corridor 60 inches directly in front the farthest call button controlling that car to the centerline of its hoistway door.
 - c. Door delay - Elevator doors shall remain fully open in response to a car call for 5 seconds minimum.
5. Elevator Door Requirements - CBC 11B-407.4:
 - a. Floor Surfaces: Floor surfaces in elevator cars shall comply with CBC 11B-302 and 11B-303.
 - b. Platform to hoistway clearance - The clearance between the car platform sill and the edge of any hoistway landing shall be 1 1/4 inches maximum.

- c. Leveling - Each car shall be equipped with a self-leveling feature that will automatically bring and maintain the car at floor landings within a tolerance of 1/2 inch under rated loading to zero loading conditions.
- d. Illumination - The level of illumination at the car controls, platform, car threshold and car landing sill shall be 5 foot candles minimum.
6. Elevator car controls - Where provided, they shall comply with CBC 11B-407.4.6 and 11B-309.4.
 - a. Location - Controls shall be located within one of the reach ranges specified in CBC 11B-308.
 - b. Buttons - Car control buttons with floor designations shall comply with the following:
 - 1) Size and Shape - Buttons shall have square shoulders, be 3/4 inch minimum in the smallest dimension and be raised 1/8 inch plus or minus 1/32 inch above the surrounding surface.
 - 2) Arrangement - buttons shall be arranged with numbers in ascending order. When two or more columns of buttons are provided they shall read from left to right.
 - 3) Illumination - Car control buttons shall be illuminated.
 - 4) Operation - Car control buttons shall be activated by a mechanical motion that is detectable.
 - c. Keypads - Car control keypads shall be in a standard telephone keypad arrangement and shall comply with CBC 11B-407.4. 7.2.
 - d. Emergency controls - Emergency controls shall comply with CBC 11B-407.4.6.4.
 - 1) Height - Emergency control buttons shall have their centerlines 35 inches minimum above the finish floor.
 - 2) Location - Emergency controls, including the emergency alarm, shall be grouped at the bottom of the panel.
7. Designations and Indicators of Car Controls: Comply with CBC 11B-407.4. 7.
 - a. Buttons - Car control buttons shall comply with CB 11B-407.4.7.1.
 - 1) Type - Control buttons shall be identified by raised characters or symbols, white on a black background, complying with CBC 11B-703.2 and Braille complying with 11B-703.3.
 - 2) Location - Raised characters or symbols and Braille designations shall be placed immediately to the left of the control button to which the designations apply.
 - 3) Symbols - The control button for the emergency stop, alarm, door open, door close, main entry floor, and phone, shall be identified with raised symbols and Braille as shown in Table 11B-407.4.7.1.3.
 - 4) Visible indicators - buttons with floor designations shall be provided with visible indicators to show that a call has been registered. The visible indication shall extinguish when the car arrives at the designated floor.
 - 5) Button spacing - A minimum clear space of 3/8 inch or other suitable means of separation shall be provided between rows of control buttons.
 - b. Keypads : Keypads shall be identified by characters complying with CBC 11B-703.5 and shall be centered on the corresponding keypad button. The number five key shall have a single raised dot. The dot shall be 0.118 inch to 0.120 inch base diameter and in other aspects comply with Table 11B-703.3.1.
8. Car Position Indicators: Audible and visible car position indicators shall be provided in elevator cars.

- a. Visible indicators - Visible indicators shall comply with CBC 11B-407.4.8.1.
 - 1) Size: Characters shall be 1/2 inch high minimum.
 - 2) Location: Indicators shall be located above the car control panel or above the door.
 - 3) Floor Arrival: As the car passes a floor and when a car stops at a floor served by the elevator the corresponding character shall illuminate
 - b. Audible indicators - Audible indicators shall comply with CBC 11B-407.4.8.2.
 - 1) Signal Type: The signal shall be an automatic verbal annunciator which announces the floor at which the car is about to stop.
 - 2) Signal Level: The verbal annunciator shall be 10 dB minimum above ambient, but shall not exceed 80 dB, measured at the annunciator.
 - 3) Frequency: The verbal annunciator shall have a frequency of 300 HZ minimum to 3000 HZ maximum.
9. Emergency Communication - Emergency two-way communication systems shall comply with CBC 11B-308. Raised symbols or characters, white on black background, and Braille shall be provided adjacent to the device and shall comply with CBC 11B-703.2 and 11B 703.3. Emergency two-way communication systems between elevator and a point outside the hoistway shall comply with ASME A17.1.
10. Support rail - Support rails shall be provided on at least one wall of the car.
- a. Location - Clearance between support rails and adjacent surfaces shall be 1-1/2 inches minimum. Top of support rails shall be 31 inches minimum to 33 inches maximum above the floor of the car. The ends of the support rail shall be 6 inches maximum from adjacent walls.
 - b. Surfaces: Support rails shall be smooth and any surface adjacent to them shall be free of sharp or abraasive elements.
 - c. Structural Strength: Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds is applied at any point on the supoort rail, fastener, mounting device, or supporting structure.
- D. Perform welding of steel in accordance with AWS D1.1/D1.1M.
- E. Fabricate and install door and frame assemblies in accordance with NFPA 80 and in compliance with requirements of authorities having jurisdiction.
- F. Perform electrical work in accordance with NFPA 70.
- G. Comply with venting or pressurization of the hoistway design in accordance with HVAC system requirements and authorities having jurisdiction.
- H. Comply with fire protection sprinkler system of the hoistway design in accordance with NFPA 13 requirements and authorities having jurisdiction. Refer to Section 211300.
- 2.05 SYSTEMS AND COMPONENTS
- A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 1. Pump: Manufacturer's standard, submersible type with submersible squirrel-cage induction motor, and shall be suspended inside oil tank from vibration isolation mounts.
 2. Motor: Solid-state starting, variable-voltage, variable-frequency control.

- B. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- C. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
 - 1. Cylinder units shall be connected with dielectric couplings.
 - 2. Casing for Underground Piping: Schedule 40 PVC pipe complying with ASTM D 1785, joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
- D. Hydraulic Fluid: Nontoxic, biodegradable, fire-resistant fluid, made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives, that is approved by elevator manufacturer for use with elevator equipment.
- E. Car Frame and Platform: Welded steel units.
- F. Guides: Roller guides. Provide guides at top and bottom of car frame.

2.06 MATERIALS

- A. Rolled Steel Sections, Shapes, Rods: 1.
- B. Steel Sheet: 1, Designation CS (commercial steel), with matte finish.
- C. Sheet Steel: Hot-dipped galvanized steel sheet, 1, with G90/Z275 coating.
- D. Stainless Steel Sheet: 1, Type 304; No. 4 Brushed finish unless otherwise indicated.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
- F. Finish Paint for Metal Surfaces: Alkyd enamel, semi-gloss, color as selected, complying with VOC limitations of authorities having jurisdiction.

2.07 OPERATION CONTROLS

- A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation indicated.
- B. Elevator Controls: Provide landing operating panels and landing indicator panels.
 - 1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
 - 2. Landing Indicator Panels: Illuminating.
 - 3. Comply with ADA Standards for elevator controls.
- C. Interconnect elevator control system with building fire alarm, smoke alarm, and building management control systems.
- D. Door Operation Controls:
 - 1. Program door control to open doors automatically when car arrives at floor landing.
 - 2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
 - 3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.

4. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door-reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.08 OPERATION CONTROL TYPE

- A. Selective Collective Automatic Operation Control: Applies to car in single elevator shaft.
 1. Refer to description provided in ASME A17.1.
 2. Automatic operation by means of one button in the car for each landing served and by "UP" and "DOWN" buttons at the landings.
 3. Stops are registered by momentary actuation of landing car buttons without consideration of the number of buttons actuated or the sequence buttons are actuated, but the stops are made in the order that landings are reached in each direction of travel.
 4. All "UP" landing calls are made when car is traveling in the up direction.
 5. All "DOWN" landing calls are made when car is traveling in the down direction.
 6. Uppermost and lowermost calls are answered as soon as they are reached without consideration of the car travel direction.
- B. 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 and predetermined weight can be adjusted.
- C. 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 5 minutes and are re-energized before car doors open.
- D. Special Operations
 1. Provide coaxial cable in the travel cable for security camera. Route cable and conduit to area of the car ceiling. Camera and hookup shall be provided by the owner.

2.09 EMERGENCY POWER

- A. Elevator Emergency Power Supply: Supplied by battery backup; provide elevator system components as required for emergency power characteristics.
 1. Single-Car Battery-Powered Lowering: 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 is lowered to the ground floor, opens its doors, and shuts down. If car is below the preselected floor, it is lowered to the next lower floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
- B. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.
- C. Provide operational control circuitry for adapting the change from normal to emergency power.

2.10 MATERIALS

- A. Stainless Steel Sheet: ASTM A666, Type 304; No. 4 Brushed finish unless otherwise indicated.
- B. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.

- C. Tempered Glass: 3/8 inch (9.5 mm) minimum thickness, fully tempered in compliance with ASME A17.1, 16 CFR 1201, ANSI Z97.1, and ASTM C1048 tempered glass requirements.

2.11 CAR AND HOISTWAY ENTRANCES

- A. Elevator, No. 1:
 - 1. Car and Hoistway Entrances:
 - a. Elevator Door Fire Rating: 1-1/2 Hours.
 - b. Framed Opening Finish and Material: Brushed stainless steel.
 - c. Car Door Material: Stainless steel, with rigid sandwich panel construction.
 - d. Hoistway Door Material: Stainless steel, with rigid sandwich panel construction.
 - e. Door Operation: Side opening, two speed.
 - f. Sills: Extruded aluminum.
 - B. Sills/Thresholds: Configure to align with frame return and coordinate with floor finish.
 - C. Gasketing: Provide acoustic type gasketing at hoistway doors and frames to eliminate audible noise due to car activities in the hoistway, and air pressure differential between hoistway and landing floors.

2.12 CAR EQUIPMENT AND MATERIALS

- A. Elevator Car, No. 1:
 - 1. Car Operating Panel: Provide main and auxiliary; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open/Door Close" buttons, "Door Open" button, "Door Close" button, and alarm button.
 - a. Panel Material: Integral with front return; one per car.
 - b. Car Floor Position Indicator: Above door with illuminating position indicators.
 - c. Locate alarm button where it is unlikely to be accidentally actuated; not more than 54 inch (1.372 m) above car finished floor.
 - 2. Flooring: Porcelain ceramic tile, top of tile to align with top of threshold.
 - 3. Front Return Panel: Match material of car door.
 - 4. Door Wall: Stainless steel.
 - 5. Side Walls: Plastic laminate on plywood.
 - 6. Rear Wall: Plastic laminate on plywood.
 - 7. Hand Rail: Stainless steel, at rear wall. Provide open clearance space 1-1/2 inch (38 mm) wide to face of wall.
 - a. Flat Bar Stock, Solid: Manufacturer's standard 2 inch tall.
 - b. Stainless Steel Finish: No. 4 Brushed.
 - 8. Ceiling:
 - a. Canopy Ceiling: Stainless steel.
 - b. Lighting: LED.
- B. Car Accessories:
 - 1. Certificate Frame: Stainless steel frame glazed with tempered glass, and attached with tamper-proof screws.
 - 2. Protective Pads: Canvas cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1; brass grommets for supports, covering side and rear walls and front return, with cut-out for control panel; provide one set for each elevator.

- a. Color: As selected by Architect.
- b. Provide at least 4 inch (102 mm) clearance from bottom of pad to finished floor.
- c. Pad Supports: Stainless steel studs, and mounted from ceiling frame.

2.13 SIGNAL EQUIPMENT

- A. General: Provide hall-call buttons that light when activated and remain lit until call has been fulfilled. Provide buttons and lighted elements illuminated with LEDs.
- B. 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, vandal resistant.
 2. Equip units with buttons for calling elevator and for indicating applicable direction of travel.
 3. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 28.
- C. Hall Lanterns: Units with illuminated arrows; however, provide single arrow at terminal landings. Provide the following:
 1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
 2. Hall Position Indicators: Provide illuminated, with arrow indication of travel, located above each hoistway entrance at ground floor.
- D. 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.
- E. 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.
 1. Incorporate ASME A17.1 appendix H in hall station.
- F. Hall Access Key: Mount within 12 inches of hall call station.

2.14 MACHINE ROOM FITTINGS

- A. Wall-Mounted Frames: Glazed with clear plastic; sized as required. Provide one chart each for master electric and hydraulic schematic and for lubrication chart. Install charts.
- B. Key Cabinet: Wall-mounted, lockable, keyed to building keying system, for control and operating panel keys.
 1. Provide two key cabinet keys.
- C. Monitoring Device Interface:

2.15 FINISHES

- A. Powder Coat on Steel: Clean and degrease metal surface; apply one coat of primer; two coats of powder coat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting this work.

- B. Verify that hoistway, pit, and machine room are ready for work of this section.
- C. Verify hoistway shaft and openings are of correct size and within tolerance.
- D. Verify location and size of machine foundation and position of machine foundation bolts.
- E. Verify that electrical power is available and of correct characteristics.

3.02 PREPARATION

- A. Arrange for temporary electrical power for installation work and testing of elevator components. Comply with requirements of Section 015000 - Temporary Facilities and Controls.
- B. Maintain elevator pit excavation free of water.

3.03 INSTALLATION

- A. Coordinate this work with installation of hoistway wall construction.
- B. Install system components, and connect equipment to building utilities.
- C. Provide conduit, electrical boxes, wiring, and accessories. Refer to Division 26.
- D. Install hydraulic piping between cylinder and pump unit.
- E. Mount machines, motors, and pumps on vibration and acoustic isolators, on bed plate and concrete pad.
 - 1. Securely fasten to building supports.
 - 2. Prevent lateral displacement.
- F. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.
- G. Install guide rails to allow for thermal expansion and contraction movement of guide rails.
- H. Accurately machine and align guide rails, forming smooth joints with machined splice plates.
- I. Bolt or weld brackets directly to structural steel hoistway framing.
- J. Field Welds: Chip and clean away oxidation and residue with wire brush; spot prime surface with two coats.
- K. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.
- L. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.
- M. Machine Room Components: Clean and degrease; prime one coat, finish with one coat of enamel.
- N. Wood Surfaces not Exposed to Public View: Finish with one coat primer; one coat enamel.
- O. Adjust equipment for smooth and quiet operation.

3.04 TOLERANCES

- A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.
- B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.05 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Testing and inspection by regulatory agencies certified in accordance with ASME QEI 1 will be performed at their discretion.
 - 1. Schedule tests with agencies and notify Owner and Architect.
 - 2. Obtain permits as required to perform tests.
 - 3. Document regulatory agency tests and inspections in accordance with requirements.
 - 4. Perform tests required by regulatory agencies.
 - 5. Furnish test and approval certificates issued by authorities having jurisdiction.
- C. Perform testing and inspection in accordance with requirements.
 - 1. Inspectors shall be certified in accordance with ASME QEI 1.
 - 2. Perform tests as required by ASME A17.2.
 - 3. Provide at least two weeks written notice of date and time of tests and inspections.
 - 4. Supply instruments and execute specific tests.

3.06 ADJUSTING

- A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.
- B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch (6.4 mm) maximum from flush with sill.

3.07 CLEANING

- A. After Substantial Completion: Remove protective coverings from finished surfaces.
- B. Clean surfaces and components in accordance with manufacturers written instructions.

3.08 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstrate proper operation of equipment to Owner's designated representative.
- D. Demonstration: Demonstrate operation of system to Owner's personnel.
 - 1. Use operation and maintenance data as reference during demonstration.
 - 2. Briefly describe function, operation, cleaning and maintenance of each component.
- E. Training: Train Owner's personnel on cleaning and operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.

3.09 PROTECTION

- A. Do not permit construction traffic within car after cleaning.
- B. Protect installed products until Date of Substantial Completion.
- C. Touch-up, repair, or replace damaged products and materials prior to Date of Substantial Completion.

3.10 MAINTENANCE

- A. Refer to Section 017000 - Execution and Closeout Requirements, for additional requirements relating to initial maintenance service.
- B. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for 3 months from Date of Substantial Completion.
- C. Submit proposal for continuation of Maintenance Contract in accordance with ASME A17.1 and requirements as indicated for installed elevator equipment.
- D. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or original installer.
- E. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Owner.
- F. Examine system components periodically.
- G. Include systematic examination, adjustment, and lubrication of elevator equipment.
- H. Perform work without removing cars from use during peak traffic periods.
- I. Provide emergency call back service on overtime throughout period of this maintenance contract.
- J. Maintain an adequate stock of parts for replacement or emergency purposes, and have personnel available to ensure the fulfillment of this maintenance contract without unreasonable loss of time.

END OF SECTION 142400

DLR GROUP
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Compton Community College District
Instructional Building #1
Revision C