

LOS ANGELES INTERNATIONAL AIRPORT CONSOLIDATED RENTAL CAR FACILITY

PROJECT MANUAL

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QTA 30% Submittal

VOLUME 2 OF 4



Prepared for:



LAX

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SECTION 08 11 13 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes hollow metal doors and frames.

NOTE: The integration of the existing LAWA Security System into the new steel door and frame may be required. The Contractor shall be responsible for the total and complete coordination of the security system components of the work.

1.2 SUBMITTALS

- A. **Product Data:** Submit product data for each product indicated. Include material descriptions, core descriptions, label compliance, sound and fire-resistance ratings, and finishes for each type of door and frame specified.
- B. **Shop Drawings:** Submit door and frame schedule using same reference designations indicated on Drawings. Include opening size(s), handing of doors, frame throat dimensions, details of each frame type, elevations of door design types, details of construction, location and installation requirements of door hardware and reinforcements, hardware group numbers, details of joints and connections, fire label requirements including fire rating time duration, maximum temperature rise requirements, and smoke label requirements.

NOTE: On the shop drawings, indicate the routing of electrical conduit with related dimensions and locations of required cutouts in doors and frames that are to accept electric hardware devices.

- C. **Construction Samples:** Submit approximately 18 by 24 inches (450 by 600 mm) construction samples, representing the required construction of doors and frames for Project.
1. **Doors:** Show vertical-edge, top, and bottom construction; insulation; face stiffeners; and hinge and other applied hardware reinforcement. Include glazing stops if applicable.
 2. **Welded Frames:** Show profile, welded corner joint, welded hinge reinforcement, dust-cover boxes, floor and wall anchors, stops, and silencers. Include glazing stops if applicable.
 3. **Frames:** Show profile, corner joint, welded hinge reinforcement, wall anchors, stops, and silencers.
- D. **Certificate of Compliance for Fire Rated Doors:** Provide copies of Certificate of Compliance for all fire rated door assemblies, all smoke and draft control door assemblies, and all temperature rise rated door assemblies.
- E. **Oversize Construction Certification:** For door assemblies required to be fire rated and

exceeding limitations of labeled assemblies, submit certification of a testing agency acceptable to authorities having jurisdiction that each door and frame assembly has been constructed to comply with design, materials, and construction equivalent to requirements for labeled construction.

1.3 QUALITY ASSURANCE

- A. Hollow Metal Door and Frame Standard: Comply with the applicable provisions and recommendations of the following publications by Hollow Metal Manufacturers Association (HMMA) Div. of National Association of Architectural Metal Manufacturers (NAAMM), unless more stringent requirements are indicated in the Contract Documents:
 - 1. HMMA "Hollow Metal Manual".
 - 2. HMMA 861 "Guide Specifications for Commercial Hollow Metal Doors and Frames".
- B. Manufacturer Qualifications: A firm experienced in manufacturing hollow metal doors and frames similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 or UL 10C "Standard for Positive Pressure Fire Tests of Door Assemblies". Fire classification labels at all doors with fire ratings greater than 20 minutes shall indicate the temperature rise developed on the unexposed surface of the door after the first 30 minutes of fire exposure.
 - 1. Provide metal labels permanently fastened on each door which is within the size limitations established by the LADBS.
 - 2. Temperature-Rise Rating: Where indicated, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.
 - 3. Positive Pressure Rated Door Assemblies: Where indicated provide positive pressure rated fire rated door assemblies. Sizes and configurations as shown on the drawings. Installed door assemblies shall be in accordance with door manufacturers certified assemblies.
 - a. Test Pressure: Test according to NFPA 252 or UL 10C. After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches (1000 mm) or less above the sill.
 - 4. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- D. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257 or UL 9.
- E. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames palletted, wrapped, or crated to provide protection during transit and Project site storage.
- B. Inspect doors and frames, on delivery, for damage. Tool marks, rust, blemishes, and other damage on exposed surfaces will not be acceptable. Remove and replace damaged items as directed by Architect. Store doors and frames at building site in a dry location, off the ground, and in such a manner as to prevent deterioration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide doors and frames by one of the following:
 - 1. Hollow Metal Doors and Frames:
 - a. Ceco Door Products; an Assa Abloy Group Company.
 - b. Curries Company; an Assa Abloy Group Company.
 - c. Steelcraft; an Allegion product line.

2.2 MATERIALS

- A. Specified Gage Thickness: All specified gauge thicknesses are Manufacturer's Standard Gauge.
- B. Hot-Rolled Steel Sheets: ASTM A 1008/A 1008M, CS (commercial steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Cold-Rolled Steel Sheets: ASTM A 1011/A 1011M, CS (commercial steel), Type B, free from scale, pitting, coil breaks, surface blemishes, buckles, waves, or other defects, exposed (matte) dull finish, suitable for exposed applications.
- D. Inserts, Bolts, and Fasteners: Galvanized steel.
 - 1. Expansion Bolts and Shields: FS FF-S-325, Group III, Type 1 or 2.
 - 2. Machine Screws: FS FF-S-92, carbon steel, Type III cross recessed, design I or II recess, style 2C flat head.
- E. Filler: Sound deadening and heat retarding mineral fiber insulating material.

2.3 DOORS

- A. General: Provide flush-design doors, 1-3/4 inches (44 mm) thick, of seamless hollow construction, unless otherwise indicated. Construct doors with sheets joined at their vertical edges by continuous welding the full height of the door, with no visible seams on their faces or vertical edges, and all welds ground and finished flush.
 - 1. Visible joints or seams around glazed panel inserts are permitted.
 - 2. For single-acting swing doors, bevel both vertical edges 1/8 inch in 2 inches (3 mm in 50

- mm).
3. For double-acting swing doors, round vertical edges with 2-1/8-inch (54-mm) radius.

NOTE: For the doors, make provisions for the installation of electrical items specified elsewhere; arrange so wiring can be readily removed and replace. Provide all cutouts and reinforcements required for these steel doors to accept security system components.

All new restrooms entrances doors shall provide the clearance width necessary to accommodate a 42" wide wheelchair.

- B. Interior Door Core Construction: Doors shall be stiffened by continuous vertically formed steel sections which, upon assembly, shall span the full thickness of the interior space between door faces. These stiffeners shall be 0.026-inch (0.6-mm) minimum thickness, spaced so that the vertical interior webs shall be not more than 6 inches (150 mm) apart and spot welded to face sheets a maximum of 5 inches (127 mm) o.c. Place filler between stiffeners for full height of door.
- C. Fire Door Cores: A continuous mineral fiberboard core permanently bonded to the inside face of the outer face sheet unless otherwise required to provide fire-protection and temperature-rise ratings indicated.
- D. Astragals: As required by NFPA 80 to provide fire ratings indicated.
- E. Top and Bottom Channels: Spot weld metal channels, having a thickness of not less than thickness of face sheet, not more than 6 inches (150 mm) o.c. to face sheets.
1. Reinforce tops and bottoms of doors with inverted horizontal channels of same material as face sheet so flanges of channels are even with bottom and top edges of face sheets.
- F. Hardware Reinforcement: Fabricate reinforcing from the same material as door to comply with the following. Offset reinforcement so that faces of mortised hardware items are flush with door surfaces.
1. Hinges and Pivots: 7 gauge (0.167 inch) (4.2 mm) thick by 1-1/2 inches (38 mm) wide by 9 inches (229 mm).
2. Lock Front, Strike, and Flushbolt Reinforcements: 12 gauge (0.093 inch) (2.3 mm) thick by size as required by hardware manufacturer.
3. Lock Reinforcement Units: 14 gauge (0.067 inch) (1.7 mm) thick by size as required by hardware manufacturer.
4. Closer Reinforcements: 12 gauge (0.093 inch) (2.3 mm) thick one piece channel by size as required by hardware manufacturer.
5. Other Hardware Reinforcements: As required for adequate strength and anchorage.
6. In lieu of reinforcement specified, hardware manufacturers recommended reinforcing units may be used.
7. Exit Device Reinforcements: 0.250 inch (6.35 mm) thick by 10 inches (245 mm) high by

4 inches (101 mm) wide centered on exit device case body, unless otherwise recommended by exit device manufacturer.

- G. Electrical Requirements: Make provisions for installation of electrical items specified elsewhere; arrange so wiring can be readily removed and replaced.
1. Provide all cutouts and reinforcements required for hollow metal doors to accept security system components.
 2. Doors with Electric Hinges and Pivots: Provide with metal conduit or raceway to permit wiring from electric hinge or pivot to other electric door hardware.
 - a. Hinge Location: Center for doors less than 90 inches (2286 mm) tall or second hinge from door bottom for doors greater than 90 inches (2286 mm); top or bottom electric hinge locations shall not be permitted.
- H. Interior Hollow Metal Doors:
1. Typical Interior Doors: Flush design with 18 gauge (0.042-inch-) (1.06-mm-) thick cold-rolled stretcher-leveled steel face sheets and other metal components from hot- or cold-rolled steel sheets.
 2. Extra Heavy Use Doors: Flush design with 14 gauge (0.067-inch-) (1.7-mm-) thick cold-rolled, stretcher-leveled steel face sheets and other metal components from hot- or cold-rolled steel sheets. Provide only where indicated.

2.4 FRAMES

- A. Fabricate hollow metal frames, formed to profiles indicated, with full 5/8 inch (16 mm) stops, and of the following minimum thicknesses.
1. For interior use, form frames from cold-rolled steel sheet of the following thicknesses:
 - a. Openings up to and Including 48 Inches (1200 mm) Wide: 16 gauge (0.053 inch) (1.3 mm).
 - b. Openings More Than 48 Inches (1200 mm) Wide: 14 gauge (0.067 inch) (1.7 mm).

NOTE: For the frames, make provisions for installation of electrical items specified elsewhere; arrange so wiring can be readily removed and replace. Provide all cutouts and reinforcements required for steel frames to accept security system components. Provide welded sheet metal boxes with metal conduit or raceway to permit wiring from electric hinge to other electric door hardware.

- B. Provide frames either saw mitered and full (continuously) profile welded, or machine mitered and full (continuously) profile welded, on back side at frame corners and stops with edges straight and true. Grind welds smooth and flush on exposed surfaces.
- C. Hardware Reinforcement: Fabricate reinforcements from same material as frame to comply with the following. Offset reinforcement so that faces of mortised hardware items are flush with surface of the frame.

1. Hinges and Pivots: 7 gauge (0.167 inch) (4.2 mm) thick by 1-1/4 inches (32 mm) wide by 10 inches (254 mm).
 2. Strike, Surface Mounted Hold Open Arms, and Flushbolt Reinforcements: 12 gauge (0.093 inch) (2.3 mm) thick by size as required by hardware manufacturer.
 3. Closer Reinforcements: 12 gauge (0.093 inch) (2.3 mm) thick one piece channel by size as required by hardware manufacturer.
 4. Other Hardware Reinforcements: As required for adequate strength and anchorage.
- D. Electrical Requirements: Make provisions for installation of electrical items specified elsewhere; arrange so wiring can be readily removed and replaced.
1. Provide all cutouts and reinforcements required for hollow metal frames to accept security system components.
 2. Frames with Electric Hinges and Pivots: Provide welded on UL listed back boxes with metal conduit or raceway to permit wiring from electric hinge or pivot to other electric door hardware.
 - a. Hinge Location: Center for doors less than 90 inches (2286 mm) tall or second hinge from door bottom for doors greater than 90 inches (2286 mm); top or bottom electric hinge locations shall not be permitted.
- E. Mullions and Transom Bars for Sidelights, Transoms, and Borrowed Light Frames: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.
- F. Jamb Anchors: Locate jamb anchors above hinges and directly opposite on strike jamb as required to secure frames to adjacent construction. At metal stud partitions locate the additional jamb anchor below the top hinge.
1. Masonry Construction: Adjustable, corrugated or perforated, anchors to suit frame size; formed of same material and gauge thickness as frame; at non-rated frames use friction fit T-shaped anchors, at rated frames use anchors consisting of spot welded strap and adjustable anchor; with leg not less than 2 inches (50 mm) wide by 10 inches (250 mm) long. Furnish at least the number of anchors per jamb according to the following frame heights:
 - a. Two anchors per jamb up to 60 inches (1500 mm) in height.
 - b. Three anchors per jamb from 60 to 90 inches (1500 to 2250 mm) in height.
 - c. Four anchors per jamb from 90 to 96 inches (2250 to 2400 mm) in height.
 - d. One additional anchor per jamb for each 24 inches (600 mm) or fraction thereof more than 96 inches (2400 mm) in height.
 2. Metal-Stud Partitions: Metal channel stud zee anchor sized to match stud width, welded to back of frames, formed of same material and gauge thickness as frame. Provide at least the number of anchors for each jamb according to the following heights:
 - a. Three anchors per jamb up to 60 inches (1500 mm) in height.

- b. Four anchors per jamb from 60 to 90 inches (1500 to 2250 mm) in height.
 - c. Five anchors per jamb from 90 to 96 inches (2250 to 2400 mm) in height.
 - d. One additional anchor per jamb for each 24 inches (600 mm) or fraction thereof more than 96 inches (2400 mm) in height.
3. In-Place Concrete or Masonry: Anchor frame jambs with minimum 3/8-inch- (9-mm-) diameter countersunk flat head bolts into expansion shields or inserts 6 inches (150 mm) from top and bottom of each jamb with intermediate anchors spaced a maximum of 26 inches (650 mm) o.c. Soffit face of frame shall be punched and dimpled to accept countersunk bolt head. Reinforce frame with spacer to prevent bowing. Bolt head shall be set slightly below soffit face, filled and ground smooth at time of installation.
- G. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of same material as frame, 12 gauge (0.093 inch) (2.3 mm) thick, and punched with two holes to receive two (2) 0.375 inch (9.5 mm) fasteners. Where floor fill or setting beds occur support frame by adjustable floor anchors bolted to the structural substrate. Terminate bottom of frames at finish floor surface. Weld floor anchors to frames with at least 4 spot welds per anchor.
- H. Head Strut Supports: Provide 3/8-by-2-inch (9-by-50-mm) vertical steel struts extending from top of frame at each jamb to supporting construction above. Bend top of struts to provide flush contact for securing to supporting construction above by bolting, welding, or other suitable anchorage. Provide adjustable wedged or bolted anchorage to frame jamb members to permit height adjustment during installation. Adapt jamb anchors at struts to permit adjustment.
- I. Head Reinforcement: For frames more than 48 inches (1200 mm) wide in masonry wall openings, provide continuous steel channel or angle stiffener, 12 gauge (0.093 inch) (2.3 mm) thick for full width of opening, welded to back of frame at head. Head reinforcements shall not be used as a lintel or load bearing member for masonry.
- J. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions to serve as bracing during shipment and handling and to hold frames in proper position until anchorage and adjacent construction have been completed.
- K. Door Silencer Holes: Drill strike jamb stop to receive three silencers on single door frames and for two silencers on double door frames. Insert plastic plugs in holes to keep holes clear during installation.
- L. Plaster Guards and Removable Access Plates: Provide 26 gauge (0.016-inch-) (0.4-mm-) thick plaster guards or dust-cover boxes of same material as frame, welded to frame at back of hardware cutouts to close off interior of openings and prevent mortar or other materials from obstructing hardware operation. Provide removable access plates in the heads of frames to receive overhead concealed door closers.

2.5 STOPS AND MOLDINGS

- A. Provide continuous stops and moldings around glazed panels where indicated.
- B. Form fixed stops and moldings integral with frame, on the exterior (non-secured) side of the frame.
- C. Provide removable stops and moldings formed of 20 gauge (0.032-inch-) (0.8-mm-) thick steel

sheets matching hollow metal frames. Secure with countersunk oval head machine screws spaced uniformly not more than 12 inches (300 mm) o.c. Form corners with butted or mitered hairline joints.

- D. Coordinate rabbet width between fixed and removable stops with type of glass or panel and type of installation indicated.

2.6 HOLLOW METAL FRAMES

- A. Provide hollow metal door frames to be used as both door buck and trim, formed to profiles shown, of minimum 16 gauge (0.053 inch) (1.3 mm) thick cold rolled steel.
1. Frames shall be splined, tabbed, and miter fit, knockdown type compatible with adjacent construction conditions.
 2. Accurately machine, file, and fit exposed connections with hairline joints.
 3. Typical Anchorage: Frames shall be provided with concealed mechanical compression anchors at top of each jamb and each jamb shall be prepared and provided with provision for anchorage at floor line of jamb return face.
 4. Miter and anchorage type subject to acceptance of Architect.
- B. Mortise, reinforce, drill and tap frames for mortise type hardware. Provide internal reinforcement for surface type hardware which is to be field drilled and tapped per requirements hereinbefore specified for welded frames and including silencers. Locate hardware in frames to match location specified and in accordance with the hardware schedule and templates.

2.7 FABRICATION

- A. Fabricate doors and frames rigid, neat in appearance, and free of defects, warp, wave, and buckle. Accurately form metal to sizes and profiles indicated. Accurately machine, file, and fit exposed connections with hairline joints. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
- B. Exposed Fasteners: Provide countersunk flat heads for exposed screws and bolts, unless otherwise indicated.
- C. Hardware Preparation: Prepare doors and frames to receive hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final hardware schedule and templates provided by hardware supplier. Secure reinforcement by spot welding. Comply with applicable requirements of ANSI/BHMA A156.115 and A156.115W specifications for door and frame preparation for hardware. Factory reinforced doors and frames to receive surface-applied hardware. Factory drill and tap for surface-applied hardware, except at push plates and kick plates provide reinforcing only.
1. Locate hardware according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames" or otherwise directed by LAWA.

2.8 STEEL SHEET FINISHES

- A. General: Clean, treat and prime surfaces of fabricated hollow metal door and frame work, inside and out, whether exposed or concealed in the construction.

- B. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale, shavings, filings, and rust, if present, complying with SSPC-SP 3, "Power Tool Cleaning,"
- C. Factory Priming for Field-Painted Finish: Apply shop primer immediately after surface preparation and pretreatment. Apply a sufficient number of coats, baked on, to obtain uniformly smooth exposed surfaces. Touch up surfaces having runs, smears, or bare spots.
 - 1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, corrosion-inhibiting, lead- and chromate-free, universal primer complying with ANSI A250.10 acceptance criteria; compatible with substrate and field-applied finish paint system indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install doors and frames according to the referenced standards, the Architect reviewed shop drawings, and manufacturer's written recommendations and installation instructions.
- B. Frames: Install frames where indicated. Extend frame anchorages below fills and finishes. Coordinate the installation of built-in anchors for wall and partition construction as required with other work.
 - 1. Frames: Install frames in locations shown, in perfect alignment and elevation, plumb, level, straight and true, and free from rack.
 - 2. Welded Frames:
 - a. Set masonry anchorage devices where required for securing frames to in-place concrete or masonry construction.
 - 1) Set anchorage devices opposite each anchor location as specified and anchorage device manufacturer's written instructions. Leave drilled holes rough, not reamed, and free of dust and debris.
 - b. Placing Frames: Set frames accurately in position; plumb; align, and brace securely until permanent anchors are set.
 - 1) At concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage devices. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 2) Anchor bottom of frames to floors through floor anchors with threaded fasteners.
 - 3) Field splice only at approved locations indicated on the shop drawings. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
 - 4) Remove spreader bars only after frames are properly set and secured. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
 - 3. At fire-rated openings, install frames according to NFPA 80.
 - 4. Existing Frames (Salvaged from Alteration Work): Install salvaged existing frames in locations indicated.

C. Doors:

1. Non-Fire Rated Doors: Fit non-fire-rated doors accurately in their respective frames, with the following clearances:
 - a. Jambs and Head: 3/32 inch (2 mm).
 - b. Meeting Edges, Pairs of Doors: 1/8 inch (3 mm).
 - c. Bottom: 3/8 inch (9 mm), if no threshold or carpet.
 - d. Bottom: 1/8 inch (3 mm), at threshold or carpet.
2. Fire-Rated Doors: Install with clearances as specified in NFPA 80.
3. Smoke Control Doors: Install according to NFPA 105.
4. Existing Doors (Salvaged from Alteration Work): Install salvaged existing doors in locations indicated.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturers written instructions.

1. Secure stops with countersunk flat or oval head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

E. Apply hardware in accordance with hardware manufacturer's instructions. Drill and tap for machine screws as required. Do not use self tapping sheet metal screws. Adjust door installation to provide uniform clearance at head and jambs, and to contact stops uniformly. Adjust hardware items just prior to final inspection. Leave work in complete and proper operating condition.

1. Field cut existing hollow metal doors and frames indicated to receive new hardware. Field cutting shall be executed in a workmanlike manner and shall not void the existing door and frame labeling.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items just before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
- C. Remove and replace defective work, including doors or frames that are warped, bowed, or otherwise defective.
- D. Institute protective measures required throughout the remainder of the construction period to ensure that hollow metal doors and frames will be without damage or deterioration, at time of substantial completion.

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors~~[and transom panels]~~ with ~~[wood-veneer]~~ **[MDO]** ~~[hardboard or MDF]~~ ~~[and] [plastic-laminate]~~ faces.
2. Hollow-core doors with ~~[wood-veneer]~~ **[hardboard or MDF]** ~~[and] [plastic-laminate]~~ faces.
3. **[Shop priming]** **[Factory finishing]** flush wood doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. **[Section 062023 "Interior Finish Carpentry]** **[Section 064800 "Wood Frames"]** for wood door frames~~[including fire-rated wood door frames]~~.
2. Section 064216 "Flush Wood Paneling" for requirements for veneers from the same flitches for both flush wood doors and flush wood paneling.
3. Section 083473.16 "Wood Sound Control Door Assemblies" for acoustic flush wood doors.
4. Section 088000 "Glazing" for glass view panels in flush wood doors.
5. **[Section 099113 "Exterior Painting"]** **[Section 099123 "Interior Painting"]** ~~[and] [Section 099300 "Staining and Transparent Finishing"]~~ for field finishing doors.
6. Section 134900 "Radiation Protection" for lead-lined flush wood doors.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** ~~<Insert location>~~.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction~~[, louvers,]~~ and trim for openings.**[Include factory-finishing specifications.]**

B. LEED Submittals:

1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured[**and regionally extracted and manufactured**] materials. Include statement indicating cost for each regionally manufactured material.
 - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
 - b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
 3. Certificates for [**Credit MR 6**] [**Credit MR 7**]: Chain-of-custody certificates indicating that flush wood doors comply with forest certification requirements.[**Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body.**] Include statement indicating cost for each certified wood product.
 4. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
 5. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products 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."
 6. Laboratory Test Reports for Credit IEQ 4.2: For paints and coatings, documentation indicating that products 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."
 7. Laboratory Test Reports for Credit IEQ 4.4: For composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
1. Dimensions and locations of blocking.
 2. Dimensions and locations of mortises and holes for hardware.
 3. Dimensions and locations of cutouts.
 4. Undercuts.
 5. Requirements for veneer matching.
 6. Doors to be factory finished and finish requirements.
 7. Fire-protection ratings for fire-rated doors.
- D. Samples for Initial Selection: For [**plastic-laminate door faces**] [**and**] [**factory-finished doors**].
- E. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. **[For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.]**
2. Plastic laminate, 6 inches (150 mm) square, for each color, texture, and pattern selected.
3. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.
 - b. Provide Samples for each color, texture, and pattern of plastic laminate required.
 - c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
4. Louver blade and frame sections, 6 inches (150 mm) long, for each material and finish specified.
5. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: **[AWI Quality Certification] [WI Certified Compliance]** Program certificates.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that **[is certified for chain of custody by an FSC-accredited certification body] [and] [is a certified participant in AWI's Quality Certification Program] [is a licensee of WI's Certified Compliance Program]**.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.
- B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between **60 and 90 deg F** (**16 and 32 deg C**) and relative humidity between **[25 and 55] [43 and 70] [17 and 50]** **<Insert numbers>** percent during remainder of construction period.

1.8 WARRANTY

- A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than **1/4 inch** (**6.4 mm**) in a **42-by-84-inch** (**1067-by-2134-mm**) section.
 - b. Telegraphing of core construction in face veneers exceeding **0.01 inch in a 3-inch** (**0.25 mm in a 76.2-mm**) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Exterior Doors: **[Two] [Five]** **<Insert number>** years from date of Substantial Completion.
 - 4. Warranty Period for Solid-Core Interior Doors: Life of installation.
 - 5. Warranty Period for Hollow-Core Interior Doors: **[One] [Two]** **<Insert number>** year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Source Limitations: Obtain flush wood doors**[indicated to be blueprint matched with paneling]** **[and wood paneling]** from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with [AWI's, AWMAC's, and WI's "Architectural Woodwork Standards] [WDMA I.S.1-A, "Architectural Wood Flush Doors]."
1. Provide [AWI Quality Certification] [WI Certified Compliance] Labels indicating that doors comply with requirements of grades specified.
 2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.
- B. Regional Materials: Flush wood doors shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- C. Regional Materials: Flush wood doors shall be manufactured within 500 miles (800 km) of Project site.
- D. Certified Wood: Flush wood doors shall be certified as "FSC Pure"[or "FSC Mixed Credit"] according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- E. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- F. Low-Emitting Materials: Fabricate doors with [adhesives] [and] [composite wood products] that 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."
- G. WDMA I.S.1-A Performance Grade: [Extra Heavy Duty] [Heavy Duty] [Standard Duty] [As indicated].
- H. WDMA I.S.1-A Performance Grade:
1. Heavy Duty unless otherwise indicated.
 2. Extra Heavy Duty: [Classrooms] [public toilets] [janitor's closets] [assembly spaces] [exits] [and] [patient rooms] <Insert locations>[and where indicated].
 3. Standard Duty: [Closets (not including janitor's closets)] [and] [private toilets] <Insert locations>[and where indicated].
- I. Fire-Rated Wood Doors: Doors 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 [NFPA 252] [or] [UL 10C].
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard

- construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Temperature-Rise Limit: **[Where indicated] [At vertical exit enclosures 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. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 4. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 5. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 6. Pairs: Provide formed-steel edges and astragals with intumescent seals.
 - a. Finish steel edges and astragals with baked enamel[same color as doors].
 - b. Finish steel edges and astragals to match door hardware (locksets or exit devices).
- J. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- K. Particleboard-Core Doors:
1. Particleboard: ANSI A208.1, **[Grade LD-1] [or] [Grade LD-2][, made with binder containing no urea-formaldehyde]**.
 2. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade LD-2 or M-2, except for density.
 3. Blocking: Provide wood blocking in particleboard-core doors as**[needed to eliminate through-bolting hardware.][follows:]**
 - a. **5-inch (125-mm)** top-rail blocking, in doors indicated to have closers.
 - b. **5-inch (125-mm)** bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. **5-inch (125-mm)** midrail blocking, in doors indicated to have exit devices.
 4. Provide doors with **[glued-wood-stave] [or] [structural-composite-lumber]** cores instead of particleboard cores for doors indicated to receive exit devices.
- L. Structural-Composite-Lumber-Core Doors:
1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: **700 lbf (3100 N)**.
 - b. Screw Withdrawal, Edge: **400 lbf (1780 N)**.
- M. Mineral-Core Doors:
1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.

2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as **[needed to eliminate through-bolting hardware.]****[follows:]**
 - a. **5-inch (125-mm)** top-rail blocking.
 - b. **5-inch (125-mm)** bottom-rail blocking, in doors indicated to have protection plates.
 - c. **5-inch (125-mm)** midrail blocking, in doors indicated to have armor plates.
 - d. **[4-1/2-by-10-inch (114-by-250-mm) lock blocks] [5-inch (125-mm) midrail blocking]**, in doors indicated to have exit devices.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - a. Screw-Holding Capability: **[550 lbf (2440 N)] [475 lbf (2110 N)] [400 lbf (1780 N)]** per WDMA T.M.-10.

N. Hollow-Core Doors:

1. Construction: **[Institutional] [Standard]** hollow core.
2. Blocking: Provide wood blocking with minimum dimensions as follows:
 - a. **5-by-18-inch (125-by-460-mm)** lock blocks**[at both stiles]**.
 - b. **5-inch (125-mm)** top-**[and bottom-]**rail blocking.
 - c. **10-inch (250-mm)** **[top- and]**bottom-rail blocking.
 - d. **2-1/2-inch (64-mm)** midrail blocking.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Exterior Solid-Core Doors **<Insert drawing designation>**:

1. Grade: **[Premium, with Grade AA faces] [Premium, with Grade A faces] [Custom (Grade A faces)] [Custom (Grade B faces)]**.
2. Species: **[Anigre] [Select white ash] [Figured select white ash] [Select white birch] [Select red birch] [Cherry] [Select red gum] [Figured select red gum] [Select white maple] [Red oak] [White oak] [Persimmon] [Sapele] [Sycamore] [Walnut] <Insert species>**.
3. Cut: **[Rotary cut] [Plain sliced (flat sliced)] [Quarter sliced] [Rift cut]**.
4. Match between Veneer Leaves: **[Book] [Slip] [Pleasant] match**.
5. Assembly of Veneer Leaves on Door Faces: **[Center-balance] [Balance] [Running] match**.
6. Pair and Set Match: Provide for doors hung in same opening**[or separated only by mullions]**.
7. Exposed Vertical**[and Top]** Edges: **[Same species as faces or a compatible species - edge Type A] [Same species as faces - edge Type A] [Applied wood-veneer edges of same species as faces and covering edges of faces - edge Type B] [Applied wood edges of same species as faces and covering edges of crossbands - edge Type D]**.

8. Core: **[Particleboard]** **[Glued wood stave]** **[Structural composite lumber]** **[Either glued wood stave or structural composite lumber]**.
9. Construction: **[Five]** **[Five or seven]** plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. **[Faces are bonded to core using a hot press.]**
10. Adhesives: Type I per WDMA T.M.-6.
11. WDMA I.S.1-A Performance Grade: **[Extra Heavy]** **[Heavy]** Duty.

B. Interior Solid-Core Doors **<Insert drawing designation>**:

1. Grade: **[Premium, with Grade AA faces]** **[Premium, with Grade A faces]** **[Custom (Grade A faces)]** **[Custom (Grade B faces)]**.
2. Species: **[Anigre]** **[Select white ash]** **[Figured select white ash]** **[Select white birch]** **[Select red birch]** **[Cherry]** **[Select red gum]** **[Figured select red gum]** **[Select white maple]** **[Red oak]** **[White oak]** **[Persimmon]** **[Sapele]** **[Sycamore]** **[Walnut]** **<Insert species>**.
3. Cut: **[Rotary cut]** **[Plain sliced (flat sliced)]** **[Quarter sliced]** **[Rift cut]**.
4. Match between Veneer Leaves: **[Book]** **[Slip]** **[Pleasant]** match.
5. Assembly of Veneer Leaves on Door Faces: **[Center-balance]** **[Balance]** **[Running]** match.
6. Pair and Set Match: Provide for doors hung in same opening **[or separated only by mullions]**.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by **[10 feet (3 m)]** **[20 feet (6 m)]** **<Insert dimension>** or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
9. Transom Match: **[Continuous match]** **[End match]** **[As indicated]**.
10. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Section 064216 "Flush Wood Paneling."
11. Exposed Vertical **[and Top]** Edges: **[Same species as faces or a compatible species - edge Type A]** **[Same species as faces - edge Type A]** **[Applied wood-veneer edges of same species as faces and covering edges of faces - edge Type B]** **[Applied wood edges of same species as faces and covering edges of crossbands - edge Type D]**.
12. Core: **[Particleboard]** **[Glued wood stave]** **[Structural composite lumber]** **[Either glued wood stave or structural composite lumber]** **[Either glued or nonglued wood stave or structural composite lumber]**.
13. Construction: **[Five]** **[Five or seven]** plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. **[Faces are bonded to core using a hot press.]**
14. Construction: Seven plies, either bonded or nonbonded construction.
15. WDMA I.S.1-A Performance Grade: **[Extra Heavy Duty]** **[Heavy Duty]** **[Standard Duty]** **[As indicated]**.

C. Interior Hollow-Core Doors **<Insert drawing designation>**:

1. Grade: **[Premium, with Grade AA faces]** **[Premium, with Grade A faces]** **[Custom (Grade A faces)]** **[Custom (Grade B faces)]**.
2. Species: **[Anigre]** **[Select white ash]** **[Figured select white ash]** **[Select white birch]** **[Select red birch]** **[Cherry]** **[Select red gum]** **[Figured select red gum]** **[Select white**

- maple] [Red oak] [White oak] [Persimmon] [Sapele] [Sycamore] [Walnut] <Insert species>.
3. Cut: [Rotary cut] [Plain sliced (flat sliced)] [Quarter sliced] [Rift cut].
 4. Match between Veneer Leaves: [Book] [Slip] [Pleasant] match.
 5. Assembly of Veneer Leaves on Door Faces: [Center-balance] [Balance] [Running] match.
 6. Pair and Set Match: Provide for doors hung in same opening[or separated only by mullions].
 7. Exposed Vertical[and Top] Edges: [Same species as faces or a compatible species - edge Type A] [Same species as faces - edge Type A] [Applied wood-veneer edges of same species as faces and covering edges of faces - edge Type B] [Applied wood edges of same species as faces and covering edges of crossbands - edge Type D].
 8. Construction: Seven plies.
 9. WDMA I.S.1-A Performance Grade: [Heavy Duty] [Standard Duty] [As indicated].

2.4 DOORS FOR OPAQUE FINISH

A. Exterior Solid-Core Doors <Insert drawing designation>:

1. Grade: [Premium] [Custom].
2. Faces: [MDO] [Any closed-grain hardwood of mill option].
 - a. Apply MDO to [standard-thickness, closed-grain, hardwood face veneers] [or] [directly to high-density hardboard crossbands].
3. Exposed Vertical[and Top] Edges: Any closed-grain hardwood.
4. Core: [Particleboard] [Glued wood stave] [Structural composite lumber] [Either glued wood stave or structural composite lumber].
5. Construction: [Five] [Five or seven] plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.[Faces are bonded to core using a hot press.]
6. Adhesives: Type I per WDMA T.M.-6.
7. WDMA I.S.1-A Performance Grade: [Extra Heavy] [Heavy] Duty.

B. Interior Solid-Core Doors <Insert drawing designation>:

1. Grade: [Premium] [Custom].
2. Faces: [MDO] [Any closed-grain hardwood of mill option] [Hardboard or MDF].
 - a. Apply MDO to [standard-thickness, closed-grain, hardwood face veneers] [or] [directly to high-density hardboard crossbands].
 - b. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
 - c. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.
3. Exposed Vertical[and Top] Edges: Any closed-grain hardwood.
4. Core: [Particleboard] [Glued wood stave] [Structural composite lumber] [Either glued wood stave or structural composite lumber] [Either glued or nonglued wood stave or structural composite lumber].

5. Construction: [**Three**] [**Five**] [**Five or seven**] plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.[**Faces are bonded to core using a hot press.**]
6. Construction: [**Three**] [**Seven**] plies, either bonded or nonbonded.
7. WDMA I.S.1-A Performance Grade: [**Extra Heavy Duty**] [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

C. Interior Hollow-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**].
2. Faces: [**Any closed-grain hardwood of mill option**] [**Hardboard or MDF**].
 - a. Hardboard Faces: ANSI A135.4, Class 1 (tempered) or Class 2 (standard).
 - b. MDF Faces: ANSI A208.2, Grade 150 or Grade 160.
3. Exposed Vertical[**and Top**] Edges: Any closed-grain hardwood.
4. WDMA I.S.1-A Performance Grade: [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

2.5 PLASTIC-LAMINATE-FACED DOORS

A. Interior Solid-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**].
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, [**Grade HGS**] [**Grade HSH**].
3. Colors, Patterns, and Finishes: [**As indicated**] [**As selected by Architect from laminate manufacturer's full range of products**].
4. Exposed Vertical[**and Top**] Edges: [**Hardwood edges for staining to match faces**] [**Hardwood edges for painting**] [**Plastic laminate that matches faces, applied before faces**] [**Impact-resistant polymer edging, applied after faces**].
 - a. Polymer Edging Color: [**Beige**] [**Brown**] [**Same color as faces**].
5. Core: [**Particleboard**] [**Glued wood stave**] [**Structural composite lumber**] [**Either glued wood stave or structural composite lumber**].
6. Construction: Three plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces are applied.[**Faces are bonded to core using a hot press.**]
7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and crossbands are applied.[**Faces are bonded to core using a hot press.**]
8. WDMA I.S.1-A Performance Grade: [**Extra Heavy Duty**] [**Heavy Duty**] [**Standard Duty**] [**As indicated**].

B. Interior Hollow-Core Doors <**Insert drawing designation**>:

1. Grade: [**Premium**] [**Custom**].
2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, [**Grade HGS**] [**Grade HSH**].

3. Colors, Patterns, and Finishes: **[As indicated]** **[As selected by Architect from laminate manufacturer's full range of products]**.
4. Exposed Vertical**[and Top]** Edges: **[Hardwood edges for staining to match faces]** **[Hardwood edges for painting]** **[Plastic laminate that matches faces, applied before faces]** **[Impact-resistant polymer edging, applied after faces]**.
 - a. Polymer Edging Color: **[Beige]** **[Brown]** **[Same color as faces]**.
5. WDMA I.S.1-A Performance Grade: **[Heavy Duty]** **[Standard Duty]** **[As indicated]**.

2.6 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: **[Same species as door faces]** **[Species compatible with door faces]** **[Any closed-grain hardwood]**.
 2. Profile: **[Flush rectangular beads]** **[Recessed tapered beads]** **[Recessed tapered beads with exposed banding]** **[Lipped tapered beads]** **[Manufacturer's standard shape]**.
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of **0.048-inch- (1.2-mm-)** thick, cold-rolled steel sheet; **[factory primed for paint]** **[with baked-enamel- or powder-coated]** finish; and approved for use in doors of fire-protection rating indicated.
- D. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.
 1. Wood Species: **[Same species as door faces]** **[Species compatible with door faces]** **[Any closed-grain hardwood]**.
- E. Metal Louvers:
 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 2. Blade Type: **[Vision-proof, inverted V]** **[Vision-proof, inverted Y]** **[Darkroom-type, double inverted V]**.
 3. Metal and Finish: Hot-dip galvanized steel, **0.040 inch (1.0 mm)** thick, **[factory primed for paint]** **[with baked-enamel- or powder-coated]** finish.
 4. Metal and Finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.

5. Metal and Finish: Extruded aluminum with [**light bronze**] [**medium bronze**] [**dark bronze**] [**black**], Class II, color anodic finish, AA-M12C22A32/A34.
- F. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.
 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 2. Metal and Finish: Hot-dip galvanized steel, **0.040 inch (1.0 mm)** thick, [**factory primed for paint**] [**with baked-enamel- or powder-coated**] finish.

2.7 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 1. Fabricate door and transom panels with full-width, solid-lumber[, **rabbeted,**] meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Factory cut and trim openings through doors.
 1. Light Openings: Trim openings with moldings of material and profile indicated.
 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
 3. Louvers: Factory install louvers in prepared openings.
- E. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before [**shop priming**] [**factory finishing**].
 1. Flash top of outswinging doors with manufacturer's standard metal flashing.

2.8 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in [Section 099113 "Exterior Painting."] [Section 099123 "Interior Painting."]
- B. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing." Seal edges of cutouts and mortises with first coat of finish.

2.9 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on **[top and]** bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Factory finish doors that are indicated to receive transparent finish.
- D. Factory finish doors where indicated in schedules or on Drawings as factory finished.
- E. Use only paints and coatings that 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."
- F. Transparent Finish:
 - 1. Grade: **[Premium]** **[Custom]**.
 - 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" **[System 5, conversion varnish]** **[System 9, UV curable, acrylated epoxy, polyester, or urethane]** **[System 10, UV curable, water based]** **[or]** **[System 11, catalyzed polyurethane]** **<Insert finish designation>**.
 - 3. Finish: **[WDMA TR-4 conversion varnish]** **[or]** **[WDMA TR-6 catalyzed polyurethane]** **<Insert finish designation>**.
 - 4. Staining: **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **[None required]**.
 - 5. Effect: **[Open-grain finish]** **[Filled finish]** **[Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores]**.
 - 6. Sheen: **[Satin]** **[Semigloss]**.
- G. Opaque Finish:
 - 1. Grade: **[Premium]** **[Custom]**.

2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" [**System 5, conversion varnish**] [**System 9, UV curable, acrylated epoxy, polyester, or urethane**] [**System 10, UV curable, water based**] [or] [**System 11, catalyzed polyurethane**] **<Insert finish designation>**.
3. Finish: [**WDMA OP-4 conversion varnish**] [or] [**WDMA OP-6 catalyzed polyurethane**] **<Insert finish designation>**.
4. Color: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].
5. Sheen: [**Satin**] [**Semigloss**] [**Gloss**].

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Hardware: For installation, see [**Section 087100 "Door Hardware."**] [**Section 087111 "Door Hardware (Descriptive Specification)."**]
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 1. Install fire-rated doors according to NFPA 80.
 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 1. Clearances: Provide **1/8 inch (3.2 mm)** at heads, jambs, and between pairs of doors. Provide **1/8 inch (3.2 mm)** from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide **1/4 inch (6.4 mm)** from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - b. 2. Bevel non-fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** at lock and hinge edges.

2. Bevel fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

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FLUSH WOOD DOORS

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SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rated and non-rated interior access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 FIRE RATED AND NON-FIRE RATED ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

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. Access Panel Solutions.
2. Acudor Products, Inc.
3. Alfab, Inc.
4. Babcock-Davis.
5. Cendrex Inc.
6. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
7. Jensen Industries; Div. of Broan-Nutone, LLC.

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8. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
 9. Karp Associates, Inc.
 10. Larsen's Manufacturing Company.
 11. Maxam Metal Products Limited.
 12. Metropolitan Door Industries Corp.
 13. MIFAB, Inc.
 14. Milcor Inc.
 15. Nystrom, Inc.
 16. Williams Bros. Corporation of America (The).
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors with Concealed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
 2. Locations: Wall and ceiling.
 3. Door Size: As indicated on drawings.
 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
 - a. Finish: Factory prime.
 - b. Final Finish: Paint color to match adjacent finish color.
 5. Frame Material: Same material and thickness as door.
 6. Hinges: Manufacturer's standard.
 7. Hardware: Lock.
- D. Fire-Rated, Flush Access Doors with Concealed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
 2. Locations: Wall and ceiling.
 3. Fire-Resistance Rating: Not less than that of adjacent construction.
 4. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.
 5. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory finish.
 6. Frame Material: Same material, thickness, and finish as door.
 7. Hinges: Manufacturer's standard.
 8. Hardware: Lock.
- E. Hardware:
1. Lock: Cylinder.

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- a. Lock Preparation: Prepare door panel to accept cylinder specified in Section 087100 "Door Hardware."

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- E. Frame Anchors: Same type as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.4 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 1. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
 2. Provide mounting holes in frames for attachment of units to metal or wood framing.
 3. Provide mounting holes in frame for attachment of masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 1. For cylinder locks, furnish two keys per lock and key all locks alike.
 2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

2.5 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
 - 1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
 - 2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil for topcoat.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 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 08 31 13

SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Service doors.
2. Fire-rated service doors.
3. Fire-rated shutters.
 - a. 90 minute fire shutters at QTA Admin Windows
 - b. 45 minute fire shutters at QTA Support Windows
 - c. 3 hour fire shutters full height at QTA/QTA Helix openings
4. Overhead rapid coiling doors.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.
2. Section 099113 "Exterior Painting" for finish painting of factory-primed doors.

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
1. Wind Loads: As indicated on Drawings.
 2. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
- B. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:

1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
 3. For fire-rated doors, description of fire-release system including testing and resetting instructions.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Show locations of replaceable fusible links.
 3. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
1. Obtain operators and controls from overhead coiling door manufacturer.
- 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 as close to neutral pressure as possible according to NFPA 252 or UL 10B.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- D. 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.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch and as required to meet requirements.
- B. Endlocks and Windlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.
- D. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent over-travel of curtain, and a continuous bar for holding windlocks.

2.2 HOOD

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 1. Galvanized Steel: Nominal 0.028-inch-thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.

2.3 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - 1. Lock Cylinders: Provide cylinders standard with manufacturer and keyed to building keying system.
 - 2. Keys: Provide two for each cylinder.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.4 CURTAIN ACCESSORIES

- A. Smoke Seals: Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.
- B. Weather Seals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weather-tight installation, unless otherwise indicated.
 - 1. At door head, use 1/8-inch-thick, replaceable, continuous sheet secured to inside of hood.
 - 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene.
- C. Automatic-Closing Device for Fire-Rated Doors: Equip each fire-rated door with an automatic-closing device that is inoperative during normal door operations and that has a governor unit complying with NFPA 80 and an easily tested and reset release mechanism designed to be activated by the following:
 - 1. Building fire-detection, smoke-detection and alarm system activates the automatic motorized door closing function in fire alarm mode.

2.5 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.6 MANUAL DOOR OPERATORS

- A. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
- B. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25 lbf force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

2.7 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door Operator Location(s): Operator location indicated for each door.
 - 1. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.
- D. Electric Motors: Comply with NEMA designation requirements.
 - 1. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 - 2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
 - 3. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening
 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
- G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 1. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

2.8 DOOR ASSEMBLY

- A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ACME Rolling Doors.
 - b. Alpine Overhead Doors, Inc.
 - c. AlumaTek, Inc.

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- d. C.H.I. Overhead Doors.
 - e. City-Gates.
 - f. Cookson Company.
 - g. Cornell Iron Works, Inc.
 - h. Dynamic Closures Corp.
 - i. Lawrence Roll-Up Doors, Inc.
 - j. Mahon Door Corporation.
 - k. McKeon Rolling Steel Door Company, Inc.
 - l. Metro Door.
 - m. Overhead Door Corporation.
 - n. QMI Security Solutions.
 - o. Raynor.
 - p. Southwestern Steel Rolling Door Co.
 - q. Wayne-Dalton Corp.
 - r. Windsor Door.
- B. Operation Cycles: Not less than 50,000.
- C. Door Curtain Material: Galvanized steel.
- D. Door Curtain Slats: Curved or Flat profile slats of 1-1/2-inch to 3-1/4-inch center-to-center height.
- E. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.
- F. Hood: Aluminum.
- 1. Shape: Round.
 - 2. Mounting: Between jambs.
- G. Locking Devices: Equip door with locking device assembly and chain lock keeper.
- H. Electric Door Operator:
- 1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
 - 2. Operator Location: Wall.
 - 3. Motor Exposure: Exterior, wet, and humid.
 - 4. Emergency Manual Operation: Chain type.
 - 5. Obstruction-Detection Device: Automatic photoelectric sensor.
 - 6. Remote-Control Station: Interior.
 - 7. Other Equipment: Audible and visual signals.
- I. Door Finish:
- 1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

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2.9 Advanced Performance Service Door: Overhead rapid coiling door formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. ACME Rolling Doors.
- b. Alpine Overhead Doors, Inc.
- c. AlumaTek, Inc.
- d. C.H.I. Overhead Doors.
- e. City-Gates.
- f. Cookson Company.
- g. Cornell Iron Works, Inc.
- h. Dynamic Closures Corp.
- i. Lawrence Roll-Up Doors, Inc.
- j. Mahon Door Corporation.
- k. McKeon Rolling Steel Door Company, Inc.
- l. Metro Door.
- m. Overhead Door Corporation.
- n. QMI Security Solutions.
- o. Raynor.
- p. Southwestern Steel Rolling Door Co.
- q. Wayne-Dalton Corp.
- r. Windsor Door.

B. Operation Cycles: Not less than 100,000.

C. Door Curtain Material: Stainless steel.

D. Door Curtain Slats: Curved or Flat profile stainless steel slats of 1-1/2-inch to 3-1/4-inch center-to-center height.

E. Curtain Jamb Guides: Stainless steel with exposed finish matching curtain slats.

F. Hood: Stainless steel.

1. Shape: Round.
2. Mounting: Between jambs.

G. Locking Devices: Equip door with locking device assembly and chain lock keeper.

H. Electric Door Operator:

1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
2. Operator Location: Wall.
3. Motor Exposure: Exterior, wet, and humid.
4. Emergency Manual Operation: Chain type.
5. Obstruction-Detection Device: Automatic photoelectric sensor.

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6. Remote-Control Station: Interior.
7. Other Equipment: Audible and visual signals.

I. Door Finish:

1. Stainless Steel Finish: Standard mill finish stainless steel.

2.10 FIRE-RATED DOOR ASSEMBLY

A. Fire-Rated Service Door and Shutter: Overhead fire-rated coiling door and shutter formed with curtain of interlocking metal slats.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. ACME Rolling Doors.
- b. Alpine Overhead Doors, Inc.
- c. AlumaTek, Inc.
- d. C.H.I. Overhead Doors.
- e. City-Gates.
- f. Cookson Company.
- g. Cornell Iron Works, Inc.
- h. Lawrence Roll-Up Doors, Inc.
- i. Mahon Door Corporation.
- j. McKeon Rolling Steel Door Company, Inc.
- k. Overhead Door Corporation.
- l. Raynor.
- m. Southwestern Steel Rolling Door Co.
- n. Wayne-Dalton Corp.
- o. Windsor Door.

B. Operation Cycles: Not less than 50,000.

C. Fire Rating: As indicated on drawings.

D. Door Curtain Material: Galvanized steel.

E. Door Curtain Slats: Curved or Flat profile slats of 1-1/4-inch to 3-1/4-inch center-to-center height.

F. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

G. Hood: Match curtain material and finish.

1. Shape: Round.
2. Mounting: Between jambs.

H. Electric Door Operator:

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1. Usage Classification: Heavy duty, 60 to 90 cycles per hour.
 2. Operator Location: Wall.
 3. Motor Exposure: Exterior, wet, and humid.
 4. Emergency Manual Operation: Chain type.
 5. Obstruction-Detection Device: Automatic photoelectric sensor.
 6. Remote-Control Station: Interior.
 7. Other Equipment: Audible and visual signals.
- I. Automatic-Closing Device for Fire-Rated Doors: Equip each fire-rated door with an automatic-closing device that is inoperative during normal door operations and that has a governor unit complying with NFPA 80 and an easily tested and reset release mechanism designed to be activated by the following:
1. Building fire-detection, smoke-detection and alarm system activation of automatic motorized door closing function in fire alarm mode.
- J. Door Finish:
1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

2.11 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

2.13 STAINLESS STEEL FINISHES

- A. Mill finish stainless steel: No. 2D finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- D. Fire-Rated Doors: Install according to NFPA 80.
- E. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 3. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide weathertight fit around entire perimeter.

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3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08 33 23

SECTION 08 33 26 - OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Open-curtain overhead coiling grilles.
 - 2. Closed-curtain overhead coiling grilles.

- B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, angle-framing of grille opening, corner guards, and bollards.
 - 2. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for finish painting of factory-primed grilles.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling grille and accessory.

- 1. Include construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
 - 3. Description of fire-release system including testing and resetting instructions.

- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

- 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. For exterior components, include details of provisions for assembly expansion and contraction.
 - 5. Show locations of controls, locking devices, and other accessories.

6. Include diagrams for power, signal, and control wiring.
7. Show locations of replaceable fusible links.

C. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Open-curtain grille with full-size components consisting of rods, spacers, and links as required to illustrate each assembly.
2. Bottom bar with sensor edge.
3. Guides.
4. Mounting frame.
5. Brackets.
6. Hood.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

A. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling-grille manufacturer.

2.2 OPEN-CURTAIN GRILLE ASSEMBLY

A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that inter-connect with vertical links.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

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- a. ACME Rolling Doors.
 - b. Alpine Overhead Doors, Inc.
 - c. AlumaTek, Inc.
 - d. City-Gates.
 - e. Cookson Company.
 - f. Cornell Iron Works, Inc.
 - g. Lawrence Roll-Up Doors, Inc.
 - h. Mahon Door Corporation.
 - i. McKeon Rolling Steel Door Company, Inc.
 - j. Metro Door.
 - k. Overhead Door Corporation.
 - l. Raynor.
 - m. Windsor Door.
- B. Operation Cycles: Grille components and operators capable of operating for not less than 50,000. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.
- C. Grille Curtain Material: Galvanized steel.
1. Rod Spacing: Approximately 1-1/2 inches o.c.
 2. Link Spacing: Approximately 3 inches apart in a straight in-line pattern.
 3. Spacers: Metal tubes matching curtain material.
- D. Bottom Bar: Continuous doubled angles, fabricated from hot-dip galvanized steel and finished to match grille.
- E. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- F. Hood: Galvanized steel.
1. Shape: Round.
 2. Mounting: As indicated on Drawings.
- G. Locking Devices: Equip grille locking device assembly and chain lock keeper.
- H. Electric Grille Operator:
1. Usage Classification: Heavy duty, 25 or more cycles per hour and more than 90 cycles per day.
 2. Operator Location: Top of hood.
 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
 4. Motor Exposure: Exterior, wet, and humid.
 5. Emergency Manual Operation: Chain type.
 6. Obstruction-Detection Device: Automatic pneumatic sensor edge on bottom bar.

- a. Sensor Edge Bulb Color: Yellow.
- 7. Control Station: Where indicated on Drawings.
- 8. Automatic-Closing Device: Equip each grille with an automatic-closing device that is inoperative during normal door operations and that has a governor unit complying with NFPA 80 and an easily tested and reset release mechanism designed to be activated by the following:
 - a. Building fire-detection, smoke-detection and alarm system activates the automatic motorized door closing function in fire alarm mode.
- I. Grille Finish:
 - 1. Aluminum Finish: Clear anodized.

2.3 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.4 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

- A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.
 - 1. Aluminum Grille Curtain: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
 - 2. Stainless-Steel Grille Curtain: ASTM A 666 or ASTM A 240/A 240M, Type 300 series.
 - 3. Steel Grille Curtain: Hot-dip zinc coated (galvanized) complying with ASTM A 123/A 123M, or electrogalvanized complying with ASTM 653/A 653M, and phosphatized before fabrication.
 - 4. Glazing Insert: Manufacturer's standard glazing of clear polycarbonate sheet secured by the curtain links.
- B. Bottom Bar: Manufacturer's standard continuous shape unless otherwise indicated, finished to match grille.
 - 1. Astragal: Equip grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
 - 2. Provide motor-operated grilles with combination bottom astragal and sensor edge.
- C. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.5 HOODS AND ACCESSORIES

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 1. Galvanized Steel: Nominal 0.028-inch-thick, hot-dip galvanized-steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.
- B. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A 36/A 36M structural-steel tubes or shapes, hot-dip galvanized per ASTM A 123/A 123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

2.6 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
 1. Lock Cylinders: Cylinders specified in Section 087100 Door Hardware, and keyed to building keying system.
- B. Safety Interlock Switch: Equip power-operated grilles with safety interlock switch to disengage power supply when grille is locked.

2.7 COUNTERBALANCING MECHANISM

- A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.8 ELECTRIC GRILLE OPERATORS

- A. General: Electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operation cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each grille.
- C. Grille Operator Location(s): Operator location indicated for each grille.
 - 1. Front-of-Hood Mounted: Operator is mounted to the right or left grille head plate, with the operator on coil side of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.
- D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated.
 - 1. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate grille in either direction from any position, at a speed not less than 8 in./sec. and not more than, without exceeding nameplate ratings or service factor.
 - 2. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - 3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- E. Limit Switches: Equip motorized grille with adjustable switches interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.
- F. Obstruction-Detection Device: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.
 - 1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in grille opening without contact between grille and obstruction.

- a. Self-Monitoring Type: Designed to interface with grille operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, grille closes only with sustained or constant pressure on close button.
- 2. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Self-Monitoring Type: Four-wire configured device designed to interface with grille operator control circuit to detect damage to or disconnection of sensor edge.
- 3. Pneumatic Sensor Edge: Automatic safety sensor edge, located within astragal mounted to bottom bar. Contact with sensor activates device.
- G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
 - 1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - 2. Exterior-Mounted Units: Full-guarded, standard-duty, surface-mounted, weatherproof type; NEMA ICS 6, Type 4 enclosure, key operated.
- H. Emergency Manual Operation: Equip electrically powered grille with capability for emergency manual operation. Design manual mechanism so required force for grille operation does not exceed 25 lbf.
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.
- L. Emergency-Egress Release: Flush, wall-mounted handle mechanism, for accessibility-code-compliant egress feature, not dependent on electric power. The release allows an unlocked grille to partially open without affecting limit switches to permit passage, and it automatically resets motor drive upon return of handle to original position.
- M. Self-Opening Mechanism: Automatic release mechanism triggered by emergency push-button station, fire alarm or power failure. When activated, the grille self-opens by means of a fail-safe operator to the fully open position without the need for power operation or battery backup systems. When the emergency push-button is reset, and the alarm is cleared and power is restored, the grille will operate normally.

2.9 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. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

- A. Mill Finish: Manufacturer's standard.

2.11 STEEL AND GALVANIZED-STEEL FINISHES

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports, according to manufacturer's written instructions and as specified.
- B. Install overhead coiling grilles, hoods, controls, and operators at the mounting locations indicated for each grille.
- C. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- D. Power-Operated Grilles: Install automatic garage grille openers according to UL 325.

3.3 STARTUP SERVICE

- A. Perform installation and startup checks according to manufacturer's written instructions.
- B. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
- C. Test grille opening when activated by detector, fire-alarm system, emergency-egress release, or self-opening mechanism as required. Reset grille-opening mechanism after successful test.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly, so that grilles operate easily, free of warp, twist, or distortion.
 - 1. Adjust exterior components to be weather resistant.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-grille Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for grille operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.
 - 2. Include 24-hour-per-day, 7-day-per-week, emergency callback service.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 08 33 26

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OVERHEAD COILING GRILLES

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SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes aluminum windows for exterior locations.
- B. Related Requirements:
 - 1. Section 084113 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.

1.2 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters, and protecting finishes.
 - 4. Review and discuss the sequence of work required to construct a watertight and weather-tight exterior building envelope.
 - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- D. Samples for Initial Selection: For units with factory-applied color finishes.

1. Include similar Samples of hardware and accessories involving color selection.

- E. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.
 - b. Glazing Units: Five years from date of Substantial Completion.
 - c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
1. Window Certification: AMMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
1. Minimum Performance Class: CW.
 2. Minimum Performance Grade: 30.
- C. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.35 Btu/sq. ft. x h x deg F.
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.30.
- E. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 52.
- F. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: 120 deg F, ambient; 180 deg F material surfaces.
- G. Outside-Inside Transmission Class (OITC): Rated for not less than 22 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

2.3 ALUMINUM WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:
1. Fixed.
- B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- C. Glass: Clear annealed glass, ASTM C 1036, Type 1, Class 1, q3.
 1. Kind: Fully tempered where indicated on Drawings.
- D. Insulating-Glass Units: ASTM E 2190.
 1. Glass: ASTM C 1036, Type 1, Class 1, q3.
 - a. Tint: Clear.
 - b. Kind: Fully tempered where indicated on Drawings.
 2. Lites: Two.
 3. Filling: Fill space between glass lites with air.
 4. Low-E Coating: Pyrolytic on second surface.
- E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.

2.4 ACCESSORIES

- A. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- B. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.
- C. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.

- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.
- F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.
- G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
 - 1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
 - 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.

- b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
- 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
- 4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
- 5. Test Reports: Prepared according to AAMA 502.
- C. Remove and replace noncomplying windows and retest as specified above.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 51 13

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ALUMINUM WINDOWS

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SECTION 08 51 23 - STEEL WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Galvanized steel windows from hot-formed steel members.
 - 2. Fire rated galvanized steel windows.

- B. Related Sections:

- 1. Section 088000 "Glazing" for glazing requirements for steel windows.
 - 2. Section 088130 "Fire Resistant Glazing" for fire resistant glazing requirements for steel windows.
 - 3. Section 099123 "Interior Painting" and Section 099113 "Exterior Painting" for on-site painting of factory prime-coated windows.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
 - 1. Mullion details including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Flashing and drainage details.
 - 4. Glazing details.
- C. Samples for Initial Selection: For each type of steel window indicated.
- D. Samples for Verification: For steel windows and components required, prepared on Samples of size indicated below:

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1. Main Framing Member: 12-inch-long, full-sized sections, with glazing bead and factory-applied primer finish.

E. Product Schedule: For steel windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for steel windows.
- B. Field quality-control reports.
- C. Warranties: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For weather stripping and finishes to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating steel windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists, and by labels, test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to window manufacturer for installation of units required for this Project.
 1. Installer's responsibilities include providing data for steel windows, including Shop Drawings and Designated Design Submittal based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- C. Source Limitations: Obtain steel windows from single source from single manufacturer.
- D. Fire-Test-Response Characteristics: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated on Drawings, based on testing indicated.
 1. Neutral-Pressure Test: NFPA 257 and UL 9.
- E. SWI Publication: Comply with applicable requirements in SWI's "The Architect's Guide to Steel Windows and Doors" except where more stringent requirements are indicated.
- F. Pre-installation Conference: Conduct conference at Project Site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review and discuss finishing of steel windows that is required to be coordinated with finishing of other steel work for color and finish matching.
3. Review, discuss, and coordinate the interrelationship of steel windows with other exterior wall components. Include provisions for structural anchorage, glazing, flashing, weeping, air barriers, sealants, and protection of finishes.
4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of steel window openings by field measurements before fabrication.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of steel windows that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection.
 - c. Water leakage or air infiltration.
 - d. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: Ten years from date of Substantial Completion.

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:

Hot-Rolled Steel Windows:

- a. A & S Window Associates, Inc.
- b. Hope's Windows, Inc.
- c. Optimum Window Manufacturing Corp.
- d. Torrance Steel Window Co., Inc.

2.2 MATERIALS

- A. Fasteners: Provide fasteners of bronze, brass, stainless steel, or other metal that are warranted by manufacturer to be noncorrosive and compatible with trim, hardware, anchors, and other components of steel windows.
 - 1. Exposed Fasteners: If exposed fasteners are used, provide Phillips flat-head machined screws that match finish of member or hardware being fastened, as appropriate.
- B. Anchors, Clips, and Window Accessories: Provide units of stainless steel, hot-dip zinc-coated steel, bronze, brass, or iron complying with ASTM A 123/A 123M. Provide units with sufficient strength to withstand design pressure indicated.
- C. Glazing Stops: Formed steel - manufacturer's standard.
- D. Sealant: For sealants required within fabricated windows, provide manufacturer's standard, permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

2.3 WINDOWS

- A. Window Type: Fixed as indicated on Drawings.
- B. Hot-Rolled Steel Window Members: Provide frame members formed from hot-rolled, new billet steel sections. For combined weight of frame members and front-to-back depth of frame members, comply with the following requirements:
 - 1. Heavy Intermediate Windows: Not less than 3.5 lb/ft. in combined weight and not less than 1-5/16 inches deep.
 - 2. Window Finish: Galvanized and factory primed.

2.4 GLAZING

- A. Glass and Glazing System: See Section 088000 "Glazing" for glass units and glazing requirements for steel windows.
- B. Glass: Glazing product complying with Section 088000 "Glazing."
- C. Glazing System: Manufacturer's standard factory-glazing system that produces weather-tight seal and complies with assembly's fire-protection listing where indicated.

2.5 ACCESSORIES

- A. General: Provide manufacturer's standard accessories that comply with indicated standards.

- B. Window Cleaner Anchor Bolts: Provide window cleaner anchor bolts of standard design, complying with requirements of authorities having jurisdiction. Fabricate bolts of nonmagnetic stainless steel.

- 1. Reinforce window units or mullions to receive bolts and provide additional anchorage of units at bolt locations.

2.6 FABRICATION

- A. General: Fabricate steel windows of type and in sizes indicated to comply with SWI standards. Include a complete system for assembly of components and anchorage of window units.

- 1. Provide units that are reglazable from the interior.

- B. Provide weep holes and internal water passages to conduct infiltrating or condensed water to the exterior.

- C. Glazing Stops: Provide stainless steel screw-applied glazing stops; coordinate with Section 088000 "Glazing" and with glazing system indicated. Provide glazing stops to match panel frames. Finish glazing stops to match window units if fabricated of steel; otherwise, provide manufacturer's standard finish.

2.7 METALLIC-COATED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with non-petroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint complying with SSPC-Paint 20 and ASTM A 780.

- B. Factory Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

2.8 STEEL FINISHES

- A. Galvanized Finish: Hot-dip galvanize per ASTM A 123.

- B. Galvanized-Steel Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weather-tight window installation.
 - 1. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, operators, accessories, and other components.
- B. Install windows level, plumb, square, true to line, without distortion or impediment to thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.
- D. Install windows and components to drain condensation, water-penetrating joints, and moisture migrating within windows to the exterior.
- E. Separate corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E 2112, Section 5.12 "Dissimilar Materials."

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. Testing Methodology: Testing of windows for air-penetration resistance and water resistance will be performed according to AAMA 502, Test Method [A] [B], by applying same test pressures required for performance.
 - 2. Testing Extent: Three windows as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested immediately after installation.

- C. Window will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports according to AAMA 502. Testing agency will interpret test results and state in each report whether tested work complies with or deviates from requirements.

3.4 CLEANING, AND PROTECTION

- A. Clean factory-galvanized or primed steel surfaces immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Avoid damaging protective coatings and finishes.
- B. Clean glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. Remove contaminants immediately according to manufacturer's written recommendations.
- E. Refinish or replace windows with damaged galvanized or prime finish.

END OF SECTION 08 51 23

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STEEL WINDOWS

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SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes door hardware.

NOTE: All door hardware for public rest rooms will be stainless steel.

1.2 SUBMITTALS

- A. Product Data: Submit product data including installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples: Submit samples of exposed door hardware for each type indicated below, in specified finish. Tag with full description for coordination with the Door Hardware Schedule.
1. Door Hardware: As follows:
 - a. Locks and latches.
 - b. Operating trim.
 2. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- C. Door Hardware Schedule: Submit door hardware schedule prepared by or under the supervision of door hardware supplier. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware. The Architect's review of schedule shall neither be construed as a complete check nor shall it relieve the Contractor of responsibility for errors, deviations, or omissions from the specified requirements to provide complete door hardware for the project.
1. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.
 2. 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 each 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. Supply templates to door

- and frame manufacturer(s) to enable proper and accurate sizing and locations of cutouts for hardware. Detail conditions requiring custom extended lip strikes, or other special or custom conditions.
- g. Door and frame sizes and materials.
 - h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
 - (1) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
- D. Keying Schedule: Submit keying schedule prepared by or under the supervision of supplier, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.
- E. Warranties: Submit special warranties specified in this Section.
- F. Fire-Rated Door Assembly Testing: Submit a written record of each fire door assembly to LAWA and to the LADBS for future building inspections.

NOTE: Perform a field survey of each opening prior to submitting shop drawings. Verify the appropriateness of the assigned hardware group for the designated opening.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed 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.
- B. Supplier Qualifications: Door hardware supplier, who has completed a minimum of three (3) projects over the last 5 years which were similar in material, design and extent to that indicated for the project and which have resulted in construction with a record of successful in service performance, and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- C. Source Limitations: Obtain each type of door hardware from a single manufacturer, unless otherwise indicated.
- D. Regulatory Requirements: Comply with the following:
- 1. Provide hardware items complying with the applicable provisions for accessibility and usability by the disabled and handicapped in compliance

- with Americans with Disabilities Act (ADA) Accessibility Guidelines (ADAAG) for Buildings and Facilities.
2. NFPA 101: Comply with applicable provisions for means of egress doors.
 3. Electrified Door Hardware: Listed and classified by Underwriter's Laboratories, Inc. or by a testing agency acceptable to authorities having jurisdiction, as suitable for the purpose indicated.
 4. LADBS requirements.
- E. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by Underwriter's Laboratories, Inc. for fire ratings indicated, based on testing according to NFPA 252. Provide only door hardware items that are identical to items tested by UL for the types and sizes of doors required. In case of conflict between type of hardware specified and type required for accessibility or fire protection, furnish type required by NFPA and UL. Doors indicated in fire rated partitions and walls shall be positive latching and self-closing, with smoke gaskets where required by applicable codes.
1. Wherever exit device hardware is required on doors, comply with UL 305. Furnish hardware to door manufacturer for installation at factory. Provide supplementary label, "Fire Exit Hardware", on each exit device to certify that panic hardware has been panic load tested with door.
- F. Keying Conference: Conduct conference at Project site to comply with LAWA requirements. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
1. The degree of security required,
 2. Preliminary key system schematic diagram.
 3. LAWA Requirements for key control system.
 4. Address for delivery of keys to LAWA.
- G. Pre-Installation Conference: Conduct conference at Project site to comply with LAWA keying and security requirements. Review methods and procedures related to electrified door hardware including, but not limited to, the following:
1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
 2. Review sequence of operation for each type of electrified door hardware.
 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 required testing, inspecting, and certifying procedures.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware

delivered to Project site. 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.

1.5 COORDINATION

- A. Templates: Furnish templates and door hardware schedules, coordinated for the application of door hardware items with door and frame details, to door opening fabricators and trades performing door opening work to permit the preparation of doors and frames to receive the specified door hardware. Where the door hardware item scheduled is not adaptable to the finished size of door opening members requiring door hardware, submit an item having a similar operation and quality to the Architect for review. Each door hardware item shall be fabricated to templates.

NOTE: Coordinate the layout and installation of electrified door hardware with connections to power supplies, fire alarms systems and detection devices, access control system, security system and the building control system.

- B. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.6 WARRANTY

- A. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
1. Faulty operation of door hardware.
 2. Deterioration of metals, metal finishes, and other materials beyond normal use.
- B. Warranty Period for Electromagnetic Locks: Five years from date of Substantial Completion.
- C. Warranty Period for Manual Closers: Ten years from date of Substantial Completion.
- D. Warranty Period for Concealed Floor Closers: Five years from date of Substantial Completion.
- E. Warranty Period for Exit Devices: Five years from date of Substantial Completion.
- F. Warranty Period for Other Hardware: Two years from date of Substantial Completion.
- G. Warranty for Mortised Mechanical Lock and Latch-sets: Ten years from date of Substantial Completion.
- H. Warranty for Heavy Duty Cylindrical Mechanical Lock and Latch-sets: Seven years

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from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets are keyed to each scheduled door in the door and frame schedule, and the Door Hardware Schedule.
1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturer's products.
 2. The hardware supplier shall review each hardware set and compare it with the door types, details, and sizes as shown and verify each hardware item for function, hand, backset, and method of fastening through shop drawing submittals.

ITEM	MANUFACTURER	ACCEPTABLE SUB
Hinges and Electric Hinges	(STN) Stanley	Hager, Zero, Select
Key System	(SCH) Schlage	Owner's Standard
Locks	(SCH) Schlage	Owner's Standard
Exit Devices	(VON) Von Duprin	Owner's Standard
Flush Bolts/Dust Proof Strike	(IVE) Ives	
Coordinator	(IVE) Ives	
Closers	(LCN) LCN	Owner's Standard
Push & Pull Plates	(IVE) Ives	Rockwood, Trimco
Kickplates/Moplates	(IVE) Ives	Rockwood, Trimco
Magnetic Catches	(ROC) Rockwood	
Magnetic Holder	(RIX) Rixson	Or Equal
Stops & Holders	(IVE) Ives	Rockwood, Trimco
Power Supply	(VON) Von Duprin	
Power Transfer	(VON) Von Duprin	
Thresholds	(PEM) Pemko	Zero, NGP,
Astragals/Seals/ Bottoms	(PEM) Pemko	Zero, NGP
Silencers	(IVE) Ives	
Decals	(VON) Von Duprin	
Door Contacts	(GES) General Electric Security	Flair
Electric Strike	(FAS) Folger Adam Security	Von Duprin
Cyberlock Cylinder	(VID) Videx Key System	
Bottom Rail Lock	(ARC) Adams Rite	
Floor Stop & Miscellaneous	(TRM) Trimco	Rockwood

NOTE: Nursing Rooms, Family Restrooms and Pet Relief Rooms will have indicator thumbturn hardware. Model will be Schlage (SCH) L9496J-06A-626 with optional L583-363 ADA thumbturn.

2.2 HINGING METHODS

- A. Conventional Hinges: High strength stainless steel pins with concealed bearings.

2.3 LOCKS AND LATCHES

- A. Mortise Lock and Latch Sets: Heavy duty, commercial, mortise bodies complying with BHMA A156.13 Series 1000, Grade 1, with through-bolted lever trim. Furnish mortise type, field reversible without disassembly, field multifunctional without opening lock cases, lock and latch sets with 1 or 2 piece anti-friction deadlocking stainless steel latchbolts having a minimum 3/4 inch (19 mm) throw, 2-3/4 inches (70 mm) backset, and UL listed for 3 hour doors. All lock and latch sets, to be furnished complete with heavy 0.109 inch (2.77 mm) (12 gage) wrought steel zinc dichromate or chrome plated case, trim, adjustable beveled square cornered armored fronts, cold forged steel or stainless steel hubs, and 6 pin cylinders. Conceal fastenings, washers and bushings. Provide formed metal or black plastic box strikes for each lock and latch set. Provide brass, bronze or stainless steel strikes with curved lips of sufficient length to protect frames. Provide solid forged or cast levers with wrought roses. Where electro-mechanical locksets are scheduled provide transformers properly sized for conversion of power supply to the power characteristics of the electromechanical locksets. Where electro-mechanical locksets are scheduled provide request to exit (REX) monitoring feature.
1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 2. Latchbolts: 3/4 inch throw stainless steel anti-friction type.
 3. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable. Provide security design independent breakaway spindles. Breakage of outside lever shall not allow access to inside lever's hubworks to gain wrongful entry.
 4. Thumbturns: accessible design not requiring pinching or twisting motions to operate.
 5. Deadbolts: stainless steel 1-inch throw.
 6. Electric operation: Manufacturer-installed continuous duty solenoid.
 7. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.
 8. Scheduled Lock Series and Design: Schlage L series, 03A design.
 9. Certifications:
 - a) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
 - b) ANSI/ASTM F476-84 Grade 31 UL Listed.

2.4 EXIT DEVICES

- A. Exit Devices: Exit devices and exit device accessories shall conform to BHMA A156.3, Grade 1. Trim shall be wrought construction and commercial plain design with straight, beveled or smoothly rounded sides, corners and edges. Keyed devices shall be furnished less cylinders. Cylinders shall be as herein specified keyed to building system.
- B. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to the LADBS, for panic protection, based on testing according to UL 305.
1. Independent lab-tested 1,000,000 cycles.
 2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.

3. 0.75-inch throw deadlocking latchbolts.
4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
5. No exposed screws to show through glass doors.
6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-lb. maximum operating force per UBC Standard 10-4, and with 32 lb. maximum pressure under 250-lb. load to the door.
8. Flush end cap design as opposed to typical "bottle-cap" design end cap.
9. Comply with CBC Section 1003.3.1.9.

C. Specific features:

1. Non-Fire Rated Devices: cylinder dogging.
2. Lever Trim: Breakaway type, forged brass or bronze escutcheon min 0.130" thickness, compression spring drive, match lockset lever design.
3. Rod and latch guards with sloped full-width kick plates for doors fitted with surface vertical rod devices with bottom latches.
4. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware". Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.
5. Delayed Egress Devices: Function achieved within single exit device component, including latch, delayed locking device, request-to-exit switch, nuisance alarm, remote alarm, key switch, indicator lamp, relay, internal horn, door position input, external inhibit input plus fire alarm input. NFPA 101 "Special Locking Arrangement" compliant.
6. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.

2.5 CYLINDERS AND KEYING

- A. Cores for Bored Cylindrical Locksets: Provide key-in lever 6 pin cores for all bored cylindrical locksets, keyed into base building system, as manufactured by the bored lockset manufacturer.
- B. Cylinders: Full faced, interchangeable cylinders with square shouldered (not tapered) compression rings, 6 pin cylinders, standard threaded, keyed into building system, with cams to suit lock functions. Provide cylinders for installation into all locks.
 1. 1100 Series Flexible Head Mortise Cylinder; Corbin Russwin Architectural Hardware (CR).
 2. Series 40 Adjustable Front Cylinder; Sargent Manufacturing Company (SGT).
 3. 30-001 full-faced mortised cylinder with 36-083 compression rings; Schlage Lock Company (SCH).

- C. Keying System: Final keying to determine lock cylinders, keyed alike sets, level of keying, master key groups, grandmaster keying system shall be as directed by the LAWA. Supplier and Contractor shall meet with the LAWA and obtain final instructions in writing. Provide 2 nickel silver keys for each lock, and 6 keys for each grandmaster and master key system. Provide 2 blank keys for each lock for the LAWA's convenience in making additional keys.
 - 1. Temporary Cylinders: Provide temporary cylinders in locks during construction and as may be necessary for security or as may be requested by the LAWA. All temporary cylinders shall be individually keyed as required and subject to a single master key.
- D. Key Control System: Furnish a key control system with complete accessories including key gathering envelopes, labels, reserve pattern key tags with self-locking key clips, key receipt forms, key receipt holders, 3 way visible card index, temporary key markers and permanent key markers.

2.6 STRIKES

- A. Strikes for Locks and Latches: All strikes for locks and latches shall be provided by the lock and latch manufacturer unless otherwise specified or scheduled, refer to Article 'Locks and Latches'.
- B. Dustproof Floor Strikes: Complying with BHMA A156.16, Type L04251, L04021 or L14021, one of the following:
 - 1. No. 80; Door Controls International.
 - 2. DP2; H.B. Ives.
 - 3. 3910; Triangle Brass Manufacturing Company, Inc. (TBM or Trimco).
 - 4. 570; Rockwood Manufacturing Company (RM).
- C. Electric Strikes: Complying with BHMA A156.5, Grade 1. Mortised type for devices mounted in hollow metal frames. Unless otherwise required to interphase with the security access system furnish in 24 volt DC continuous voltage for silent operation. Provide each strike with extended lips as required to suit jamb conditions and fail secure function. Remote electrical control from card reader or control panel will unlock strike jaw, releasing latchbolt of the deadlatch, so door can be opened without operating latch by key cylinders from outside of secured room. Electric strikes shall be UL listed for up to 3 hour fire door assemblies.
 - 1. 6200 Series Electric Strikes; Von Duprin.

2.7 CLOSERS

- A. Surface-Mounted Closers: Closers shall be certified by ETL laboratories and the manufacturer to a minimum of 8,000,000 cycles and meet BHMA A156.4, Grade 1. Closers used in conjunction with overhead stops and holders shall be templated and coordinated to function properly. Properly detail closers to meet application requirements

by providing drop plates, brackets, etc. to meet application and installation requirements as indicated. Comply with manufacturer's recommendations for size of door closer depending on size of door, stack pressure conditions, and anticipated frequency of use. Closers shall have adjustable spring power, full rack and pinion, independent closing speed and latch regulating V-slotted valves, fully hydraulic with a high strength cast iron cylinder and solid forged steel arms, bore diameter of 1-1/2 inches (38.1 mm), pinion shaft diameter of 5/8 inches (15.87 mm), adjustable back check, cushion and built-in stop feature where scheduled, hold open arms where scheduled, delayed action where scheduled, arm finish to match closer cover finish scheduled. Provide metal covers of clean line design with plated or primed for paint finish as scheduled and that require removal in order to make adjustments to closer.

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjustable to open with not more than 5 lbs pressure to open at exterior doors and 5 lbs at interior doors. As allowed per California Building Code, Section 1133B.2.5, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15 lbs.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors do not require seasonal adjustments in temperatures from 120° F to -30° F, furnish data on request.
11. Non-flaming fluid, will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV): unsafe, not permitted.

2.8 PROTECTIVE TRIM UNITS

- A. Kick and Armor Plates: Fabricate protection plates from minimum 0.050 inch (1.3 mm) thick stainless steel, beveled top and 2 sides (B3E), square corners, complying with BHMA A156.6, and fastened with oval head Phillips fasteners countersunk into plate surface.
 1. Series 8400; H. B. Ives (IVS).
 2. K1050 Doorplate Series; Rockwood Manufacturing Company (RM).

3. KA050-2 Armor Plate and KOO50 for Kick Plates; Triangle Brass Manufacturing Company, Inc. (TBM or Trimco).
- B. Size: Furnish kick and armor plates sized 2 inches (51 mm) less than door width. Furnish kickplates 12 inches (305 mm) high, furnish armor plates 48 inches (1219 mm) high unless otherwise indicated. Provide protective plates with cutouts for locks, louvers and windows to the extent indicated. Mount protective plates flush with bottom of door.

2.9 OTHER HARDWARE

- A. Automatic Flush Bolts: Low operating force design, "LBR" type where scheduled.
- B. Overhead Stops: Stainless steel (100 series). Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.
- C. Door Stops: Provide stops to protect walls, casework or other hardware.
 1. Unless otherwise noted in Hardware Sets, provide wall type with appropriate fasteners. Where wall type cannot be used, provide floor type. If neither can be used, provide overhead type.
 2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90° stop / 95° deadstop. Note degree of opening in submittal.
- D. Seals: Finished to match adjacent frame color. Resilient seal material: polypropylene, nylon brush, or solid high-grade neoprene. UL label applied to seals on rated doors. Substitute products: certify that the products equal or exceed specified material's thickness and durability. Proposed substitutions: submit for approval.
 1. Solid neoprene: MIL Spec. R6855-CL III, Grade 40.
 2. Non-corroding fasteners at in-swinging exterior doors.
 3. Fire-rated Doors, Resilient Seals: UL10C / UBC Standard 7-2 compliant. Coordinate with selected door manufacturers' and selected frame manufacturers' requirements. Where rigid housed resilient seals are scheduled in this section and the selected door manufacturer only requires an adhesive-mounted resilient seal, furnish rigid housed seal at minimum, or both the rigid housed seal plus the adhesive applied seal. Adhesive applied seals alone are deemed insufficient for this project where rigid housed seals are scheduled.
- E. Thresholds: Comply with CBC Section 1133B.2.4.1.
 1. Exteriors: Seal perimeter to exclude water and vermin. Use butyl-rubber or polyisobutylene sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Non-ferrous 1/4inch fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors (SS/FHSL).
 2. Fire-rated openings, 90 min or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If

none scheduled, request direction from Architect.

3. Fire-rated openings, 3hour duration: Thresholds, where scheduled, to extend full jamb depth.
 4. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
- F. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- G. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Omit where adhesive mounted seal occurs. Leave no unfilled/uncovered pre-punched silencer holes.

2.10 FABRICATION

- A. Manufacturer's Nameplate: Provide each door hardware item without exposed manufacturers labels, names, or designs.
- B. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended. Provide Phillips oval-head screws with finished heads to match surface of door hardware item being attached. Machine screws and expansion shields shall be used for attaching hardware to concrete and masonry. Use through bolts for renovation work only where existing door blocking and reinforcements are unknown.
1. Concealed Fasteners: All new doors and door frames have been specified with adequate blocking and reinforcement provisions to eliminate exposed through bolting of hardware items. Doors installed with exposed through bolts will be rejected and replaced by the Contractor at no cost to the Owner. Where through bolts are used on existing doors provide sleeves for each through bolt.

2.11 FINISHES

- A. Designations: The abbreviations used to schedule hardware finishes are generally BHMA (Federal Standards where indicated in parenthesis) designations. Comply with base material and finish requirements indicated by the following:
1. BHMA 600 (USP): Primed for painting.
 2. BHMA 626 (US26D): Satin chromium plated.
 3. BHMA 630 (US32D): Satin stainless steel.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Hardware for fire door assemblies shall be installed in accordance with NFPA 80. Hardware for smoke and draft control door assemblies shall be installed in accordance with NFPA 105. Install hardware for non-labeled and non-smoke and draft door assemblies in accordance with BHMA A156.115 for steel doors and frames, BHMA A156.115-W series for wood doors, and hardware manufacturers installation instructions for doors and frames fabricated from other than steel or wood.
 - 1. All modifications to fire doors and frame for electric and mortised hardware shall be made by the respective door and frame manufacturers.
- B. Smoke Seals at S Labeled Door Assemblies: Provide and install smoke seals at S labeled doors in accordance with door manufacturer's instructions.

3.2 INSTALLATION

- A. Mounting Heights: Mount door hardware units at the following heights, unless specifically indicated on the drawings or required to comply with LADBS regulations:
 - 1. Locate levers, key cylinders, t-turn pieces, touchbars and other operable portions of latching hardware between 30 inches to 44 inches above the finished floor, per CBC Section 1133B.2.5.1.
 - 2. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- B. Install each door hardware item to comply with manufacturer's written instructions. Install overhead surface closers for maximum degree of opening obtainable. Place on room side of corridor doors, stair side of stair doors, and secondary corridor side of doors between corridors. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be finished, coordinate removal, storage, and reinstallation of surface protective trim units. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Existing frames and doors scheduled to receive new hardware: carefully remove existing hardware, tag and bag, and turn over to LAWA.
 - 1. Metal doors/frames: Weld or fasten with screws: filler pieces in existing hardware cut-outs and mortises not scheduled for re-use by new hardware. Leave surfaces smooth - - no applied patches.
 - 2. Remove unused existing floor closers; fill empty floor closer cavities with concrete.
- D. Do not install permanent key cylinders in locks until the time of preliminary acceptance by the Owner. At the time of preliminary acceptance, and in the presence of LAWA, permanent key all lock cylinders. Record and file all keys in the key control system, and turn system over to LAWA for sole possession and control.
- E. Key control storage system shall be installed where directed by the LAWA.

3.3 ADJUSTING

- A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every hardware component. Replace hardware components that cannot be adjusted to operate as intended. Adjust door control devices to compensate for building stack pressures, final operation of forced air mechanical equipment and to comply with referenced accessibility requirements.
 - 1. Test each electrical hardware item to determine if devices are properly functioning. Wiring shall be tested for correct voltage, current carrying capacity, and proper grounding. Stray voltages in wiring shall be eliminated.
 - 2. Coordinate with electrical installation for interface and connection with life safety and security systems.
- B. Fire-Rated Door Assembly Testing: Upon completion of the installation, test each fire door assembly in the project to confirm proper operation of its closing device and that it meets all criteria of a fire door assembly as per NFPA 80 2007 Edition. The inspection of the fire doors is to be performed by individuals with knowledge and understanding of the operation components of the type of door being subjected to testing. A written record shall be maintained and transmitted to LAWA and be made available to the LADBS. The record shall list each fire door assembly throughout the project, and include each door number, an itemized list of hardware set components at each door opening, and each door location in the facility.

3.4 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation. Clean hardware components as necessary to restore proper finish. Provide protection during the progress of the work and maintain conditions that ensure door hardware is in perfect working order and without damage or deterioration at time of Substantial Completion.

END OF SECTION 08 71 00

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SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Doors.
 - 3. Glazed curtain walls.
 - 4. Storefront framing.
 - 5. Glazed entrances.
 - 6. Sloped glazing.
 - 7. Skylights.
 - 8. Interior borrowed lites.
- B. Related Sections:
 - 1. Section 084229.23 "Sliding Automatic Entrances."
 - 2. Section 084423 "Structural-Sealant-Glazed Curtain Walls" for glazing sealants.
 - 3. Section 085123 "Steel Windows".
 - 4. Section 088130 "Fire Protection Rated Glazing" for steel windows.

1.2 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

1.3 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. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. LEED Submittals:
 1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- D. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in 12-inch lengths.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers.
- B. Product Certificates: For glass and glazing products, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulating glass.
- D. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- C. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 1. GANA Publications: GANA's "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."

3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- D. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
- E. Pre-installation Conference: Conduct conference at Project site.
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Review temporary protection requirements for glazing during and after installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.9 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed

from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.

- C. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 5. 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.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AFG Industries, Inc.; Krystal Klear.
 - b. Guardian Industries Corp.; Ultrawhite.
 - c. Pilkington North America; Optiwhite.
 - d. PPG Industries, Inc.; Starphire.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 - 1. For uncoated glass, comply with requirements for Condition A.
 - 2. For coated vision glass, comply with requirements for Condition C (other coated glass).
- C. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.
 - 1. Glass: Clear float.
 - 2. Ceramic Coating Color: As selected by Architect from manufacturer's full range.

2.3 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
- B. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

2.4 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary.

2. Spacer: Manufacturer's standard spacer material and construction.
 3. Desiccant: Molecular sieve or silica gel, or blend of both.
- B. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article.
- C. Insulating Glass Types:
1. Vision Light:
 - a. Type: Reflective Tinted Solar Control Low-E Insulating Glass
 - b. "Solarcool®" (2) "Solexia®" + "Solarban®" 60 (3) Clear by PPG Industries, Inc.
 - c. Outdoor Lite: "Solexia" Glass by PPG Industries, Inc.
 - d. Indoor Lite: Clear (transparent) Float Glass, Sputter Coated on third surface (3)
 - e. Low-E Coating: "Solarban" 60 Solar Control (Sputtered) by PPG Industries, Inc.
 - f. Location: Third Surface (3)
 - g. Reflective Coating: "Solarcool" by PPG Industries, Inc.
 - h. Location: Second Surface (2)
 - i. Performance Values
 - 1) Visible Light: 24%
 - 2) U-Value Winter: 0.29
 - 3) U-Value Summer: 0.27
 - 4) SHGC: 0.19
 - 5) Shading Coefficient: 0.22
 - 6) Outdoor Visible Light Reflectance: 24%
 2. Spandrel Light
 - a. Reflective Tinted Insulating Glass. Green Metallic color, reflective glass outdoor appearance with spandrel.
 - 1) Unit Overall Thickness [25 mm].
 - 2) Interspace Content: [Air].
 - 3) Outdoor Lite: Class 2 Tinted float glass, [6 mm] minimum thickness.
 - a) Annealed, tinted float glass.
 - b) Kind HS (heat strengthened) where required.
 - c) Kind FT (fully tempered) where indicated.
 - d) Reflective Coating: Pyrolytic coating on second surface.
 - e) Color: [Green Metallic]
 - f) Basis of Design Product:
 - (1) PPG Industries, Solarcool Solexia
 - 4) Indoor Lite: Class 1 (clear) float glass, [6 mm] minimum thickness.
 - a) Annealed.

- b) Kind HS (heat strengthened) where required.
- c) Kind FT (fully tempered) where indicated.
- d) Opacifier Coating: Applied on fourth surface.
- e) Basis of Design Product:

- (1) ICD Coatings Warm Gray #3-0770
- (2) Silicone Coating: match Architect's sample

- 5) Visible Light Transmittance: 2 percent minimum.
- 6) Winter Nighttime U-Factor: 0.48 maximum.
- 7) Summer Daytime U-Factor: 0.50 maximum.
- 8) Solar Heat Gain Coefficient: 0.26 maximum.
- 9) Outdoor Visible Light Reflectance: 24 percent maximum.

2.5 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.
- B. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
 - b. Schott North America, Inc.; Laminated Pyran Crystal.
 - c. Vetrotech Saint-Gobain; SGG Keralite FR-L.
- C. Fire-Protection-Rated Laminated Glass: 5/16-inch-thick, fire-protection-rated laminated glass, complying with testing requirements in 16 CFR 1201 for Category II materials.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Oldcastle Glass, Inc.; Pyroguard.

2.6 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:

1. Neoprene complying with ASTM C 864.
 2. EPDM complying with ASTM C 864.
 3. Silicone complying with ASTM C 1115.
 4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.7 GLAZING SEALANTS

- A. General:
1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Sealants used inside the weatherproofing system 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."
 5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. May National Associates, Inc.; Bondaflex Sil 290.
 - d. Pecora Corporation; 890.
 - e. Sika Corporation, Construction Products Division; SikaSil-C990.
 - f. Tremco Incorporated; Spectrem 1.

- C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.10 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

2.11 MONOLITHIC-GLASS TYPES

- A. Glass Type GL-1: Clear float glass.
 - 1. Thickness: 6.0 mm.
 - 2. Provide safety glazing labeling.
- B. Glass Type GL-2: Clear heat-strengthened float glass.
 - 1. Thickness: 6.0 mm.
 - 2. Provide safety glazing labeling.
- C. Glass Type GL-3: Ceramic-coated spandrel glass.
 - 1. Thickness: 6.0 mm.
 - 2. Coating Location: Second surface.
 - 3. Winter Nighttime U-Factor: 0.29 maximum.
 - 4. Summer Daytime U-Factor: 0.27 maximum.
 - 5. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.

2.12 LAMINATED-GLASS TYPES

- A. Glass Type GL-4: Clear laminated glass with two plies of float glass.
 - 1. Thickness of Each Glass Ply: 6.0 mm.
 - 2. Interlayer Thickness: 0.060 inch.
 - 3. Provide safety glazing labeling.

2.13 INSULATING-GLASS TYPES

- A. Glass Type GL-5: Clear insulating glass.
 - 1. Overall Unit Thickness: 1 inch.
 - 2. Thickness of Each Glass Lite: 6.0 mm.
 - 3. Outdoor Lite: Float glass.
 - 4. Interspace Content: Air.
 - 5. Indoor Lite: Float glass.
 - 6. Winter Nighttime U-Factor: 0.29 maximum.
 - 7. Summer Daytime U-Factor: 0.27 maximum.
 - 8. Provide safety glazing labeling.

2.14 FIRE-PROTECTION-RATED GLAZING TYPES

- A. Glass Type GL-6: 45-minute, 60-minute, 90-minute or 120-minute fire-rated glazing as indicated on Drawings; laminated ceramic glazing.
 - 1. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.

3.8 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

SECTION 08 88 13 - FIRE-RESISTANT GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire-protection-rated glazing.

1.2 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of glass and glazing product, from manufacturer.
- B. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install fire-resistant glazing until spaces are enclosed and weather-tight and temporary HVAC system is operating and maintaining ambient temperature conditions at occupancy levels during the remainder of the construction period.

1.9 WARRANTY

- A. Manufacturer's Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

- 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the

following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."

2.4 GLASS PRODUCTS

2.5 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL 9, including the hose-stream test, and shall comply with NFPA 80.

1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.

- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg F (250 deg C) temperature-rise limitation; and the fire-resistance rating in minutes.

- A. Laminated Ceramic Glazing: Laminated glass made from two plies of clear, ceramic glass; 8-mm total thickness; and complying with 16 CFR 1201, Category II.

1. AGC PyroSafe, Hebron, OH 43025
2. Anemostat, Carson CA 90745
3. Pilkington NA Pyrostop, Lathrop CA 95330
4. Safti First Fire Rated Glazing Solutions Brisbane, CA 94005
5. Vetrotech St Gobain, Contraflam, Auburn, WA 98001

2.6 GLAZING ACCESSORIES

- A. Provide glazing gaskets, glazing sealants, glazing tapes, setting blocks, spacers, edge blocks, and other glazing accessories that are compatible with glazing products and each other and are approved by testing agencies that listed and labeled fire-resistant glazing products with which products are used for applications and fire-protection ratings indicated.

- B. Glazing Sealants for Fire-Rated Glazing Products: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated.
 - 1. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- C. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

2.8 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with manufacturing and installation tolerances, including those for size, squareness, and offsets at corners, and for compliance with minimum required face and edge clearances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

- B. Examine glazing units to locate fire side and protected side. Label or mark units as needed so that fire side and protected side are readily identifiable. Do not use materials that leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Use methods approved by testing agencies that listed and labeled fire-resistant glazing products.
- B. 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.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites with proper orientation so that coatings face fire side or protected side 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.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial washaway from glass.

3.6 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry

surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 FIRE-PROTECTION-RATED GLAZING SCHEDULE

- A. Glass Type FPGL-1: 90-minute fire-protection-rated glazing with 450 deg temperature-rise limitation; laminated glass with intumescent interlayers.

END OF SECTION 08 88 13

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SECTION 08 91 10 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes conventionally glazed aluminum curtain walls installed as stick assemblies.
- B. Related Sections:
 - 1. Division 3 sections for concrete.
 - 2. Division 7 Section "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
 - 3. Section 088000 – Glazing.

1.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Based on standard test reports, comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
- B. Structural Loads:
 - 1. Basic Wind Speed: 70 mph
 - 2. Importance Factor: 1
 - 3. Exposure Category: C
 - 4. Seismic Zone 1.
- C. Deflection of Framing Members: At design wind pressure, as follows:
- D. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to applicable code, but not less than 1.76 times weight.
 - 1. Component Importance Factor is 1.0.
- E. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-

pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.

1. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
- F. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.57 Btu/sq. ft. x h x deg F .63 as determined according to AAMA15103.
 2. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of .06 cfm/sq. ft. of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 6.24 lbf/sq. ft.
 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC- certified condensation resistance rating of no less than 66 when tested to AAMA Specification 1503.
- G. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas having the following sound-transmission characteristics:
1. Outdoor-Indoor Transmission Class: Minimum of not less than 33 when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332 with one inch insulated glass.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Provide glazed aluminum curtain walls that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified testing agency similar to installation indicated in the Construction Documents.
1. Provide the following test data:
 - a. Structural-performance preloading at 50 percent of the specified wind-load design pressure when tested according to ASTM E 330.
 - b. Air infiltration when tested according to ASTM E 283.
 - c. Water penetration under static pressure when tested according to ASTM E 331.
 - d. Water penetration under dynamic pressure when tested according to AAMA 501.1.
 - e. Structural performance at design load when tested according to ASTM E 330.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. LEED Submittal:

1. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.

C. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, half-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Qualification Data: For qualified Installer.

G. Seismic Qualification Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

H. Welding certificates, for welding to be performed on-site.

I. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

J. Warranties: Sample of special finish warranties.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed energy performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

- D. 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."
- E. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - 1. Provide NFRC-certified glazed aluminum curtain walls with an attached label.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: 2 years from date of Substantial Completion.
- B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Reliance Wall with 2-1/2" x 7-1/4" mullion profiles, SSG option, as manufactured by Vistawall; or a comparable product by one of the following manufacturers:
1. Kawneer North America; an Alcoa company.
 2. Wausau Window and Wall Systems.
 3. Or approved equal.

2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 4. Structural Profiles: ASTM B 308/B 308M.
 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING

- A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction: Thermally improved.
 2. Glazing System: SSG
 3. Glazing Plane: Front.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.

2. Reinforce members as required to receive fastener threads.
 3. Use exposed fasteners with countersunk Phillips screw heads fabricated from 300 series stainless steel.
- D. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- F. Framing Sealants: Manufacturer's standard sealants.

2.4 GLAZING

- A. Glazing: Comply with Division 8 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.
1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 OPERABLE UNITS

- A. Doors: Comply with Division 8 Section "Automatic Entrance Doors."

2.6 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
 2. Accurately fitted joints with ends coped or mitered.

3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Fabricate components that, when assembled, have the following characteristics:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

E. Curtain-Wall Framing: Fabricate components for assembly using shear-block system.

F. Factory-Assembled Frame Units:

1. Rigidly secure nonmovement joints.
2. Seal joints watertight unless otherwise indicated.
3. Install glazing to comply with requirements in Division 8 Section "Glazing."

G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

A. High-Performance Organic Finish exterior surfaces: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: To match Duranar Sunstorm Bright Silver UC99463F.

B. Acrylic or Polyester (interior surfaces): Pigmented organic coatings conforming to AAMA 2603.

1. Color and Gloss: To match exterior.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Attach firmly to building structure for long life under hard service. Use threaded metal fasteners and malleable metal inserts. Do not use plastic fastening devices.
3. Do not install damaged components.
4. Fit joints to produce hairline joints free of burrs and distortion.
5. Rigidly secure nonmovement joints.
6. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
7. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
8. Seal joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

- D. Install components plumb and true in alignment with established lines and grades.

- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

- F. Install glazing as specified in Division 8 Section "Glazing."

3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.

- c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

- 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 FIELD QUALITY CONTROL

- A. Testing Services: Testing and inspecting of representative areas of glazed aluminum curtain walls shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.

- 1. Water Spray Test: Before installation of interior finishes has begun, areas shall be tested according to AAMA 501.2 and shall not evidence water penetration.

- a. Test Area: Entire area of glazed aluminum curtain wall.

- B. Glazed aluminum curtain walls will be considered defective if they do not pass tests.

- C. Prepare test and inspection reports, and submit for informational purposes.

3.5 CORRECTION OF DEFECTS

- A. Correct defects in glazed aluminum curtain walls that do not pass tests. Perform tests on corrected areas at no additional cost to Owner.

3.6 CLEANING AND PROTECTION

- A. Use cleaning agents and methods recommended by manufacturer.

- B. Remove temporary protective coverings from metal members as work progresses. Remove adhesive labels to avoid sun-baking onto exposed surfaces.

- C. Remove marks, scribe lines, and other minor blemishes. If blemishes cannot be removed by cleaning, remove affected members and replace with new, unblemished members.

END OF SECTION

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SECTION 08 91 19 - FIXED LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fixed, extruded-aluminum louvers.
2. Fixed, formed-metal vents.
3. One large louver to be removable from interior per Architectural detail – see drawings.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for louvers in hollow-metal doors.

1.2 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Vertical Louver: Louver with vertical blades (i.e., the axes of the blades are vertical).
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
2. Show mullion profiles and locations.

- C. Samples: For each type of metal finish required.
- D. Delegated-Design Submittal: For louvers indicated to comply with structural performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.
- B. Windborne-debris-impact-resistance test reports.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.

1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- E. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Wind-Driven-Rain-Resistant Louver:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Air Balance Inc.; a Mestek company.
 - b. Air Flow Company, Inc.
 - c. Airolite Company, LLC (The).
 - d. All-Lite Architectural Products.
 - e. American Warming and Ventilating, Inc.; a Mestek company.
 - f. Arrow United Industries; a division of Mestek, Inc.
 - g. Construction Specialties, Inc.
 - h. Greenheck Fan Corporation.
 - i. Industrial Louvers, Inc.
 - j. NCA Manufacturing, Inc.
 - k. Nystrom Building Products.
 - l. Reliable Products, Inc.
 - m. Ruskin Company; Tomkins PLC.
 - n. United Enertech Corp.
 2. Louver Depth: 5 inches or as indicated on the Drawings.
 3. Frame and Blade Nominal Thickness: Not less than 0.060 inch for blades and 0.080 inch for frames.
 4. Louver Performance Ratings:
 - a. Free Area: Not less than 5.0 sq. ft. for 48-inch- wide by 48-inch-high louver.
 - b. Air Performance: Not more than 0.10-inch wg static pressure drop at 600-fpm free-area exhaust or intake velocity.
 - c. Wind-Driven Rain Performance: Not less than 95 percent effectiveness when subjected to a rainfall rate of 3 inches per hour and a wind speed of 29 mph at a core-area intake velocity of 300 fpm.

5. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 FIXED, FORMED-METAL VENTS

A. Horizontal, Drainable-Blade Vent:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Air Balance Inc.; a Mestek company.
 - b. Air Flow Company, Inc.
 - c. Airolite Company, LLC (The).
 - d. American Warming and Ventilating, Inc.; a Mestek company.
 - e. Arrow United Industries; a division of Mestek, Inc.
 - f. Cesco Products; a division of Mestek, Inc.
 - g. Construction Specialties, Inc.
 - h. Dowco Products Group; Safe-Air of Illinois, Inc.
 - i. Greenheck Fan Corporation.
 - j. Industrial Louvers, Inc.
 - k. Metal Form Manufacturing Inc.
 - l. NCA Manufacturing, Inc.
 - m. Ruskin Company; Tomkins PLC.
 - n. United Enertech Corp.
 - o. Vent Products Company, Inc.
2. Vent Depth: 4 inches.
3. Frame and Blade Material and Nominal Thickness: Not less than 0.060 inch for blades and 0.080 inch for frames.
4. Mullion Type: Exposed.
5. Louver Performance Ratings:
 - a. Free Area: Not less than 7.0 sq. ft. for 48-inch-wide by 48-inch-high vent.
6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.5 VENT SCREENS

- A. General: Provide screen at each exterior vent.
 1. Screen Location for Fixed Vents: Interior face.
 2. Screening Type: Bird screening.
- B. Secure screen frames to vent frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to vent sizes indicated.

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1. Metal: Same type and form of metal as indicated for vent to which screens are attached.
2. Finish: Same finish as vent frames to which vent screens are attached.

2.6 BLANK-OFF PANELS

- A. Uninsulated, Blank-Off Panels: Metal sheet attached to back of louver.
1. Aluminum sheet for aluminum louvers, not less than 0.050-inch nominal thickness.
 2. Attach blank-off panels with clips.
- B. Insulated, Blank-Off Panels: Laminated panels consisting of an insulating core surfaced on back and front with metal sheets and attached to back of louver.
1. Thickness: 2 inches.
 2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch nominal thickness.
 3. Insulating Core: Rigid, glass-fiber-board insulation.
 4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness, with corners mitered and with same finish as panels.
 5. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
 6. Panel Finish: Same finish applied to louver.
 7. Attach blank-off panels with clips.

2.7 MATERIALS

- A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
1. Use tamper-resistant screws for exposed fasteners unless otherwise indicated.
 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 3. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 5. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Post-Installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.8 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- C. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel unless otherwise indicated.
- D. Include supports, anchorages, and accessories required for complete assembly.
- E. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
 - 1. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.

2.9 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - 1. Color:
 - a. CW-1: To match PPG UC51568XL Duranar XL “Champagne Gold”.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 08 91 19

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FIXED LOUVERS

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SECTION 092116.23 - GYPSUM BOARD SHAFT-WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Gypsum board shaft wall assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For shaft wall assemblies, from ICC-ES.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: 2 hours.
- B. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Depth: 2-1/2 inches (64 mm).
 - 2. Minimum Base-Metal Thickness: 25 gauge.
- C. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.
 - 1. Minimum Base-Metal Thickness: 25 gauge.
- D. Room-Side Finish: Gypsum board, Type X, 2 layers of 1/2" thick board.
- E. Shaft-Side Finish: Gypsum shaftliner board, Type X.

2.3 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Gypsum Shaftliner Board, Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with paper faces.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Gypsum; Shaft Liner.
 - b. CertainTeed Corp.; ProRoc Shaftliner.
 - c. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; ToughRock Fireguard Shaftliner.
 - d. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner.
 - e. USG Corporation; Sheetrock Brand Gypsum Liner Panel.
 - 2. Thickness: 1 inch (25.4 mm).

3. Long Edges: Double bevel.

2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120) unless otherwise indicated.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.
- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.

- B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.
 - 1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.
 - 2. Other locations: Provide shaft wall assemblies as indicate on the Drawings.
- D. 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.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- F. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 21 16.23

SECTION 09 22 16 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes non-structural metal framing assemblies.

1.2 ASSEMBLY PERFORMANCE REQUIREMENTS

1. Typical Walls: Wall assemblies shall be constructed for deflection not to exceed $1/240$ of the wall height when subjected to a positive and negative pressure of 5 psf (239 kPa).
2. Walls with Tile or Stone Finish: Wall assemblies to receive tile finishes shall be constructed for deflection not to exceed $1/360$ of the wall height when subjected to a positive and negative pressure of 5 psf (239 kPa). $L/600$ where supporting stone.
3. Ceilings, bulkheads, soffits, ceiling transitions, ledges, and coves shall be constructed for a deflection not to exceed $1/360$ of the distance between supports.
4. Partitions Enclosing Pressurized Mechanical Rooms: Provide metal framing systems of base metal thickness and spacing capable of limiting lateral deflections to $L/240$ when subjected to a 15 psf uniform lateral load or the design value induced by the mechanical system, whichever is greater.

1.3 SUBMITTALS

- A. Product Data: Submit product data for each product indicated.
- B. Evaluation Reports: Provide ICC-ESR numbers and LARR identification numbers for Metal Studs, Fasteners, and Suspension Ceilings.
- C. Provide Structural Calculations signed by a licensed California Civil or Structural engineer.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For non-structural metal framing assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."
- B. Sound Transmission Characteristics: For non-structural metal framing faced with gypsum wallboard materials and having STC ratings, provide materials and

- construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
- C. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PRE-INSTALLATION MEETING

- A. Prior to start of the non-structural metal framing Work, and at the Contractors direction, meet at the site and review the installation procedures and coordination with other Work. Meeting shall include Contractor, Architect and major material manufacturer as well as the Installer and other subcontractors whose Work must be coordinated with the non-structural metal framing and the gypsum wallboard Work.

1.7 PROJECT CONDITIONS

- A. Comply with ASTM C754 requirements or wallboard material manufacturer's written recommendations, whichever are more stringent.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. General: For fire rated assemblies, provide materials, including accessories and fasteners produced by one manufacturer, or, when products of more than one manufacturer are used in a rated system, they shall be acceptable to the Los Angeles Department of Building and Safety.

2.2 STEEL SUSPENDED CEILING FRAMING

- A. Components, General: Provide steel framing members sized and spaced as indicated but not less than that required to comply with ASTM C 754 under the maximum deflection conditions specified under Article 'Assembly Performance Requirements'.
- B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- (1.59-mm-) diameter wire, or double strand of 0.0475-inch- (1.21-mm-) diameter wire.
- C. Hanger Attachments to Overhead Decks: Suitable for application indicated, fabricated from

corrosion-resistant materials, with eyepins, clips or other devices for attaching hangers and capable of sustaining, without failure, a load equal to 10 times that imposed by the complete ceiling system.

- D. Hangers: As follows:
1. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.
 2. Rod Hangers: ASTM A 510 (ASTM A 510M), mild carbon steel.
 - a. Diameter: 1/4-inch (6.34-mm).
 - b. Protective Coating: ASTM A 153/A 153M, hot-dip galvanized.
 3. Flat Hangers: Commercial-steel sheet, ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized.
 - a. Size: 1 by 3/16 inch (25.4 by 4.76 mm) by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch (1.37 mm), a minimum 1/2-inch- (12.7-mm-) wide flange, with manufacturer's standard corrosion-resistant zinc coating.
- F. Furring Channels (Furring Members): Commercial-steel sheet with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.
1. Cold Rolled Channels: 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2- inch- (12.7-mm-) wide flange, 3/4 inch (19.1 mm) deep.
 2. Steel Studs: ASTM C 645, 0.0312 inch (0.79 mm) minimum base metal thickness and minimum depth as required to suit deflection criteria.
 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22.2 mm) deep.
 - a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
 4. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep members designed to reduce sound transmission.
- G. Grid Suspension System for Interior Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

2.3 STEEL PARTITION AND SOFFIT FRAMING

- A. General: Provide steel framing members sized and spaced as indicated but not less than that required to comply with ASTM C 754 under the maximum deflection conditions specified under Article 'Assembly Performance Requirements'.
1. In areas where top of partitions are dependent on ceiling system for lateral support, coordinate design and installation to comply with the above deflection limitation.
 2. Steel Sheet Components: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized zinc coating.

- B. Steel Studs and Runners: ASTM C 645, in minimum depth indicated in partition type details.
1. Minimum Base Metal Thickness:
 - a. Typical: As required to comply with deflection criteria.
 - b. Partitions Supporting Wall Mounted Casework: 16 gauge (0.053 inch) (1.3 mm) minimum thickness.
 - c. 18 gauge minimum, galvanized metal studs @ 16" oc max at all Restroom, Janitor, and mechanical rooms.
 2. Depth: As indicated.
- C. Deflection Track: ASTM C645 top runner with custom fabricated flanges with depths sized to accommodate roof and floor deck live and dead load deflections but not less than 2 inch (50.8 mm) deep flanges. Steel sheet top runner manufactured to prevent cracking of gypsum board applied to interior partitions resulting from deflection of structure above; in thickness indicated for studs and in width to accommodate depth of studs; one of the following:
1. CEMCO; CST, slotted Track.
 2. Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
 3. MBA Building Supplies; Slotted Deflecto Track
 4. Steel Network Incl; VertiClip SLD or VertiTrack VTD Series.
 5. Superior metal Trim; Superior Flex Track System (SFT)
 6. Telling Industries; Vertical Slip Track.
- D. Firestop Track: ASTM C645 top runner with custom fabricated flanges with depths sized to accommodate roof and floor deck live and dead load deflections but not less than 2 inch (50.8 mm) deep flanges. Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs; one of the following:
1. CEMCO; FAS Track.
 2. Fire Trak Corp; Fire Trak System.
 3. HILTI.
- E. Flat Strap and Backing Plate: 36 -inch (914-mm) wide steel sheet for blocking and bracing required for the attachment of surface mounted items and accessories indicated.
1. Minimum Base Metal Thickness: 0.040 inch (1.024mm) (18 gauge)
- F. Cold-Rolled Channel Bridging: For channel bridging for fixture attachment or lateral bracing provide 0.0538-inch (1.37-mm) bare steel thickness, with minimum 1/2-inch- (12.7-mm-) wide flange:
1. Depth: 1-1/2 inches (38.1 mm).

2. Clip Angle: 1-1/2 by 1-1/2 inch (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-) thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 1. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
 2. Depth: 7/8 inch (22.2 mm).
- H. Resilient Furring Channels: 1/2-inch- (12.7-mm-) deep, steel sheet members designed to reduce sound transmission.
- I. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members securely to substrates involved; complying with the recommendations of the gypsum board manufacturers for applications indicated.

NOTE: On the drawings, indicate the locations for each type of metal framing, fasteners, furring or suspension system with the required spacing and corresponding thickness with their related LARR number.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Acoustical Sealant for Exposed and Concealed Joints: Non-sag, paintable, non-staining, latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- C. Mold/mildew resistant Firestop materials per ASTM G21 Standard. Provide product data as evaluation for Resistance of Synthetic Polymetric Materials to Fungi.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which non-structural metal framing attaches or abuts, installed door frames and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed-on fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (600 mm) o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of the non-structural metal framing and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.3 INSTALLING STEEL FRAMING, GENERAL

- A. General: Install steel framing to comply with ASTM C754, ASTM C840 and the gypsum board manufacturers recommendations, where standards conflict the more stringent shall apply.
- B. Install supplementary framing, blocking, backerplates and bracing at locations in gypsum board assemblies which are indicated to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."
- C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement.
1. Isolate ceiling assemblies where they abut or are penetrated by building structure.
 2. Isolate partition framing and wall furring where it abuts structure, except at floor. Install slip-type joints at head of assemblies that avoid axial loading of assembly and laterally support assembly.
 - a. Use deep-leg deflection track where indicated.
 - b. Use proprietary firestop track where indicated.

3.4 INSTALLING STEEL SUSPENDED CEILING FRAMING

A. Suspended Ceiling Framing:

1. Suspend ceiling hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. 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 the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3. Attach hangers to structural members. Do not support ceilings from or attach hangers to permanent metal forms, steel deck tabs, steel roof decks, ducts, pipes, or conduit.
 4. Secure wire hangers by looping and wire-tying, to eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail.
 5. Secure rod and flat hangers to structure, including intermediate framing members, by attaching to 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.
- B. Installation Tolerances: Install steel framing components for suspended ceilings so members for panel attachment are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member and transversely between parallel members.
- C. Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.
- D. Install suspended steel framing components in sizes and spacings indicated, but not less than that required by the referenced steel framing and installation standards unless more stringent spacings are recommended by the gypsum board manufacturer.
- E. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

3.5 INSTALLING STEEL PARTITION AND SOFFIT FRAMING

- A. Install continuous runners (tracks) sized to match studs at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction. Secure runners to substrates with fasteners spaced a maximum of 24 inches (600 mm) o.c. unless closer spacing is recommended by the framing manufacturer for the floor and ceiling construction involved. Provide fasteners at all corners and ends of runner tracks.
1. Where studs are installed directly against exterior walls, install foam gasket isolation strip between studs and wall.
- B. Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings and at partial height partitions. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
1. Cut studs 1/2 inch (13 mm) short of full height to provide perimeter relief.
 2. For fire-resistance-rated and STC-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain

- ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure.
3. Terminate partition framing at suspended ceilings where indicated.
 4. Terminate partial height partition framing as indicated.
- D. Install steel studs and furring in sizes and at spacing indicated but not less than that required by the referenced steel framing installation standard to comply with maximum deflection and minimum loading requirements specified, unless more stringent requirements are recommended by the gypsum board manufacturer:
1. Space studs 16 inches (400 mm) o.c., unless otherwise indicated.
- E. Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.
- F. Install backerplates for support of wall mounted items.
- G. Curved Partitions:
1. Cut top and bottom track (runners) through leg and web at 2-inch (50-mm) intervals for arc length. In cutting lengths of track, allow for uncut straight lengths of not less than 12 inches (300 mm) at ends of arcs.
 2. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 3. Support outside (cut) leg of track by clinching steel sheet strip, 1-inch- (25-mm-) high- by-thickness of track metal, to inside of cut legs using metal lock fasteners.
 4. Begin and end each arc with a stud, and space intermediate studs equally along arcs at stud spacing recommended in writing by gypsum board manufacturer for radii indicated. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches (150 mm) o.c.
- H. Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
1. Install two studs at each jamb, unless otherwise indicated. Install one additional stud no more than 6 inches (150 mm) from jamb studs at single doors greater than 48 inches (1200 mm) and at all pairs of doors.
 2. Install cripple studs at head adjacent to each jamb stud. Provide runner track and typical studs above door openings with studs spaced not more than 24 inches (600 mm) o.c.
 3. At all welded frames with fixed anchor clips secure stud reinforcing to jamb anchor clips with not less than two self tapping screws per clip.
 4. Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
- I. Frame openings other than door openings the same as required for door openings,

unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

- J. Isolation Strip Attachment: Where partitions abut exterior wall window mullions, and partition filler panels are not indicated, adhesively attach isolation strips to window mullions. Center isolation strips on mullion to form a continuous, sound resistant and lightproof, recessed joint seal for the entire length of the interface between the partition studs and trim members and the vertical window mullions.

3.6 CLEANING AND PROTECTION

- A. Clean floors of all non-structural metal framing debris and leave broom clean. Excess material, scaffolding, tools and other equipment are to be removed upon completion of the Work.
- B. Provide final protection and maintain conditions that ensure non-structural metal framing Work remains without damage or deterioration at time of Substantial Completion.

END OF SECTION 09 22 16

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NON-STRUCTURAL METAL FRAMING

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SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gypsum board assemblies.

1.2 SUBMITTALS

- A. Product Data: Submit product data for each product indicated.
- B. Samples: Submit full size samples in 12-inch- (300-mm-) long lengths for each exposed trim accessory indicated.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance-Rated Assemblies: Indicated by design designations from UL's "Fire Resistance Directory."
- B. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by a qualified independent testing agency.
- C. STC-Rated Assemblies: Indicated by design designations from GA-600, "Fire Resistance Design Manual."
- D. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- E. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to prevent sagging.
- C. Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or

otherwise damage metal corner beads and trim.

1.5 PRE-INSTALLATION MEETING

- A. Prior to start of each type of gypsum wallboard system, and at the Contractors direction, meet at the site and review the installation procedures and coordination with other Work. Meeting shall include Contractor, Architect and major material manufacturer as well as the Installer and other subcontractors whose Work must be coordinated with the gypsum wallboard Work.

1.6 PROJECT CONDITIONS

- A. Comply with ASTM C840 requirements or wallboard material manufacturer's written recommendations, whichever are more stringent.
- B. Installation of wallboard joint treatments shall not start until the space to receive wall board joint treatments is heated to maintain a continuous and uniform temperature of not less than 55 degrees F, from one week prior to beginning of joint treatment until joint treatment is completed and thoroughly dry. Ventilation, either natural or supplied by fans, circulators or air conditioning systems shall be provided to remove excess moisture during joint treatment. Temperature requirements may be waived only on recommendation of wallboard materials manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. General: For fire rated assemblies, provide materials, including accessories and fasteners produced by one manufacturer, or, when products of more than one manufacturer are used in a rated system, they shall be acceptable to authorities having jurisdiction.

2.2 INTERIOR GYPSUM WALLBOARD

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Gypsum Wallboard: ASTM C36 or ASTM C1396/C1396M.
 - 1. Regular Type:
 - a. Thickness: 5/8 inch (15.9 mm), unless otherwise indicated.
 - b. Long Edges: Tapered.
 - c. Location: Vertical surfaces, unless otherwise indicated.
 - 2. Type X:
 - a. Thickness: 5/8 inch (15.9 mm).
 - b. Long Edges: Tapered.
 - c. Location: Where required for fire-resistance-rated assembly.

NOTE: On the drawings indicate the locations for each type of gypsum board and tile backing units using the same terminology as in these specifications. On the drawings place UL or LARR numbers for all fire rated gypsum and cementitious backer unit assemblies.

- C. Flexible Gypsum Wallboard for Curved Surfaces: ASTM C36 or ASTM C1396/C1396M, manufactured to bend to fit tight radii and to be more flexible than standard regular-type panels of the same thickness.
 - 1. Thickness: 1/4 inch (6.4 mm).
 - 2. Long Edges: Tapered.
 - 3. Location: Apply in double layer at curved assemblies.
- D. Sag-Resistant Gypsum Wallboard for Interior Ceilings: ASTM C36 or ASTM C1396/C1396M, manufactured to have more sag resistance than regular-type gypsum board.
 - 1. Thickness: 1/2 inch (12.7 mm).
 - 2. Long Edges: Tapered.
 - 3. Location: Ceiling surfaces.

NOTE: Use Impact Resistant Gypsum Board in areas susceptible to high abuse and the use of alternative materials is not feasible. Use a minimum of 20 gauge metal framing as support.

2.3 TILE BACKING PANELS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.
- B. Water-Resistant Gypsum Backing Board: ASTM C630/C630M or ASTM C1396/C1396M.
 - 1. Core: 5/8 inch (15.9 mm).
- C. Cementitious Backer Units: ANSI A118.9, in thickness indicated.
 - 1. Thickness: 1/2 inch (12.7 mm).

NOTE: For adhesive applied ceramic tile in rest rooms, use cementitious back units as a substrate. When using water-resistant gypsum backing board at tile applications, the metal studs shall be spaced at 16 inches on center. When using water resistant backing board on ceilings spacing of supports shall be 12 inches on center.

2.4 TRIM ACCESSORIES

- A. Interior Steel Trim Accessories: ASTM C1047; formed metal sheet steel zinc coated by hot dipped process. Shapes indicated below by reference to Fig. 1 designations in ASTM C1047.
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead with both face and back flanges to receive joint compound; use at exposed panel edges.
 - 3. U-Bead with face and back flanges; face flange formed to be left without application of joint compound: Use where indicated.
 - 4. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.
 - 5. Expansion (Control) Joint: One-piece control joint formed with V-shaped slot, with removable strip covering slot opening. Use where indicated.
- B. Aluminum Trim Accessories: Extruded aluminum trim with 1/4 inch (6.35 mm) diameter holes in fins for attachment to wallboard or studs; longest lengths available in profiles indicated; primed for finish painting; sized for scheduled wallboard thickness shown.

2.5 JOINT TREATMENT MATERIALS

- A. General: Provide joint treatment materials complying with ASTM C475 and the recommendations of both the manufacturers of the wallboard products and joint treatment materials for each application indicated.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard over Metal Studs: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.
 - 3. Second coat: For filling over tape, beads and fasteners. Use setting-type, sandable topping compound.
 - 4. Third coat: For finishing over tape, beads and fasteners. Use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping and setting-type, sandable topping compounds.
 - 2. Cementitious Backer Units: As recommended by manufacturer.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Acoustical Sealant for Exposed and Concealed Joints: Non-sag, paintable, non-staining, latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
- C. Steel Drill Screws: ASTM C1002, unless otherwise indicated.
 - 1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound Attenuation Blankets, and Fire Resistive Insulation for Installation Within Gypsum Wallboard Partitions: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

NOTE: Sound insulation is required in all rest room walls.

- E. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board assemblies attach or abut, installed door frames and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS

- A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C840, GA-216, and the gypsum wallboard manufacturer's recommendations, where standards conflict, the more stringent shall apply.
- B. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- C. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated. Install ceiling board panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints or avoid them entirely.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of board.
 - b. At high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

D. Multilayer Application:

1. On Partitions/Walls: Apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. On Ceilings: Apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply base layers in same sequence. Apply base layers at right angles to framing members and offset face layer joints 1 framing member, 16 inches minimum, from parallel base joints, unless otherwise indicated or required by fire-resistance-rated assembly.

E. Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.

F. Multilayer Fastening Methods: Fasten base layers and face layers separately to supports with screws.

G. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

H. Curved Partitions:

1. Install panels horizontally and unbroken, to the extent possible, across curved surface plus 12 inches (300 mm) long straight sections at ends of curves and tangent to them.
2. Wet gypsum panels on surfaces that will become compressed where curve radius prevents using dry panels. Comply with gypsum board manufacturer's written recommendations for curve radii, wetting methods, stacking panels after wetting, and other preparations that precede installing wetted gypsum panels.
3. On convex sides of partitions, begin installation at one end of curved surface and fasten gypsum panels to studs as they are wrapped around curve. On concave side, start fastening panels to stud at center of curve and work outward to panel ends. Fasten panels

to framing with screws spaced 12 inches (300 mm) o.c.

4. For double-layer construction, fasten base layer to studs with screws 16 inches (400 mm) o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches (300 mm) o.c.
5. Allow wetted gypsum panels to dry before applying joint treatment.

I. Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: For substrates indicated to receive thin-set tile, install water-resistant gypsum backing board panels, unless otherwise indicated. Where tile backing panels abut other types of panels in the same plane, shim surfaces to produce a uniform plane across panel surfaces.
2. Cementitious Backer Unit Application: ANSI A108.11 at showers and where otherwise indicated.

J. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.

K. 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.

L. Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

M. Attach gypsum panels to framing provided at openings and cutouts.

N. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Fit gypsum panels around ducts, pipes, and conduits.
2. Where partitions intersect open exterior and interior wall kickers, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by the wall kickers and other structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
3. Where chase walls are shown, provide bracing between parallel rows of studs. Unless otherwise shown, provide gypsum wallboard braces no less than 1/2-inch- (12.7-mm-) thick x 12-inches- (300-mm-) wide and cut to width of chase. Locate at quarter points in wall height between each pair of parallel studs. Fasten with not less than 3 screws at each stud.

O. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4 to 1/2 inch (6.4 to 12.7 mm) wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

P. STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion joints,

and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.

- Q. Cut openings in wallboard for electrical outlets, piping and other penetrations. Maintain close tolerances so that edges will be covered by plates and escutcheons. Cut both face and back paper. Do not install electrical outlets back to back on opposing sides of partitions.
- R. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
 - 1. Space screws a maximum of 12 inches (304.8 mm) o.c. for vertical applications.
 - 2. Space fasteners in panels that are tile substrates a maximum of 8 inches (203.2 mm) o.c.
 - 3. Install fasteners not less than 3/8-inch- (9.5-mm-) from ends or edges of wallboard sheets, spacing fasteners opposite each other on adjacent ends or edges.
 - 4. Begin fastening from center of wallboard and proceed toward edges and corners.
 - 5. Apply pressure on surface of wallboard adjacent to fasteners being driven to ensure that wallboard will be secured tightly to supporting members.
 - a. Drive fastener with shank perpendicular to face of board.
 - b. Drive screws with a power screwdriver as recommended by wallboard manufacturer. Set heads of screws slightly below surface of paper without cutting paper.

3.3 INSTALLING TRIM ACCESSORIES

- A. General: Fasten trim accessories according to manufacturer's written instructions for type, length, and spacing of fasteners.
- B. Install corner beads at external corners.
- C. Install interior trim accessories where edge of gypsum panels would otherwise be exposed or semi-exposed. Provide interior trim accessories with face flange formed to receive joint compound.
- D. Install aluminum trim accessories where indicated.
- E. Install control joints in locations indicated and where directed by the Architect for visual effect, or if not indicated or directed by the Architect, provide control joints in accordance with ASTM C840 which is as follows:
 - 1. Where a partition, wall or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
 - 2. Where a wall or a partition runs in an uninterrupted straight plane exceeding 30 linear

feet (9,100 mm).

3. Control joints in interior ceilings with perimeter relief shall be installed so that linear dimensions between control joints do not exceed 50 feet (15,000 mm) and total area between control joints does not exceed 2500 square feet (230 m²).
4. Control joints in interior ceilings without perimeter relief shall be installed so that linear dimensions between control joints do not exceed 30 linear feet (9,100 mm) and total area between control joints does not exceed 900 square feet (84 m²).
5. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

3.4 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Apply joint treatment at gypsum board joints, flanges of interior trim and aluminum trim accessories, interior angles, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated. Produce surfaces free of tool marks and ridges ready for decoration of type indicated. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Cementitious Backer Units: Finish according to manufacturer's written instructions.
- E. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C840, for locations indicated:
 1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
 2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile and where indicated.
 3. Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.
 4. Level 5: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges, and apply skim coat of joint compound over entire surface where wallboard is indicated to receive wall coverings, semi-gloss and high gloss paints, and Italian plaster.

3.5 CLEANING AND PROTECTION

- A. Clean floors of all wallboard debris and leave broom clean. Excess material, scaffolding, tools

and other equipment are to be removed upon completion of the Work.

- B. Provide final protection and maintain conditions that ensure gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.

END OF SECTION 09 29 00

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes ceramic and porcelain tile.

1.2 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C1028:
 - 1. Level Surfaces: Minimum 0.6.
 - 2. Step Treads: Minimum 0.6.
 - 3. Ramp Surfaces: Minimum 0.8.

1.3 SUBMITTALS

- A. Product Data: Submit product data for each product used.
- B. Samples: Submit samples showing full range of color and texture variations expected.
 - 1. Full size units of each type, composition, color, and finish of tile.
 - 2. Assembled samples with grouted joints for each color grout and for each type, composition, color, and finish of tile.
 - 3. Thresholds in 6-inch (150-mm) lengths, each type.
- C. Test Reports: Submit test reports from qualified independent, L.A. City Approved testing laboratory indicating and interpreting test results relative to compliance of tile products with requirements specified for slip resistance.
- D. Maintenance instructions: Submit maintenance instructions for each type of product installed.

1.4 QUALITY ASSURANCE

- A. Installer: Engage an installer, with a minimum of 5 years of successful commercial tile installations similar in material, design, and scope to that indicated.
- B. Source Limitations for Tile: Obtain tile from one source or producer, and from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- C. Field-Constructed Sample Installations: Before installing tile, erect sample installations for each form of construction and finish required to verify selections made under sample

submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build sample installations to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate sample installations on site, in locations and size indicated or, if not shown or indicated, as directed by LAWA but not less than 100 sq. ft. (9.29 sq. m) area for floors, and not less than 100 sq. ft. (9.29 sq. m) area for walls.
2. Retain and maintain sample installations during construction in undisturbed condition as a standard for judging completed unit of Work.
3. Approved sample installations may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.
- B. Maintain temperatures at 50°F or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.
- C. Illuminate work areas during installation to provide the same or greater level of illumination required to properly perform this work and as will occur in the room or space after the building is in operation.

1.7 EXTRA MATERIALS

- A. Provide attic stock equal to the following for each type, color, pattern, and size (or fraction thereof) of tile provided for the project. Supply in manufacturer's unopened containers, identified with name, brand type, grade, class and all other qualifying information, to a location where directed by LAWA.

1. 2% of amount installed but not less than one box.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI

A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

- B. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless otherwise indicated.
- C. Tile Trim Units: Matching characteristics of adjoining flat tile and coordinated with sizes and coursing where applicable.
- D. Floor Tiles
 - 1. Manufacturers: "Crossville"; Daltile; or Approved Equal
 - 2. Size: 12" x 12"
- E. Wall Tiles
 - 1. Manufacturers: "Crossville"; Daltile; or Approved Equal
 - 2. Size: Square or rectangular shape with no dimension less than 4".
- F. Wall Base Tiles
 - 1. Manufacturers: Same as Floor Tiles
 - 2. Size: Will be one piece self-coved tile with inside corner and outside corner base tiles.

2.2 ACCESSORY MATERIALS

- A. Thresholds: Fabricate to provide transition between adjacent floor finishes. Bevel edges at 1:2 slope, limit height of bevel to 1/2 inch (12.7 mm) or less, and finish bevel to match face of threshold.
 - 1. Marble Thresholds: ASTM C503 with a minimum abrasion resistance of 12 per ASTM C1353 or ASTM C241 and with honed finish.
 - a. Description: Uniform, fine- to medium-grained white stone with gray veining.
- B. Waterproofing for all Wet Areas and Existing Concrete Slabs on Grade.
 - 1. Fabric-Reinforced, Fluid-Applied Product: System consisting of liquid-latex rubber and fabric reinforcement which are compatible with mortar bed specified and complying with ANSI A118.10; one of the following:
 - a. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
 - b. LATICRETE International Inc.; Laticrete 9235 Waterproof Membrane.
 - c. MAPEI Corporation; Mapelastic 400.

NOTE: All wet areas such as but not limited to kitchens, rest rooms, custodial closets and all existing concrete slabs on grade, will incorporate a waterproofing membrane as part of the floor assembly. Indicate relevant waterproofing details on the drawings. The waterproofing membrane will extend up the wall, a minimum of 3 feet, behind all wall hung plumbing fixtures and 12 inches high at all walls without plumbing fixtures. Provide penetration waterproofing details where partitions or other built-ins are attached to a wall system that has a waterproofing layer.

2.3 SETTING AND GROUTING MATERIALS

A. Manufacturers:

1. Custom Building Products.
2. LATICRETE International Inc.
3. MAPEI Corporation.

B. Source Limitations: For each tile installation, obtain compatible formulations of setting and grouting materials containing latex or latex additives from a single manufacturer.

C. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.1A and as specified below:

1. Reinforcing Wire Fabric: Galvanized, flat, welded wire fabric, 2" x 2" x 0.062 inch (50.8 x 50.8 mm x 1.57 mm) diameter; comply with ASTM A185 and ASTM A82 except for minimum wire size.
2. Latex Additive: Manufacturer's standard styrene-butadiene-rubber water emulsion, serving as replacement for all gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed Portland cement and aggregate mortar bed.

D. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4 consisting of the following:

1. Prepackaged dry-mortar mix combined with liquid-latex additive.
2. For wall applications, provide non-sagging mortar.

E. Medium-Bed, Latex-Portland Cement Mortar: ANSI A118.4:

1. Prepackaged dry-mortar mix combined with liquid-latex additive.

F. Polymer-Modified Tile Grout: ANSI A118.7.

1. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
2. Colors: As selected from manufacturers standards to match tile being grouted.

NOTE: Epoxy grout will be used in all restrooms. Latex grout in restrooms is not allowed. All grout joints will be made as small as possible.

TCA "method F111" for suspended slabs and TCA "method F113" for slabs on grade. Industry approved anti-fracture membrane is required for both methods.

2.4 MISCELLANEOUS MATERIALS

- A. Sealants: 'Silicone sanitary sealant'.
- B. 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.

2.5 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions. Add materials and liquid latex additives in accurate proportions. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 PREINSTALLATION MEETING

- A. Prior to the installation of tile, meet at the project site to review the material selections, substrate preparations, installation procedures, coordination with other trades, special details and conditions, standard of workmanship, and other pertinent topics related to the Work. The meeting shall include LAWA, the Architect of Record, the Contractor, tile installer, tile and setting material manufacturer's representatives, and representatives of other trades or subcontractors affected by the installation.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds. Grind concrete substrates to remove existing floor adhesive and mortar residues, films, sealing and curing compounds if they are determined to be present on the substrate.
 - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with the Architect of Record.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Remove paint, coatings, including curing compounds and other substances that are

incompatible with tile-setting materials.

- B. Blending: Color blend tiles at Project site before installing.
 - 1. Furnish the same lots, batches, etc. within the same contiguous areas of the site (i.e. corridors on the same floors, common rooms which adjoin each other, etc.).

3.4 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation".
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area beginning at thresholds. Adjust to minimize tile cutting. 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.
- F. Movement (Expansion) Joints: Locate sealant filled expansion joints where recommended by the manufacturers of mortar and tile materials but not less than the requirements of TCA EJ171, and as accepted by the Architect of Record. Form movement joints and other sealant-filled joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
 - 2. Prepare joints and apply sealants.

NOTE: All control joints to be carried to the surface.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.

1. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 FLOOR TILE INSTALLATION

A. Thinset Tile over Concrete Slabs (Typical): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for ANSI setting bed methods, TCA installation methods related to types of subfloor construction, and grout ANSI installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

1. Mortar: Latex-Portland Cement Mortar: ANSI A108.5.
2. Concrete Subfloors, Interior: TCA F113.
 - a. With a trowel, having notches sized as recommended by the mortar manufacturer, comb the surface of the mortar with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturers recommendations.
 - b. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.
 - c. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile for 100% coverage to thickness of not less than 1/16-inch (1.5-mm).
 - d. Place tiles onto mortar bed, maintaining 1/8-inch (3-mm) wide joints, and true accurate pattern as shown. Exercise care to quickly remove spillage from faces of tile using water. Rake out joints to depth required to receive grout as tile units are set.
 - e. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.
3. Grout Installation, Latex-Portland cement: ANSI A108.10.

B. Thinset Tile over Waterproof Membrane (*Toilet Rooms, Kitchens and any other wet areas, in addition to all concrete slabs on grade*): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for ANSI setting bed methods, TCA installation methods related to types of subfloor construction, and grout ANSI installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

1. Mortar: Latex-Portland Cement Mortar: ANSI A108.5.
2. Concrete Subfloors, Interior: TCA F122.
 - a. Apply the mortar to waterproofed slab with the flat side of the trowel.
 - b. With a trowel, having notches sized as recommended by the mortar manufacturer, comb the surface of the mortar with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturers recommendations.
 - c. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.

- d. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile for 100% coverage to thickness of not less than 1/16-inch (1.5-mm).
 - e. Place tiles onto mortar bed, maintaining 1/8-inch (3-mm) wide joints, and true accurate pattern as shown. Exercise care to quickly remove spillage from faces of tile using water. Rake out joints to depth required to receive grout as tile units are set.
 - f. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.
 3. Grout Installation, Latex-Portland cement: ANSI A108.10.
- C. Mediumset Tile (Only where indicated): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for ANSI setting bed methods, TCA installation methods related to types of subfloor construction, and grout ANSI installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.
 1. Mortar: Latex-Portland Cement Mortar: ANSI A108.5.
 2. Concrete Subfloors, Interior: TCA F113 except apply medium set bed thickness.
 - a. With a trowel, having notches sized as recommended by the mortar manufacturer, comb the surface of the mortar with the notched side of the trowel removing excess mortar. Spread only as much mortar as can be covered in the time limits established by the mortar manufacturers recommendations.
 - b. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying mortar to tiles.
 - c. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile for 100% coverage to thickness of not less than 1/16-inch (1.5-mm).
 - d. Place tiles onto mortar bed, maintaining 1/8-inch (3-mm) wide joints, and true accurate pattern as shown. Exercise care to quickly remove spillage from faces of tile using water. Rake out joints to depth required to receive grout as tile units are set.
 - e. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.
 3. Grout Installation: Latex-Portland cement: ANSI A108.10.
- D. Thickset Tile (Only where indicated): Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for ANSI setting bed methods, TCA installation methods related to types of subfloor construction, and grout ANSI installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.
 1. Mortar and Bond Coat:
 - a. Latex-Portland Cement Mortar: ANSI A108.1A (Wet Set Method).
 - b. Latex-Portland Cement Bond Coat: ANSI A108.5.
 2. Concrete Subfloors, Interior: TCA F121.
 - a. Apply 1/2 of the mortar bed to slab and place reinforcing wire fabric. After placing mesh, apply balance of mortar bed. The mortar shall be rodded and

- compacted with a steel trowel.
- b. Wipe the back of each tile, with a damp sponge, to remove all dust or dirt immediately before applying bond coat to tiles
- c. Immediately after wiping tile backs, but prior to placing tile, the mortar shall be troweled to back of tile sheets for 100% coverage to thickness of not less than 1/16-inch (1.5-mm)
- d. Place tile onto the green mortar bed, maintaining 1/8-inch (3-mm) wide joints for typical tile units and 1/4-inch (6.35-mm) wide joints for quarry tile units if any, and true accurate pattern as shown. Tamp tile with wood block and rubber mallet to produce finish levels of tile matching adjacent tile surfaces. Beating shall take place prior to mortar taking and initial set. Exercise care to quickly remove spillage from faces of tile using water. Rake out joints to depth required to receive grout as tile units are set.
- e. Prohibit foot and wheel traffic on tiled floors for period of time as recommended by the mortar manufacturer.

3. Grout Installation: Latex-Portland cement: ANSI A108.10.

E. Stone Thresholds: Install stone thresholds in one piece, notched to fit neatly at door jambs; set in same type of setting bed as abutting field tile in accordance with TCA Method TR611.

3.7 WALL TILE INSTALLATION

A. Install in accordance with the mortar manufacturer's recommendations and requirements indicated below for ANSI setting bed methods, TCA installation methods related to types of construction, and grout ANSI installation methods and grout types. Where recommendations and methods conflict, the manufacturer's recommendations shall apply.

- 1. Latex Portland Cement Mortar Installation (using specified latex Portland cement mortar material): ANSI A108.5.
- 2. Gypsum Wallboard, Interior (Latex Portland Cement Mortar) Method: TCA W243, place tiles maintaining 1/8-inch (3-mm) wide joints, and true accurate pattern as shown.
- 3. Cementitious Backerboard (Latex Portland Cement Mortar) Method: TCA W244, place tiles maintaining 1/8-inch (3-mm) wide joints, and true accurate pattern as shown.
- 4. Grout Installation: Latex-Portland cement: ANSI A108.10.

3.8 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all 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.

- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- D. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

END OF SECTION 09 30 00

SECTION 09 51 13 ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each product indicated.
- B. Coordination Drawings: Drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
 - 1. Ceiling suspension assembly members.
 - 2. Method of attaching hangers and lateral bracing to building structure.
 - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- C. Samples: For each acoustical panel, for each exposed suspension system member, and for each color and texture required.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Research/evaluation reports:

NOTE: Indicate LARR numbers on the drawings as a condition of plan check approval.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.
- B. Fire-Test-Response Characteristics:
 - 1. Fire-Resistance Ratings: Where indicated, provide acoustical panel ceilings identical to

those of assemblies tested for fire resistance per ASTM E119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Ratings are indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

2. Surface-Burning Characteristics: Acoustical panels complying with ASTM E1264 for Class A materials, when tested per ASTM E84.

C. Seismic Standard: Comply with the following:

1. Los Angeles Department of Building and Safety Document requirements.

NOTE: Refer to LADBS document number P/BC 2008-40: Recommended Standards for Suspended Ceiling Assemblies. This document provides guidelines for designing and installing a suspended ceiling assembly and provides standard support configurations for typical conditions. This document can be found online at www.ladbs.org.

D. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.

1. Approved mockups are not to become part of the completed Work.

NOTE: The ceiling installing shall not be installed until the installation mock-up has been approved by LAWA.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:

1. Products: Subject to compliance with LAWA selection criteria and requirements,

2.2 GENERAL

- A. Acoustical Panel Standard: Comply with ASTM E1264.

1. Recycled Content: Provide acoustical panels with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a

minimum of 70 percent by weight.

- B. Low-Emitting Materials: Acoustical tile ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Metal Suspension System Standard: Comply with ASTM C635.
 - 1. Recycled Content: Provide products made from steel sheet with average recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content is not less than 25 percent.
- D. Attachment Devices: Size for five times the design load indicated in ASTM C635, Table 1, "Direct Hung," unless otherwise indicated.
 - 1. 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 per ASTM E1190, conducted by a qualified testing and inspecting agency.

NOTE: The use of powder actuated fasteners is by **SPECIAL APPROVAL ONLY**. Prior to the use of these fasteners, the Contractor shall develop and present to LAWA, their procedures and protocol for using such equipment at LAX.

- E. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A641/A641M, Class 1 zinc coating, soft temper.
 - 1. Size: Select wire diameter so its stress at three times hanger design load (ASTM C635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106 inch diameter wire.
- F. Rod Hangers: ASTM A510, mild carbon steel.
 - 1. Diameter: 1/4 inch.
 - 2. Protective Coating: ASTM A153/A153M, hot-dip galvanized.
- G. Seismic struts and seismic clips.
- H. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2 inch wide flange, and in depth indicated.
- I. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.3 ACOUSTICAL PANELS

A. Products: Subject to compliance with requirements, provide one of the following:

1. Armstrong World Industries, Inc.
2. USG Corporation

2.4 METAL SUSPENSION SYSTEM

A. Products: Subject to compliance with requirements, provide one of the following:

1. Chicago Metallic Corporation

2.5 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard non-sag, paintable, non-staining latex sealant, that complies 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," complying with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90. Provide STC test report for fire resistive materials per ASTM E90. For Non-Fire Rated Acoustical and Smoke Partitions, use mold/mildew resistant sealant per ASTM G21 Standard. Sealants or sprays tested in compliance with ASTM E90, ASTM C 919, and ISO 11600.6.

2.6 INSTALLATION

A. Per manufacturer's instructions and applicable codes.

END OF SECTION 09 51 13

SECTION 09 51 30 - FABRIC-FACED ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fabric-faced, fiberglass core acoustical panels. (FC-1)

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.

B. Samples: For each type of material.

1. Fabric Selection Samples: Manufacturer's full range of fabric samples illustrating available colors.
2. Verification Samples: Two samples, minimum size 24 x 24 inches, representing actual acoustical panel product.

1.3 WARRANTY

- ##### A. Provide acoustical panel manufacturer's standard written ten-year limited warranty.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS

A. Acceptable Manufacturers:

1. Hunter Douglas Specialty Products; TechStyle Ceilings: www.hdtechstyle.com.
2. Armstrong World Industries, Inc.; Optima: www.armstrong.com.
3. Decoustics Limited; Claro: www.decoustics.com.

- ##### B. Provide panels comprising a compressible structural fiberglass core with non-woven polyester textile surface wrapped on edges; with properties as follows:

1. Panel Thickness: 1.125 inches.

2. Panel Sizes: As indicated on the drawings.
3. Noise Reduction Coefficient (NRC): Minimum 0.85, measured in accordance with ASTM C423.
4. Sound Absorption Average: (SM) 0.89, measured in accordance with ASTM C 423.
5. Surface Burning Characteristics: Flame spread less than 25, smoke developed less than 100; Class A, per ASTM E 84 and ASTM E 1264.
6. Light Reflectance: LR-1 (0.75), measured in accordance with ASTM E 1477.
7. Moisture Resistance: Resistant to relative humidity up to 95 percent at 104 degrees F for 30 days.
8. Mold and Mildew Resistance: In accordance with requirements of ASTM C 665.
9. Accessibility: Downward accessibility by disengaging hinge support rail on one side of panel without the use of tools; panel providing complete access without removal from ceiling.

C. SUSPENSION SYSTEM

- A. General: Provide suspension system as specified in Section 09 5100.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that layout of hangers will not interfere with other work; make adjustments in layout to accommodate other work.
- B. Do not begin ceiling installation until services above ceiling are complete except for final trim.

3.2 PREPARATION

- A. Lay out system to a balanced grid design, with edge units not less than 50 percent of acoustical unit size.
- B. Locate system on room axis according to reflected floor plan.

3.3 INSTALLATION OF SUSPENSION SYSTEM

- A. Install in accordance with requirements of Section 09511 (09 5100).
- B. Conform to the requirements of Cisca (AC)- Acoustical Ceilings: Use and Practice.
- C. Install in accordance with manufacturer's instructions and ASTM C 636/C 636M.

- D. Space hangers not more than 48 inches on center.
- E. 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.
- F. 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.
- G. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently. Do not eccentrically load system or induce rotation of runners.
- H. Perimeter Trim: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

3.4 INSTALLATION OF ACOUSTICAL PANELS

- A. Install acoustical panels in accordance with manufacturer's written instructions.
- B. Scribe and cut panels for accurate fit at perimeter and around penetrations.
- C. Hold tile field in compression when cutting. Match field cut edges with factory edges in accordance with manufacturer's instructions.
- D. Install acoustical panels after above-ceiling work is complete. Install panels level, in uniform plane, and free from warp, twist, and dents.
- E. Installation Tolerance: Maximum variation from flat and level surface is 1:1000.

3.5 CLEANING AND PROTECTION

- A. Clean exposed surfaces of acoustical panel ceilings, including suspension system and edge trim, complying with manufacturer's written instructions for cleaning of minor finish damage. Replace acoustical panels that cannot be cleaned to an appearance matching unmarred panels.
- B. Protect installed acoustical panel ceilings until completion of project.

END OF SECTION 09 51 30

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SECTION 09 65 13 - RESILIENT BASE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For resilient stair accessories, documentation from an independent testing agency indicating compliance with the FloorScore standard.

C. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

D. Samples for Initial Selection: For each type of product indicated.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient base shall comply with requirements of FloorScore certification.

2.2 THERMOPLASTIC-RUBBER BASE (TYPE RB)

- A. Product Standard: ASTM F 1861, Type TP (rubber, thermoplastic).
 - 1. Group: I (solid, homogeneous) or II (layered).
 - 2. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient flooring.
- B. Thickness: 0.125 inch.
- C. Height: 4 inches.
- D. Lengths: Cut lengths 48 inches long or coils in manufacturer's standard length.
- E. Outside Corners: Job formed or preformed.
- F. Inside Corners: Job formed or preformed.
- G. Colors: As selected by Architect from full range of industry colors

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until 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.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

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3.5 RESILIENT BASE SCHEDULE

A. Resilient Base:

1. RB-1: Johnsonite #80 Fawn, 4" cove.
2. RB-1: Johnsonite #63 Burnt Umber B, 4" cove

END OF SECTION 09 65 13

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RESILIENT BASE

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SECTION 09 65 16 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes rubber sheet flooring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives[**and chemical-bonding compounds**], documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products 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."
 - 3. Product Data for Credit IEQ 4.3: For adhesives[**and chemical-bonding compounds**], documentation including printed statement of VOC content.
 - 4. Product Data for Credit IEQ 4.3: For resilient sheet flooring, documentation from an independent testing agency indicating compliance with the FloorScore standard.
 - 5. Laboratory Test Reports for Credit IEQ 4.3: For flooring system[**and chemical bonding compounds**], documentation indicating that products 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."
- C. Shop Drawings: For each type of flooring. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- D. Samples: For each exposed product and for each color and texture specified in manufacturer's standard size, but not less than [6-by-9-inch (150-by-230-mm)] <Insert dimensions> sections.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than [9 inches (230 mm)] <Insert dimension> long, of each color required.
- E. Samples for Initial Selection: For each type of resilient sheet flooring indicated.

- F. Samples for Verification: In manufacturer's standard size, but not less than [**6-by-9-inch (150-by-230-mm)**] **<Insert dimensions>** sections of each different color and pattern of resilient sheet flooring required.
 - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than [**9 inches (230 mm)**] **<Insert dimension>** long, of each color required.
- G. Welded-Seam Samples: For seamless-installation technique indicated and for each resilient sheet flooring product, color, and pattern required; with seam running lengthwise and in center of [**6-by-9-inch (150-by-230-mm)**] **<Insert dimensions>** Sample applied to a rigid backing and prepared by Installer for this Project.
- H. Product Schedule: For resilient sheet flooring.[**Use same designations indicated on Drawings.**]

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of resilient sheet flooring to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Resilient Sheet Flooring: Furnish not less than [**10 linear feet (3 linear m)**] **<Insert dimension>** for every [**500 linear feet (150 linear m)**] **<Insert dimension>** or fraction thereof, in roll form and in full roll width for each type, color, and pattern of flooring installed.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for resilient sheet flooring installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by resilient sheet flooring manufacturer for installation techniques required.
- 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. Build mockups for resilient sheet flooring including[**resilient base and**] accessories.
 - a. Size: Minimum **100 sq. ft. (9.3 sq. m)** for each type, color and pattern [**in locations indicated**] [**in locations directed by Architect**] **<Insert locations>**.
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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient sheet flooring 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)**. Store rolls upright.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than [**70 deg F (21 deg C)**] **<Insert temperature>** or more than [**85 deg F (29 deg C)**] **<Insert temperature>**, in spaces to receive resilient sheet flooring during the following time periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than [**55 deg F (13 deg C)**] **<Insert temperature>** or more than [**95 deg F (35 deg C)**] **<Insert temperature>**.
- C. Close spaces to traffic during resilient sheet flooring installation.
- D. Close spaces to traffic for 48 hours after resilient sheet flooring installation.
- E. Install resilient sheet flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
 - B. FloorScore Compliance: Resilient sheet flooring shall comply with requirements of FloorScore certification.
 - C. Low-Emitting Materials: Flooring system 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."
- 2.2 UNBACKED VINYL SHEET FLOORING <Insert drawing designation>
- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 - B. Product Standard: ASTM F 1913.
 - C. Thickness: [**0.080 inch (2.0 mm)**] <Insert dimension>.
 - D. Wearing Surface: [**Smooth**] [**Embossed**].
 - E. Sheet Width: [**As standard with manufacturer**] [**6 feet (1.8 m)**] [**6.6 feet (2.0 m)**] <Insert width>.
 - F. Seamless-Installation Method: [**Heat welded**] [**Chemically bonded**] <Insert requirements>.
 - G. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <Insert colors and patterns>.
- 2.3 VINYL SHEET FLOORING WITH BACKING <Insert drawing designation>
- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 - B. Product Standard: ASTM F 1303.
 1. Type (Binder Content): [**Type I, minimum binder content of 90 percent**] [**Type II, minimum binder content of 34 percent**].
 2. Wear-Layer Thickness: Grade 1.
 3. Overall Thickness: [**As standard with manufacturer**] <Insert thickness>.
 4. Interlayer Material: [**Foamed plastic**] [**None**].
 5. Backing Class: [**Class A (fibrous)**] [**Class B (nonfoamed plastic)**] [**Class C (foamed plastic)**].
 - C. Wearing Surface: [**Smooth**] [**Embossed**] [**Smooth with embedded abrasives**] [**Embossed with embedded abrasives**].

- D. Sheet Width: [As standard with manufacturer] [5 feet (1.5 m)] [6 feet (1.8 m)] [6.6 feet (2.0 m)] [12 feet (3.6 m)] <Insert width>.
- E. Seamless-Installation Method: [Heat welded] [Chemically bonded] <Insert requirements>.
- F. Colors and Patterns: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert colors and patterns>.

2.4 UNBACKED RUBBER SHEET FLOORING <Insert drawing designation>

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Product Standard: ASTM F 1859.
 - 1. Type: [Type I (homogeneous rubber sheet)] [Type II (layered rubber sheet)].
 - 2. Thickness: [As standard with manufacturer] <Insert thickness>.
 - 3. Hardness: [Not less than required by ASTM F 1859] [Manufacturer's standard hardness, measured using Shore, Type A durometer per ASTM D 2240].
- C. Wearing Surface: [Smooth] [Textured] [Molded pattern].
 - 1. Molded-Pattern Figure: [Raised discs] [Raised squares] <Insert pattern>.
- D. Sheet Width: [As standard with manufacturer] [3.0 feet (0.9 m)] [3.3 feet (1.0 m)] [4.0 feet (1.2 m)] [5 feet (1.5 m)] [6.3 feet (1.9 m)] <Insert width>.
- E. Seamless-Installation Method: [Heat welded] [Chemically bonded] <Insert requirements>.
- F. Colors and Patterns: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert colors and patterns>.

2.5 RUBBER SHEET FLOORING WITH BACKING <Insert drawing designation>

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Product Standard: ASTM F 1860.
 - 1. Type: [Type I, homogeneous rubber sheet with backing] [Type II, layered rubber sheet with backing].
 - 2. Wear-Layer Thickness: [As standard with manufacturer] <Insert thickness>.
 - 3. Overall Thickness: [As standard with manufacturer] <Insert thickness>.
 - 4. Interlayer Material: [As standard with manufacturer] [None].
 - 5. Backing: [Fibrous] [Foamed rubber].
 - 6. Hardness: [Not less than required by ASTM F 1860] [Manufacturer's standard hardness, measured using Shore, Type A durometer per ASTM D 2240].

- C. Wearing Surface: [Smooth] <Insert description>.
- D. Sheet Width: [As standard with manufacturer] [3.3 feet (1.0 m)] <Insert width>.
- E. Seamless-Installation Method: [Heat welded] [Chemically bonded] <Insert requirements>.
- F. Colors and Patterns: [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert colors and patterns>.

2.6 INSTALLATION MATERIALS

- A. 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.
- B. Adhesives: Water-resistant type recommended by flooring and adhesive manufacturers to suit resilient sheet flooring and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of [50] [60] <Insert value> g/L or less.
 - 2. Adhesives 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."
- C. Seamless-Installation Accessories:
 - 1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Color: [As selected by Architect from manufacturer's full range to contrast with flooring] [Match flooring] <Insert color>.
 - 2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
 - a. Bonding compound shall have a VOC content of 510 g/L or less.
 - b. Bonding compound 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."
- D. Integral-Flash-Cove-Base Accessories:
 - 1. Cove Strip: 1-inch (25-mm) radius provided or approved by resilient sheet flooring manufacturer.
 - 2. Cap Strip: [Square metal, vinyl, or rubber cap] [Tapered vinyl cap] <Insert requirements> provided or approved by resilient sheet flooring manufacturer.
 - 3. Corners: Metal inside and outside corners and end stops provided or approved by resilient sheet flooring manufacturer.

- E. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient sheet flooring manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient sheet flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than [9] [10] <Insert number> pH.
 - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of [3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)] <Insert rate> in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum [75] <Insert number> percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

- D. Do not install resilient sheet flooring until it is the same temperature as the space where it is to be installed.
 - 1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 RESILIENT SHEET FLOORING INSTALLATION

- 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 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.
- D. 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.
- E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.
- F. 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.
- G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.
- H. 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.
- I. 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.
 - 2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless flooring. Prepare seams and apply compound

to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

- J. Integral-Flash-Cove Base: Cove resilient sheet flooring [**6 inches (152 mm)**] [**to dimension indicated**] **<Insert dimension>** up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt at top against cap strip.

1. Install metal corners at inside and outside corners.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient sheet flooring.
- B. Perform the following operations immediately after completing resilient sheet flooring installation:
1. Remove adhesive and other blemishes from surfaces.
 2. Sweep and vacuum surfaces thoroughly.
 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from flooring surfaces before applying liquid floor polish.
1. Apply [**one**] [**two**] [**three**] **<Insert requirement>** coat(s).
- E. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 09 65 16

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RESILIENT SHEET FLOORING

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SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl composition floor tile.

B. Related Sections:

1. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.
2. Section 096536 "Static-Control Resilient Flooring" for static-dissipative, solid vinyl floor tile.

1.2 ACTION SUBMITTALS

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

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, sealants and chemical-bonding compounds, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives and chemical-bonding compounds, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For resilient tile flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.

C. Samples for Initial Selection: For each type of floor tile indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.5 MATERIALS MAINTENANCE 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. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

2.2 VINYL COMPOSITION FLOOR TILE (TYPE VCT)

- A. **Basis of Design Product:** Subject to compliance with requirements, provide Tarket, Azrock VCT:
 - 1. Armstrong World Industries, Inc.
 - 2. Congoleum Corporation.
 - 3. Mannington Mills, Inc..
 - 4. Tarkett, Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
 - 1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. VCT Adhesives: Not more than 50 g/L.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles square with room axis.

- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply one coat.
- E. Cover floor tile until Substantial Completion.

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3.5 RESILIENT TILE SCHEDULE

A. Resilient Tiles:

1. VCT-2: Tarkett, Azrock VCT, V-229 Shuttle Grey, 12" x 12"

END OF SECTION 09 65 19

SECTION 09 66 23 – RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes resinous matrix (epoxy) terrazzo.

1.2 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For terrazzo installed on walkway surfaces, provide finished installation with the following values as determined by testing per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.
2. Step Treads: Minimum 0.6.
3. Ramp Surfaces: Minimum 0.8.

1.3 SUBMITTALS

- A. Product Data: Submit product data for each material indicated.
- B. Shop Drawings: Submit shop drawings showing the extent of each terrazzo matrix, type, size and layout of divider strips, control joint strips, and edge strips
1. Indicate layout of abrasive strips at stair nosings.
 2. Indicate layout of stair treads, risers, and landings.
 3. Large scale details of precast terrazzo jointing and edge conditions, including anchorage details.
- C. Samples: Submit samples of each of the following items for each type, color, and pattern of terrazzo and accessory required and in size indicated below. Sample submittals shall be for color, pattern and texture only. Compliance with other requirements is the responsibility of the Contractor.
1. Epoxy Terrazzo: 6-inch- (150-mm-) square Samples.
 2. Precast Epoxy Terrazzo Base: 12-inch- (300-mm-) long Samples.
 3. Precast Epoxy Terrazzo Tread: 12-inch- (300-mm-) long Samples.
 4. Precast Epoxy Terrazzo Riser: 12-inch- (300-mm-) long Samples.
 5. Accessories: 6-inch- (150-mm-) long Samples of each exposed strip item required.

NOTE: With previous terrazzo installations at the airport, a minimum of three sample runs have been required in order to achieve the approved design.

- D. Field Testing: Submit pre-installation relative humidity probe readings and pH testing for information only. Readings shall be prepared in accordance with ASTM F2170.
- E. Maintenance Data: Submit copies of instructions for maintenance of each type of terrazzo.

- F. Warranty: Submit sample copies of the Moisture Vapor Transmission (MVT) warranty to verify compliance with specification. Submit executed copies of epoxy terrazzo warranty as specified herein.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who is a current NTMA member in good standing and who has completed a minimum of 3 terrazzo installations similar in material and extent to that indicated for Project – as determined by LAWA – over the last 5 years and that have resulted in construction with a record of successful in-service performance.

NOTE: A letter from the NTMA dated within 30 days of the bid, stating same, must be submitted with the bid. Any active investigations of contractor's work must be noted in this letter.

- B. Standard: Except as modified by governing codes and by the Contract Documents, comply with applicable provisions and recommendations of the NTMA Terrazzo Information Guide Specification.
- C. Sample Installations:
1. Following acceptance of samples, provide sample installations of the following where directed by the LAWA.
 - a. Floors: Cast a typical module (minimum 10' x 10') of interior flooring including divider strips.
 2. Sample installations shall be complete with all bedding, jointing, and sealants as shown in accordance with the final shop drawings. Sample installations shall be reviewed by the Architect for acceptance of terrazzo assemblies including jointing and workmanship. Replace unsatisfactory work as directed. Maintain sample installations during construction as a standard for judging acceptability of terrazzo work. Properly finished and maintained sample installations shall be retained as a portion of the completed work.

1.5 PROJECT CONDITIONS

- A. Deliver materials, other than bulk materials, in manufacturer's unopened containers, fully identified with trade name, grade and color.
- B. Store materials above grade, protected from the weather, soiling or damage from any source. Store in accordance with manufacturer's instructions.
- C. Wrap precast units individually in polyethylene film or other non-staining protective cover and mark each unit for proper identification of installed location.

1.6 PROTECTION

- A. Protect terrazzo work throughout the construction period so that it will be without any indication of use or damage at the time of acceptance by LAWA.

1.7 WARRANTY

- A. Manufacturer and installer shall supply to LAWA a three year Joint and Several Warranty from the date of substantial completion stating that the Moisture Vapor Barrier shall protect the epoxy terrazzo installation from moisture related blistering or dis-bondment and that in the event of defects related to moisture vapor transmission within the stipulated period, the manufacturer and installer shall jointly or severally effect all repairs or replacement necessary to remedy defects at the convenience of, and no cost to LAWA.

PART 2 - PRODUCTS

2.1 EPOXY TERRAZZO

- A. Epoxy Terrazzo Material Products and Manufacturers: The epoxy resin terrazzo specifications are based on Terroxy Resin System by Terrazzo and Marble (T & M) Supply Companies.

1. The following terrazzo systems and manufacturers are capable of providing epoxy resin terrazzo flooring complying with the requirements of the Contract Documents.
 - a. General Polymers; Thin-Set Epoxy Terrazzo #1100 Flooring System.
 - b. Crossfield Products Corp., Dex-O-Tex Division; Dex-O-Tex Cheminert Terrazzo.
 - c. Master Terrazzo Technologies, LLC; Morricite.
 - d. Terrazzo and Marble (T & M) Supply Companies; Terroxy Resin Systems – Thin-set Epoxy Terrazzo

2. System Performance: The epoxy resin flooring system shall possess the following properties:

Compressive Strength, ASTM D695	10,000 psi
Water Absorption, ASTM D570	0.10 %
Tensile Strength, ASTM D638	3,000 psi
Flexural Strength, ASTM D790	4,500 psi
Adhesion, ACI 503R	350 psi, 100% concrete failure
Hardness, ASTM D2240	65-85 Shore D
Impact Resistance – MIL-D-3134, Sec. 4.7.3	Withstands 16 ft/lbs. no chipping, cracking, spalling or loss of adhesion.
Abrasion Resistance, ASTM D4060, CS 17 Wheel	70-90 milligrams lost
Slip Resistance	Meets ADA Standards
Critical Radiant Flux, ASTM D648	.90
Thermal coefficient of linear expansion, ASTM D696	25×10^{-6} in/in/ degree F.

- B. Moisture Vapor Barrier: One of the following:
1. Moisture Vapor Treatment; Terrazzo and Marble (T & M) Supply Companies.
 2. FasTop MVT or AquArmorS; General Polymers.
- C. Flexible Epoxy Membrane (Crack Bridging Membrane): 100% solids for crack preparation followed by full coverage application.
1. Products: One of the following:
 - a. Isocrack Membrane; Terrazzo and Marble (T & M) Supply Companies.
 - b. 3556 EPO-FLEX Flexible Epoxy Membrane; General Polymers.
 2. System Performance: The flexible epoxy membrane shall possess the following properties:

Tensile Strength, ASTM D412	1,000-1,300 psi
Elongation at Break, ASTM D412	130-145%
Adhesion, ACI 503R	350 psi, 100% concrete failure
Hardness, ASTM D2240	23 Shore D
Thermal Cycling, ASTM C884 (24 hours, -21C to +25C)	No Cracking
Flammability	Self-extinguishing over concrete
VOC	Zero

The epoxy elastomer must be free of solvent, external plasticizers, coal tar, known carcinogens, rubber compounds or nitrile butadienes
- D. Fabric Reinforcing: Fiberglass of type and manufacture recommended and acceptable to the matrix manufacturer.
1. FS38-4.4 Fiberglass Scrim; General Polymers.
- E. Aggregates: Natural, sound, crushed stone chips, mother of pearl, glass, plastic, and metal filings with colors selected and graded to match Architect's samples, but with maximum size within limits of workability for terrazzo thickness indicated.
1. Sizes shall be #1's and #0's only, conforming with N.T.M.A. standards.
 2. Abrasion and impact resistance shall not exceed 40% loss per ASTM C131.
 3. 24 hour absorption rate not to exceed 0.75 percent.
 4. Chips shall contain no deleterious or foreign matter.
 5. Dust content less than 1% by weight.
 6. Obtain and stockpile each aggregate material from a single source of consistent quality in appearance and physical properties for the entire project.

- F. Epoxy Fill Mortar: 100% Solids fill mortar system including blended aggregate of a type recommended by the epoxy resin terrazzo manufacturer. One of the following:
1. Terroxy Fill; Terrazzo and Marble (T & M) Supply Companies.
 2. 3520 Epoxy Terrazzo Matrix as the binder resin mixed with dry silica sand; General Polymers.
- G. Finishing Grout: 100% solids resin-based grout with filler and pigments as recommended by matrix manufacturer. One of the following:
1. Terroxy Grout; Terrazzo and Marble (T & M) Supply Companies.
 2. 3520 Epoxy Terrazzo Matrix with 5271 Terrazzo Grout Additive; General Polymers.
- H. Substrate Primer: 100% solids, moisture insensitive, two-component resin recommended by matrix manufacturer. No solvent containing primers are allowed.

2.2 MIXES

- A. Toppings: Adjust topping mixes as required to obtain LAWA's acceptance for each type, color, pattern and finish. Refer to the drawings and finish schedules for the extent of each topping and finish; the following topping mixes were used to develop the Architect's samples. The samples were prepared by and reflect sample controls numbers of using Terrazzo and Marble (T & M) Supply Companies terrazzo materials. Each precast terrazzo unit shall be composed of a single mix design prepared using the matrices specified, precast units consisting of a face mix and a backup mix shall not be permitted. Adjust Portland cement precast mixes, for bases, treads and riser units, as required to obtain LAWA's acceptance for matching the type, color, pattern and finish of the epoxy matrix type, color pattern and finish indicated on the drawings for the base, tread and riser units.
1. TR-01: Refer to Sample #1 in the Terrazzo Chart below.
 2. TR-02: Refer to Sample #2 in the Terrazzo Chart below.

NOTE: A white field with dark aggregate will maintain a clear appearance longer. In a multi-color design, a matrix with a repetition of aggregate is helpful in order to create a more unified appearance.

TERRAZZO CHART

Sample #1		Chip Blend		
Matrix Color	Resin Color # & Fanfold	Aggregate	Size	%
	Resin Color selected to match		0's	90
			0's	10

Sample #2		Chip Blend		
Matrix Color	Color # & Fanfold	Aggregate	Size	%
	Resin Color selected to match		1's & 0's	90
			1's, & 0's	10

B. Precast Terrazzo Base and Stair Tread/Riser Setting Beds:

1. Cement Setting Bed Mix: 226 Thick Bed Mortar Mix; Laticrete International Inc.
2. Liquid Latex Additives: Laticrete 3701 Liquid Latex Mortar Admix.
3. Mixing: Comply with the manufacturers printed recommendations for either machine or hand mixing of setting bed mixes.
 - a. Mix 6 bags of cement setting bed mix to 1 pail (5 gal.) of liquid latex additive. Adjust quantity of liquid latex additive to bring the cement setting bed to the proper consistency for placing.
4. Welded Wire Fabric for Setting Bed Reinforcement at Metal Stair Risers and Treads: ASTM A185, 2 in. x 2 in. x 16 gage, galvanized.

C. Grout for Precast Items: Polymer-modified tile grout composed of ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients to which only water must be added at Project site, and complying with ANSI A118.6, custom colored to match adjacent precast terrazzo tile units.

NOTE: the mix design shall consist no more than 40% glass / mirror. Recycled glass is not permitted. All glass/mirror or aggregate shall be no larger than #1, (#0s and #1s only).

The Contractor shall also premix all terrazzo ingredients which are able to be combined prior to installation (Epoxy Part A and B and aggregate mixes). This premix process shall occur in a clean and neat factory or laboratory environment. Quantities should be carefully measured on certified/calibrated scales and mixing shall follow laboratory best practices. The resulting premixed ingredients shall then be packaged in clean, clearly labeled, hard sided containers in ratios whereby labor staff can combine in the field with no need to calculate or measure. LAVA or its authorized third party inspectors shall have continuous and unabated access to witness/inspect the factory/laboratory premix and packaging processes.

2.3 ACCESSORIES

- A. Divider and Stop Strips: White alloy zinc, 1/8" in. thick x depth as indicated for terrazzo topping. Angle or "T" - types. Verify compatibility of divider and stop strips with resin supplier prior to ordering.
1. Control Joint Strips: Laminations of 16 gage zinc, back to back strips infilled with Flexible Epoxy Membrane pigmented to match resin color of epoxy terrazzo.

- B. Cleaner: A neutral chemical cleaner, specially compounded for cleaning terrazzo of the types indicated, as recommended by the manufacturer of the cleaner with the following minimum characteristics.
 - 1. pH factor between 7 and 10.
 - 2. Biodegradable and phosphate free.
 - 3. Free form crystallizing salts or water soluble alkaline salts.
- C. Floor Sealer: Waterbased, colorless, stain-resistant penetrating sealer with Ph factor between 7 and 10, that does not affect color or physical properties of terrazzo surface, and which will provide an anti-slip coefficient of friction of greater than 0.6.
 - 1. Product: "Scotchgard Stone Floor Protector"
 - 2. LAWA approved Equal
- D. Joint Sealants: Two-Part Polyurethane Sealant (Self Leveling), refer to Section 079200, JOINT SEALANTS.
- E. Channels to receive abrasive inserts at Precast Stair Nosings: 16 gauge aluminum channel.
- F. Abrasive Inserts: One line composition strips filled with 100 or finer carborundum, aluminum oxide or silicon carbide, black, mixed 4 parts to 1 with a binding material.
- G. Reinforcing, Anchors and Fasteners for Precast Units:
 - 1. Reinforcing for Treads and Risers: ASTM A615, grade as selected by fabricator. Reinforcing adjacent to the exposed surface of panels is to be positioned and firmly held in place by hangers, or other means without the use of form-contact bar supports.
 - 2. Welded Wire Fabric for Treads and Risers: ASTM A185, 2 in. x 2 in. x 16 gage, galvanized.
 - 3. Anchors and Fasteners: All anchors, clips, shapes, fasteners, dowels, cramps, and accessories for erecting precast terrazzo units shall be galvanized steel devices of grade, type, size and number required to attach precast terrazzo to supporting stair substrates.
- H. Precast Portland Cement Terrazzo Base, Tread and Riser Materials (To be used when proposing Alternate):
 - 1. Portland Cement: ASTM C150, Type I, non-air entraining, non-staining white and gray as required to match Architect's epoxy terrazzo samples. Obtain cement from a single source for all work of one color.
 - 2. Sand: ASTM C33 for fine aggregates as required to match Architect's epoxy terrazzo samples.
 - 3. Water: Fresh, clean and potable.
 - 4. Aggregates, Glass, Plastic and Shell Materials: As required to match Architect's epoxy terrazzo samples.
 - 5. Pigments: Pure mineral pigments, resistant to alkalis, nonfading and weatherproof,

colors as required to match Architect's epoxy terrazzo samples.

2.4 PRECAST UNIT FABRICATION

- A. Precast Terrazzo Bases: Fabricate precast terrazzo bases from epoxy terrazzo materials to the sizes, shapes and profiles shown and from the terrazzo mix(es) indicated.
1. The minimum thickness of the precast terrazzo base shall be ½”.
 2. Forms: Construct forms of non-staining metal, fiberglass reinforced polyester, plywood, or other acceptable material. Fabricate and reinforce forms for close control of dimensions and details. Construct forms tightly to prevent leakage of mixes. Form joints will not be permitted on faces exposed to view in the finished work.
 3. Mixing and Placing: Mix terrazzo mixes to distribute fine and coarse aggregate evenly throughout. Place terrazzo so as to prevent segregation in the forms.
 4. Curing: Allow units to cure.
 5. Casting Tolerances: As required to achieve installation tolerances. Units which have bowed, warped, or curled shall not be acceptable.
- B. Precast Terrazzo Treads and Risers: Fabricate precast terrazzo treads and risers from epoxy terrazzo materials to the sizes, shapes and profiles shown to match the epoxy terrazzo mix indicated for treads and risers.
1. The minimum thickness of the precast terrazzo stairs and treads shall be 1-1/2”. Provide 2 lines of abrasive insert at stair tread nosing.
 2. Forms: Construct forms of non-staining metal, fiberglass reinforced polyester, plywood, or other acceptable material. Fabricate and reinforce forms for close control of dimensions and details. Construct forms tightly to prevent leakage of mixes. Form joints will not be permitted on faces exposed to view in the finished work.
 3. Reinforcement: Place welded wire and reinforcing bars of size and spacings as required to resist shrinkage, temperature and handling stresses. Support and space reinforcement using devices to ensure that it will remain positioned in the precast terrazzo units as required. Keep reinforcement from the edges and surfaces of the units.
 4. Mixing and Placing: Mix terrazzo mixes to distribute fine and coarse aggregate evenly throughout. Place terrazzo so as to prevent segregation in the forms.
 5. Curing: Allow units to cure.
 6. Casting Tolerances: As required to achieve installation tolerances. Units which have bowed, warped, or curled shall not be acceptable.
- C. Surface Treatment:
1. Finish surfaces exposed to view to match accepted samples in all respects. Provide smooth joints and square edges.
 2. Finish: Allow terrazzo to obtain sufficient strength prior to grinding and as required to withstand handling stresses and to produce a terrazzo finish consistent with the accepted samples. Protect corners and edges to preserve uniform, straight arrisses and corners.

Grind in a continuous operation, using grinding equipment to achieve a uniform appearance. Do not change equipment, materials, procedure or operating personnel during the course of the grinding work for the entire Project. Discard and replace terrazzo units which develop any irregular penetration or appearance, or swirl marks as a result of grinding. Select type of grit gradation(s) and speed of operation to achieve the following:

- a. Match finish of cast in place epoxy terrazzo as specified under Part 3 – Execution below.
3. Abrasive Inserts for Stair Treads:
 - a. Carefully mask terrazzo on either side of abrasive channel to protect finished terrazzo.
 - b. Clean all foreign matter from channel.
 - c. Trowel abrasive mix into channel with finished elevation approximately 1/16" above terrazzo tread.
 - d. After abrasive mix has set, remove masking material and allow to cure.

PART 3 - EXECUTION

3.1 CONDITION OF SURFACES

- A. Examine the substrates and adjoining construction and the conditions under which the Work is to be installed. Do not proceed with the Work until unsatisfactory conditions have been corrected. Examine areas to receive terrazzo for:
 1. Defects in existing work that affect proper execution of terrazzo work.
 2. Deviations beyond allowable tolerances for the concrete slab work. The substrate shall not exceed 1/4" in a 10'-0" span. When placing a 10 foot straightedge anywhere on the substrate, at no point shall the gap between the straightedge and the substrate exceed 1/4".
 3. Ensure that the building expansion joints in the floor area are raised or lowered to actual finish elevation of terrazzo.
 4. Ensure that drains in installation area are functional and raised or lowered to actual finish elevation of terrazzo.

3.2 PREPARATION

- A. General: Comply with NTMA specifications and recommendations, unless otherwise shown or specified for preparation of substrate.
- B. Substrates to Receive Epoxy Terrazzo: After the removal of existing floor coverings in areas to receive the terrazzo work, and before the terrazzo flooring installation, visit the jobsite to evaluate substrate condition. The evaluation shall include a determination of the suitability of the substrate to receive the epoxy terrazzo materials and to test for moisture and alkalinity of the substrate. Test for moisture by relative humidity probe and digital meter method according to ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete Floor

Slabs Using In-situ Probes" and the probe manufactures instructions. Use a minimum of 1 probe for every 5,000 sf of surface to receive terrazzo flooring. Proceed with the epoxy floor system installation only after substrates have a maximum relative-humidity-measurement reading of 75 percent in 24 hours. If the pH of the slab is 10 or lower, notify the manufacturer for preparations required to ensure a good bond.

1. Probe Manufacturer: A relative humidity probe kit and manufacturer known to comply with the requirements includes "The Rapid RH Probe" manufactured by Wagner Electronic Products, Inc., Rogue River, OR. (800) 207-2164 (v).

C. Surface Treatment:

1. Prepare slab substrates, (*including any existing cementitious terrazzo*) to "open" surface pores by means of light scarification, medium shot blast or medium scarification with a vacuum unit. Surface preparation results shall achieve a minimum Concrete Surface Profile (CSP) of 5 according to International Concrete Repair Institute Guideline No. 03732. Remove all contaminating or bond breaking substances including but not limited to dust, laitance, curing compounds, coatings, sealers, oil, grease, existing floor covering adhesives and mastics. All oil or grease not removed by scarification or blasting shall be removed by either detergent scrubbing with heavy duty cleaner/degreaser, low pressure water cleaning, steam cleaning, or chemical cleaning methods in accordance with the manufacturers written instructions. All spalled or deteriorated slab surfaces shall be mechanically removed by scabbling or chipping hammers. Acid etching is not acceptable.

NOTE: Many of the existing sub-floor areas of the existing Terminals are not level and require extensive floor prep. All existing finishes such as but not limited to Fritztile are to be removed from the concrete slab.

2. Apply moisture vapor barrier across the entire area to receive the epoxy terrazzo in accordance with the manufacturer's recommendations.
3. Repair or level damaged slab surfaces with epoxy fill mortar. Latex fills or self-leveling underlayments are not acceptable.
4. Flexible Epoxy Membrane (Crack Bridging Membrane) Placement:
 - a. Install flexible epoxy membrane at 40 mils thickness over the moisture vapor barrier and embed fabric reinforcement. Follow the specific recommendations of the flooring manufacturer for detailing at terminations, construction control joints, construction joints, building columns, and base conditions. Thoroughly mix flexible epoxy membrane and apply to prepared moisture vapor coated slab substrates according to manufacturer's instructions. Allow membrane to level until no ridges are showing.
5. Cracks and non-expansion joints greater than 1/16" wide after surface preparation shall be prepared until sound and treated with membrane materials in accordance with the instructions of the epoxy terrazzo manufacturer and as follows. Allow in base bid for above crack detailing as follows - 5% of lineal footage of total project square footage for

combined Type 1 & 2, and 3% of lineal footage of Type 3. (i.e., a 10,000 sq ft project would allow for a combined 500 lineal feet of Type 1 & 2 repairs and 300 lineal feet of Type 3 repairs.

- a. Type 1 Crack Detailing: Hairline cracks shall receive detail coat of epoxy primer with 6" fabric reinforcement.
- b. Type 2 Crack Detailing Fill cracks greater than hairline but less than 1/16" wide after surface preparation with neat, epoxy membrane. Place detail coat of epoxy membrane over crack and embed 12" fiberglass cloth. Lightly abrade or solvent wipe treated cracks prior to applying primer.
- c. Type 3 Crack Detailing Fill cracks greater than 1/16" with flexible epoxy membrane. Place 25-30 mil detail coat so that flexible epoxy membrane extends at least 9" to 12" on each side of crack or joint. After flexible epoxy membrane has leveled, lay precut reinforcing fabric into wet membrane. Smooth cloth with a flat steel trowel, allowing cloth to be encapsulated but remain exposed on the surface of flexible epoxy membrane. Lightly abrade or solvent wipe treated cracks prior to applying primer.

NOTE: For the floor leveling purposes, the Bid cost for Epoxy Terrazzo shall include the price for installing a 5/8" minimum epoxy sand level.

3.3 INSTALLATION

- A. General: Comply with NTMA specifications and recommendations, unless otherwise shown or specified for installation of strips, placing, curing, grinding, and finishing of terrazzo. Make provisions for protecting adjacent work from terrazzo placement and finishing.
 1. Extend terrazzo work into recesses and under equipment in the spaces shown or scheduled to receive terrazzo. Form a complete covering without interruptions or seams, except provide divider strips where shown. Place and finish terrazzo uniformly and neatly around obstructions so as to achieve continuous color, pattern and finish throughout the Work.
 2. Complete terrazzo work prior to contiguous work which might be damaged by water or other materials used.
- B. Epoxy Terrazzo:
 1. Control Joints, Stop Strips and Divider Strips:
 - a. Control Joints: Place back to back angle divider strips directly over concrete control joints leaving a space appropriate for anticipated movement – typically 1/4" – 3/8". Fill gap between control joints with divider strip joint sealant. If flexible membrane was placed greater than 72 hours before placement of epoxy terrazzo, solvent wipe completely prior to installing epoxy primer and terrazzo.

NOTE: All control joints to be carried to the surface.

- b. Stop Strips: Install stop strips at perimeter of epoxy terrazzo flooring fields. Adhere stop strips with substrate primer – do not fasten to concrete. If flexible membrane was placed greater than 72 hours before placement of epoxy terrazzo, solvent wipe completely prior to installing epoxy primer and terrazzo.
- c. Divider Strips: Place divider strips directly over concrete where indicated on the drawings. Adhere divider strips with substrate primer – do not fasten to concrete. If flexible membrane was placed greater than 72 hours before placement of epoxy terrazzo, solvent wipe completely prior to installing epoxy primer and terrazzo.

NOTE: All pours to be to the divider strips. Phased pours in areas within the divider strips shall not be allowed unless directed otherwise by LAWA. The leg of the divider strip shall be fully bonded to the slab. When two divider strips are joined, the ends shall touch and align.

- 2. Placing Epoxy Terrazzo:
 - a. Clean and prepare substrate to comply with NTMA specifications for type of terrazzo application indicated. Clean substrate of loose chips and foreign matter.
 - b. Priming: Apply epoxy primer evenly over prepared flexible membrane at the rate of 200-300 square feet per gallon, to thoroughly wet surface, but avoiding "ponding" the material.
 - c. For thin-set terrazzo topping, comply with resin manufacturer's recommendations for proportioning mixes.
 - d. Comply with NTMA guide specifications previously referenced under "Thin-Set Terrazzo Materials" and with matrix manufacturer's directions for installing thin-set terrazzo. Match Architect's samples and provide total material thickness of not less than 3/8". Allow cure per manufacturer's recommendations prior to grinding operations.
- 3. Grinding: Exercise extreme care to ensure fluids from grinding operation do not react with dividers and strips to produce a stain on aggregate. Delay grinding until heavy trade work is completed and construction traffic through the area is restricted.
 - a. Rough Grinding: Grind with 24 or finer grit stones or with comparable diamond plates.
 - b. Intermediate Grinding: Follow initial grind with 80 or finer grit stones.
 - c. Grouting: Cleanse floor with clean water and rinse thoroughly. Remove excess rinse water by wet vacuum and machine until completely dry. Apply epoxy grout to fill voids.
 - d. Fine Grinding: Grind with 120 or finer grit stones until all grout is removed from surface. Upon completion terrazzo shall show a minimum of 70% to 75% of marble chips.

C. Precast Terrazzo:

1. Preparation: Clean precast terrazzo surfaces which have become dirty or stained prior to setting to remove soil, stains and foreign materials. Clean precast terrazzo by thoroughly scrubbing with fiber brushes followed by a thorough drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh filler or abrasives.
2. Installation, General:
 - a. Employ only skilled and experienced workmen to install the precast terrazzo work. Use carborundum or diamond tipped power saws to cut precast terrazzo units which need to be fitted to existing field conditions.
 - b. Set precast terrazzo units to comply with requirements indicated on drawings and final shop drawings. Install anchors, supports, fasteners and other attachments indicated or necessary to secure precast terrazzo work in place. Shim and adjust anchors, supports and accessories to set precast terrazzo work accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned.
 - c. Installation Tolerances:
 - 1) Joint Widths: $\pm 1/16"$.
 - 2) Variation from Plumb: $\pm 1/16"$.
 - 3) Variation from Level: $\pm 1/8"$ in 20', non-cumulative.
 - 4) Piece Alignments (Edge to Edge): $\pm 1/32"$.
3. Installation of Wall Base: Install base where indicated, after placing floors, and in accordance with NTMA, and the applicable provisions of TCA W243 and ANSI A108.5. Tamp units into setting bed to achieve a full bond without voids. Level units at joints. Grind at joints to remove any minor discrepancies in level of units. Replace warped, stained, damaged and non-matching units as directed. Grout joints, except those shown to receive sealant or divider strips, with a mixture of Portland cement, pigment and water, matching the matrix of the unit being grouted.
4. Installation of Stair Tread/Risers: Place setting bed on steel pan and poured in place concrete type stairs where shown and in accordance with NTMA, and the applicable provisions of TCA S151 Method F111 (for steel pan stairs) and Methods F112 and W211 (for concrete stairs) and ANSI A108.1A. Tamp units into setting bed to achieve a full bond without voids. Level units at joints. Grind at joints to remove any minor discrepancies in level of units. Replace warped, stained, damaged and non-matching units as directed. Grout joints, except those shown to receive sealant or divider strips, with a mixture of Portland cement, pigment and water, matching the matrix of the units being grouted.

3.4 CLEANING, SEALING AND PROTECTION

- A. Clean terrazzo after installing and grinding operations are completed by thoroughly washing all terrazzo surfaces with a neutral cleaner. Rinse with clean water and allow surface to dry thoroughly. Apply sealer per manufacturer's recommendations.
- B. Apply 3M Stone Floor Protector Sealer in two coats at the coverage rate of 2500 sq./gallon per coat in compliance with sealer manufacture instructions.

END OF SECTION 09 66 23

LOS ANGELES INTERNATIONAL AIRPORT
CONSOLIDATED RENTAL CAR FACILITY
DA4881

RESINOUS MATRIX TERRAZZO FLOORING

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SECTION 09 68 13 – TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes carpet tile.

1.2 STANDARDS

- A. Except as modified by governing codes and by the Contract Documents, comply with the applicable provisions and recommendations of the following:
 - 1. The Carpet and Rug Institute "The Carpet Specifiers' Handbook."
 - 2. The Carpet and Rug Institute "CRI 104 Commercial Carpet Installation Standard."

1.3 SUBMITTALS

- A. Product Data: Submit product data, specifications, and installation instructions for materials specified herein and other data as may be required to show compliance with the Contract Documents. Include installation recommendations for each type of substrate required.
- B. Shop Drawings: Submit shop drawings showing the following:
 - 1. Existing floor materials to be removed.
 - 2. Existing floor materials to remain.
 - 3. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 4. Carpet tile type, color, and dye lot.
 - 5. Type of subfloor.
 - 6. Type of installation.
 - 7. Pattern of installation, carpet locations, direction, and starting points per floor.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Pile direction.
 - 11. Transition and other accessory strips.
 - 12. Transition details to other flooring materials.
- C. Samples: Submit samples showing full range of color, texture, and pattern variations expected. Prepare samples from same material to be used for the Work. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules. Submit the following:
 - 1. Carpet Tile: Full-size Samples.
 - 2. Exposed Edge Stripping and Accessory: 12-inch- (300-mm-) long Samples.

- D. Maintenance Data: Submit copies of instructions for care, cleaning, maintenance and repair of carpeting.
 - 1. Each carpet manufacturer shall meet with the authorized LAWA personnel, to review the characteristics of his product and to recommend appropriate maintenance procedures, prior to occupancy of the finished spaces.
- E. Warranty: Submit special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage a carpet installer, who has completed a minimum of three (3) projects over the last 10 years which were similar in material, design and extent to that indicated for the project - as determined by the LAWA – and which have resulted in construction with a record of successful in service performance.
 - 1. In the case where the Installer is actually a Dealer, it is understood that the terms Installer, Dealer, Carpeting Contractor and Contractor shall be one and the same for purposes of this Contract. He shall assume responsibility for all of the work, including acquisition of the materials from the manufacturers herein specified.
- B. Mill Inspection: The carpeting may be inspected to determine compliance with the Contract Documents with respect to manufacture, materials, pattern and colors. Inspection may be made at the mill by a representative of LAWA at any time during the process of manufacture.
- C. Sample Installations: Before installing carpet, install sample installation, for each type of carpet installation required to demonstrate aesthetic effects and qualities of materials and execution. Install sample installations to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Size and Location: Provide 250 square foot (23.23 sq.m) sample installation in location as directed by LAWA.
 - 2. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 3. Obtain LAWA's approval of sample installations before starting work.
 - 4. Maintain sample installations during construction in an undisturbed condition as a standard for judging the completed Work.
 - 5. Approved sample installations may become part of the completed Work if undamaged at time of Substantial Completion.

NOTE: The contractor shall not proceed with installation until the required mock up has been approved by LAWA.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver carpeting in original mill protective wrapping with mill register numbers and tags attached.

- B. Deliver other materials in manufacturers unopened containers identified with name, brand, type, grade, class, and other qualifying information.

- C. Store materials in a dry location, in such a manner as to prevent damage.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install carpet tile until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Do not install carpet tile 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.

1.7 WARRANTY

- A. Carpet Manufacturer's Warranty: Written warranty, signed by carpet tile manufacturer agreeing to replace carpet tile that does not comply with requirements or that fails within specified warranty period. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, wear, static buildup in excess of 3.0 kV when tested under the Standard Shuffle Test at 70 deg. F (21 deg. C) and 20% RH, edge raveling without seam sealers, tuft bind loss, zippering (wet or dry), shrinkage, curling, doming, snags, runs, and delamination. Warrantees shall be full term, not pro-rated for the specified warranty period.

- 1. Warranty Period: 10 years.

1.8 EXTRA MATERIALS AND ATTIC STOCK

- A. Attic Stock: Package and deliver usable remnants of carpet to LAWA at the conclusion of the job. Include any uncut carpet tiles.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Carpet Tile Types: Provide manufacturers commercial grade carpet tile for a 100% glue down installation.
- B. Provide carpet tile by one of the following:
 - 1. Interface
 - 2. Lees / Mohawk Industries
 - 3. Milliken
 - 4. Mannington
 - 5. Shaw

- C. Fiber Content: Nylon 6,6.
- D. Pile Characteristics: No Over-Tufting.
- E. Dye Process: Solution-dye or injection-dye is required.
- F. Density: Greater than 7000.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Portland cement-based formulation provided by or recommended by carpet tile manufacturer. Do not use gypsum based compounds.
- B. Carpet Adhesives: Water-resistant, mildew resistant, and nonstaining, high solids, low VOC emitting formulations that are specifically recommended by the carpet manufacturer, as verified through compatibility and adhesion testing for the intended substrate and application, and that comply with flammability requirements for installed carpet.
- C. Carpet Edging: Provide rubber composition carpet edging in single lengths wherever possible, keeping the number of joints or splices to a minimum. Provide in quantities and locations as job required based upon the recommended good practice of the industry; include in every location where carpet terminates and other flooring continues. Color to match adjacent carpet types.
- D. Floor Sealer: Type as recommended and manufactured by the carpet tile manufacturer for the applications indicated.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION MEETING

- A. Prior to the installation, meet at the project site to review the material selections, substrate preparations, installation procedures, coordination with other trades, special details and conditions, standard of workmanship, and other pertinent topics related to the Work. The meeting shall include LAWA, the Architect of Record, the Contractor, the installer, material manufacturer's representatives, and representatives of other trades or subcontractors affected by the installation.

3.2 PREPARATION

- A. Coordinate the installation of carpet so as not to delay the occupancy of the site or interfere with the completion of construction.
- B. Examine the substrates, adjoining construction and the conditions under which the Work is to be installed. Verify recommended limits for moisture content and alkalinity of concrete substrates with carpet manufacturer.

1. Moisture Content: Verify moisture content using a standard calcium chloride crystal test or a 1 square yard (0.84 sq.m) clear plastic test. Perform testing at a frequency as recommended by the carpet manufacturer. Perform testing at a frequency of not less than once every 1,000 square feet (93 sq.m).
 2. Alkalinity Test: Verify alkalinity of concrete substrates by drilling a 3/8 inch (9.5 mm) diameter hole approximately 1/4 inch (6.35 mm) deep, remove all residue; fill with distilled water, allow water to stand 3 minutes and test with a calibrated electronic meter or Ph paper. Perform testing at a frequency of not less than once every 1,000 square feet (93 sq.m).
 3. Alternative test procedures for moisture content and alkalinity may be acceptable subject to the carpet manufacturer's review and written acceptance.
- C. Concrete Subfloors: Verify that concrete slabs comply with the following:
1. Remove coatings, including curing compounds, existing floor covering adhesive residues, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by the carpet manufacturer.
 2. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by the carpet manufacturer.
 3. Use leveling and patching compounds recommended by flooring manufacturer for filling cracks, holes and depressions in the substrate. Surface shall be smooth, level and at proper elevation. Remove ridges, roughness and protrusions from concrete surfaces by grinding.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.
- E. Carpet installation shall not commence until painting and finishing work are complete and ceiling and overhead work is tested, approved, and completed.
- F. Proceed with installation only after unsatisfactory conditions have been corrected

3.3 INSTALLATION

- A. General: Comply with the manufacturer's instructions, specified industry standards and recommendations, and as required to match the accepted sample installations. Apply adhesive in accordance with adhesive manufacturer's directions.
- B. Adhere all full size, perimeter tiles, and cut tiles, with a full spread of adhesive. Dry fit cut tiles and apply adhesive to tile back after tile has been cut. Use full uncut tiles down the center of corridors and, where necessary, cut perimeter tiles to butt walls.
1. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal

cut edges as recommended by carpet tile manufacturer.

2. Cut openings in carpet for electrical outlets, piping and other penetrations. Maintain close tolerances so that edges of carpet will be covered by plates and escutcheons.
 3. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- C. Butt carpet tile tightly together to form seams without gaps or entrapped pile yarns and aligned with adjoining tiles.
- D. Edge Strip Installation: Install edge strip at every location where edge of carpet is exposed to traffic, unless otherwise indicated. Unless otherwise directed by the Architect of Record, install in single lengths and secure in accordance with manufacturer's directions.
- E. Traffic over adhesive installations shall be restricted until adhesive has properly cured in accordance with the adhesive manufacturers recommendations.

3.4 CLEANING AND PROTECTION

- A. Cleaning: As the carpeting is installed, remove and dispose of all trimmings, excess pieces of carpeting and laying materials from each area as it is completed. Vacuum carpeting with a commercial vacuum, having a cylindrical brush or beater bar and high suction. Remove adhesives, stains, and soil spots in accordance with the carpet manufacturer's recommendations.
- B. Protection: Protect carpeting against damage of every kind as damaged carpeting shall be rejected. Use non-staining cover material for protection. Tape joints of protective covering.
1. Plastic and polyethylene sheet protective coverings shall not be permitted.
 2. Remove and replace rejected carpeting with new carpeting. At the completion of the work, remove covering, vacuum clean carpeting and remove soiling and stains (if any) to the satisfaction of LAWA.

END OF SECTION 09 68 13

SECTION 09 72 00 - WALL COVERING PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rigid high-impact plastic sheet protective wall covering (Korogard).
2. High pressure compact laminate wall panels (Trespa).

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
- B. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
- C. Samples for Initial Selection: For each type of wall covering indicated.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Surface-Burning Characteristics: As follows, per ASTM E 84:
 - a. Flame-Spread Index: 25 (Class A) or less
 - b. Smoke-Developed Index: 450 or less.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET WALL PANELS

A. General:

1. Basis of Design Plastic Sheet Protective Wall Covering Product: Subject to compliance with requirements, provide Korogard Protective Wallcovering.
 - a. Nominal Thickness: 0.060 inch.
 - b. Item PK, texture "Cashmere".
2. Basis of Design High Pressure Compact Laminate Wall Panel Product: Subject to compliance with requirements, provide Trespa Meteon FR.
 - a. Nominal Thickness: 6mm.
 - b. SP-1: Color A03.4.0 Satin Silver Gray.
 - c. SP-2: Color A05.5.0 ST Quartz Gray.

2.2 ACCESSORIES

A. Adhesive: As recommended by panel manufacturer for the required substrates.

1. Adhesive shall have VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Accessory Moldings: Furnish accessory moldings by Protective Wall Covering or High Pressure Compact Laminate Wall Panel manufacturer to ensure accurate match of colors, dimensions and physical properties

C. Caulk: Furnish color-matched caulk by Protective Wall Covering or High Pressure Compact Laminate Wall Panel manufacturer to ensure accurate match of color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

3.3 INSTALLATION

- A. Cut and drill panels with carbide tipped saw blades or drill bits, or cut with snips.

3.4 CLEANING

- A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by panel manufacturer.

END OF SECTION 09 72 00

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WALL COVERING PANELS

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SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on exterior substrates, including but not limited to:
 - 1. Concrete.
 - 2. Steel.
 - 3. Galvanized metal.
 - 4. Concrete masonry units (CMU).
 - 5. Aluminum (not anodized or otherwise coated).
 - 6. Stainless-steel flashing.
 - 7. Exterior gypsum board.
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
 - 2. Section 055100 "Metal Stairs" for shop priming of metal substrates with primers specified in this Section.
 - 3. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
 - 4. Section 099600 "High-Performance Coatings" for special-use coatings.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

- E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- 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.
 - 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.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

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. Behr Process Corporation.
 2. Benjamin Moore & Co.
 3. ICI Paints.
 4. PPG Architectural Finishes, Inc.
 5. Pratt & Lambert.
 6. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. 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.

C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

D. Colors: As selected by Architect from manufacturer's full range.

2.3 PRIMERS/SEALERS

A. Primer, Bonding, Solvent Based: MPI #69.

B. Block Filler, Latex, Interior/Exterior: MPI #4.

2.4 METAL PRIMERS

A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.

B. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

C. Primer, Quick Dry, for Aluminum: MPI #95.

2.5 SOLVENT-BASED PAINTS

A. Alkyd, Exterior Flat (Gloss Level 1): MPI #8.

B. Alkyd, Exterior, Semi-Gloss (Gloss Level 5): MPI #94.

C. Alkyd, Exterior Gloss (Gloss Level 6): MPI #9.

2.6 ALUMINUM PAINT

A. Aluminum Paint: MPI #1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Gypsum Board: 12 percent.
- C. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. 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."
- 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 by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- H. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. 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 undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed to view:
 - a. Equipment, including panelboards and switch gear.
 - 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.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test 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.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete or Concrete Masonry Substrates, Non-traffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Prime Coat: Primer, alkali resistant, water based, MPI #3.
 - c. Intermediate Coat: Latex, exterior, matching topcoat.
 - d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.
- B. Steel Substrates:
 - 1. Alkyd System:
 - a. Prime Coat: Primer, alkyd, anticorrosive for metal, MPI #79.

- b. Prime Coat: Shop primer specified in Section 051200 "Structural Steel Framing" where substrate is specified.
 - c. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.
 - 2. Aluminum Paint System:
 - a. Prime Coat: Primer, alkyd, anti-corrosive for metal, MPI #79.
 - b. Prime Coat: Shop primer specified in Section 051200 "Structural Steel Framing" where substrate is specified.
 - c. Topcoat: Aluminum paint, MPI #1.
- C. Galvanized-Metal Substrates:
 - 1. Alkyd System:
 - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
 - b. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.
- D. Aluminum Substrates:
 - 1. Alkyd System:
 - a. Prime Coat: Primer, quick dry, for aluminum, MPI #95.
 - b. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5), MPI #94.
- E. Exterior Gypsum Board Substrates:
 - 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems.

1.2 SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Product List: For each product indicated.

1.3 EXTRA MATERIALS

- A. Furnish extra materials from the same production run as the material applied.

1.4 QUALITY ASSURANCE

- 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. LAWA will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide to LAWA, samples of at least 100 sq. ft..
 - b. Other Items: LAWA may designate items or areas required.
 - 2. Final LAWA approval of paint selections will be based on mockups.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with LAWA requirements:

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1. Benjamin Moore & Co.
2. Dunn-Edwards Corporation.
3. Kelly-Moore Paints
4. PPG Architectural Coatings / PPG Industries, Inc.
(includes ICI Paints / Glidden)
5. Sherwin-Williams Company.
(includes Frazee Paints)
6. Vista Paint.

2.2 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. VOC Content: Products shall comply with VOC limits of Los Angeles Department of Building and Safety and LAWA requirements.

C. FLOOR COATINGS:

1. Frazee; Monochem Dex-coat 2600
2. Glidden (formerly ICI; Groundworks), 3214 Water-based Clear Acrylic Concrete Sealer
3. PPG; Perma-Crete Plex-Seal WB Interior/Exterior Clear Sealer 4-6200
4. Sherwin Williams; H&C Concrete & Masonry Waterproofing Sealer

2.3 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: LAWA reserves the right to invoke the following procedure:

1. LAWA may 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements

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for maximum moisture content and other conditions affecting performance of the Work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Gypsum Board: 12 percent.
 4. Plaster: 12 percent.

3.2 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.

NOTE: When planning, either partial or full removal of existing coatings, regulatory restrictions and procedures shall be followed.

- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. SSPC-SP 2, "Hand Tool Cleaning."
 2. SSPC-SP 3, "Power Tool Cleaning."
 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations.
- B.
 - 1. 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.
 - 2. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 3. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in LAWA equipment rooms:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping
 - d. Pipe hangers and support.
 - 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.
 - i. Mechanical and electrical equipment that is indicated to have a factory primed finish for field painting.
 - 2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: LAWA 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.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site as per LAWA direction.
- 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 LAWA, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

Provide interior painting schedule indicating the type of prime coat, intermediate coat and top coat for all substrates applicable to your project.

END OF SECTION 09 91 23

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SECTION 09 96 00 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
 - 1. Exterior Substrates:
 - a. Steel.
- B. Related Sections include the following:
 - 1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
 - 2. Division 09 painting Sections for special-use coatings and general field painting.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of finish-coat product indicated.
- C. Samples for Verification: For each type of coating system and in each color and gloss of finish coat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.3 QUALITY ASSURANCE

- A. Master Painters Institute (MPI) Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."

2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and coating systems indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 HIGH-PERFORMANCE COATINGS, GENERAL

- A. Material Compatibility:
 1. Provide materials for use within each coating 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. Provide products of same manufacturer for each coat in a coating system.
- B. Colors: As selected by Architect from manufacturer's full range.
- C. Cold-Curing Epoxy Primer: MPI #101.
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. ICI Paints; Devoe High Performance Coatings, Universal Epoxy Primer, Devran 205, 205B2735/205C0910.
 - b. Sherwin-Williams Company; Industrial & Marine, Duraplate 235 Multi-Purpose Epoxy, B67W235.
 - c. Tower Paint; Dura Prime, 86850.

2.2 POLYURETHANE COATINGS

A. Polyurethane, Two-Component, Pigmented, Gloss: MPI #72.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Benjamin Moore & Co.; Aliphatic Acrylic Urethane Gloss, CM74/M75.
 - b. ICI Paints; Devoe High Performance Coatings, Aliphatic Urethane Gloss Enamel, 389, 389BXXXX/389C0910.
 - c. PPG Architectural Finishes, Inc.; Pitthane, Urethane Aliphatic Pigmented Gloss, 95-850.
 - d. Tower Paint; DuraGloss, 8740 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

- #### A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
1. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 2. Coating application indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- #### A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- #### B. Steel Substrates: Remove rust and loose mill scale.
1. Clean using methods recommended in writing by coating manufacturer.

3.3 APPLICATION

- #### A. Shop-apply surface prep and high-performance primer coatings, and field touch up primer and field apply top coat according to manufacturer's written instructions.
1. Use applicators and techniques suited for coating and substrate indicated.

- B. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At the end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the Project Site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.5 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Steel Substrates:
 - 1. Polyurethane, Pigmented, Over Epoxy Coating System:
 - a. Prime Coat: Cold-curing epoxy primer, MPI #101.
 - b. Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.

3.6 HIGH-PERFORMANCE COATING TYPE SCHEDULE

- A. High-Performance Coatings: Refer to Paint Colors specified in Division 09 "Interior Painting"
 - 1. HPC-1: To match P-1
 - 2. HPC-2: To match P-4
 - 3. HPC-3: To match PPG UC51568XL Duranar XL Champagne Gold

END OF SECTION 09 96 00

SECTION 10 11 00 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Visual display board assemblies.
2. Floor-to-ceiling visual display assemblies.
3. Rail support systems for visual display board assemblies.
4. Modular support systems for visual display board assemblies.
5. Sliding visual display units.
6. Visual display conference units.
7. Natural-slate chalkboards.
8. Glass markerboards.
9. Display rails.

B. Related Requirements:

1. Section 097723 "Fabric-Wrapped Panels" for tackable, fabric-covered panels mounted on walls.
2. Section 101200 "Display Cases" for [**individually framed and enclosed, wall-mounted bulletin boards**] [**and for**] [**tackboards within display cases**].
3. Section 101416 "Visual Display Fabrics" for visual display wall coverings intended for use with dry-erase markers.

1.2 PREINSTALLATION MEETINGS

- ##### A. Preinstallation Conference: Conduct conference at [**Project site**] <**Insert location**>.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
2. Include electrical characteristics for motorized units.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.

2. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products 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."
3. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that the product contains no urea formaldehyde.
4. Laboratory Test Reports for Credit IEQ 4.4: For composite wood products used in visual display units, documentation indicating that products 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."

C. Shop Drawings: For visual display units.

1. Include plans, elevations, sections, details, and attachment to other work.
2. Show locations of panel joints.[**Show locations of field-assembled joints for factory-fabricated units too large to ship in one piece.**]
3. Show locations and layout of special-purpose graphics.
4. Include sections of typical trim members.
5. Include wiring diagrams for power and control wiring.

D. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes, and as follows:

1. Samples of facings for each visual display panel type, indicating color and texture.
2. Fabric swatches of fabric facings for tackboards.
3. Actual factory-finish color samples, applied to **[aluminum]** **[wood]** substrate.
4. Include accessory Samples to verify color selected.

E. Samples[**for Verification**]: For each type of visual display unit indicated.

1. Visual Display Panel: Not less than **8-1/2 by 11 inches (215 by 280 mm)**, with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
2. Trim: **6-inch- (150-mm-)** long sections of each trim profile.
3. Display Rail: **6-inch- (150-mm-)** long section of each type.
4. **[Rail]** **[Modular]** Support System: **6-inch- (152-mm-)** long sections.
5. Accessories: Full-size Sample of each type of accessory.

F. Product Schedule: For visual display units.[**Use same designations indicated on Drawings.**]

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of tackboards.
- C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. **[Operation and]**Maintenance Data: For visual display units[**and motorized units**] to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical **[wall area] [visual display unit] [floor-to-ceiling visual display assembly]** **<Insert description>** as shown on Drawings. Include accessories.
 - 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with visual display units by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.9 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 2. Warranty Period: **[50]** **<Insert number>** years from date of Substantial Completion.
 3. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of visual display unit from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: **[25]** **<Insert value>** or less.
 2. Smoke-Developed Index: **[50]** **[450]** **<Insert value>** or less.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 VISUAL DISPLAY BOARD ASSEMBLY **<Insert drawing designation>**

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Visual Display Board Assembly: **[Field]** **[or]** **[factory]** fabricated.
1. Assembly: **[Chalkboard]** **[markerboard]** **[and]** **[tackboard]**.
 2. Corners: **[Square]** **[Rounded]**.
 3. Width: **[As indicated on Drawings]** **<Insert dimension>**.
 4. Height: **[As indicated on Drawings]** **<Insert dimension>**.
 5. Mounting Method: **[Direct to wall]** **[Rail support system]** **[Modular support system]**.

- C. Chalkboard Panel: **[Porcelain-enamel-faced] [High-pressure laminate-faced] [Melamine-faced] [Painted-finish-faced]** chalkboard panel on core indicated.
1. Color: **[Green] [Blue] [Brown] [Black] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert color>.**
- D. Markerboard Panel: **[Porcelain-enamel-faced] [High-pressure laminate-faced] [Melamine-faced]** markerboard panel on core indicated.
1. Color: **[White] [Beige] [Tan] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert color>.**
- E. Tackboard Panel: **[Natural-cork] [Plastic-impregnated-cork] [Vinyl-fabric-faced] [Polyester-fabric-faced]** tackboard panel on core indicated.
1. Fabric Wrapped Edge: Wrap edge of tackboard panel with fabric facing.
 2. Color and Pattern: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors].**
- F. Aluminum Frames **[and Trim]**: Fabricated from not less than **0.062-inch- (1.57-mm-)** thick, extruded aluminum; **[standard size and shape] [slim size and standard shape] [of size and shape indicated on Drawings] <Insert size and shape>.**
1. Field-Applied Trim: Manufacturer's standard, **[snap-on trim with no visible screws or exposed joints] [slip-on trim] [screw-on trim with Phillips flat-head screws].**
 2. Aluminum Finish: **[Clear anodic] [Color anodic] [Manufacturer's standard baked-enamel or powder-coat] finish.**
 - a. Color: **[Light bronze] [Medium bronze] [Dark bronze] [Black] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors and color densities] <Insert color>.**
- G. Factory-Applied Wood Trim: **[Red oak] [Walnut] [Manufacturer's standard species] <Insert species>**, not less than **1/2 inch (13 mm)** thick; **[standard size and shape] [of size and shape indicated on Drawings] <Insert size and shape>** with **[opaque] [transparent] finish.**
- H. Field-Applied Wood Trim: Comply with requirements specified in **[Section 062023 "Interior Finish Carpentry."] [Section 064600 "Wood Trim."]**
- I. Vinyl Trim: **[Dark brown] [Black] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors].**
- J. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, **[balanced around center of board, as acceptable to Architect] [as indicated on approved Shop Drawings].**

- K. Combination Assemblies: Provide [**manufacturer's standard exposed trim**] [**H-trim**] [**hidden spline**] between abutting sections of visual display panels.
- L. Chalktray: Manufacturer's standard; continuous.
 - 1. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.
 - 2. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.
- M. Display Rail: Manufacturer's standard, extruded-aluminum display rail with [**plastic-impregnated-cork**] **<Insert material>** insert, end stops, [**and continuous paper holder**], designed to hold accessories.
 - 1. Size: [**1 inch (25 mm)**] [**2 inches (50 mm)**] [**3 inches (75 mm)**] high by [**full length of visual display unit**] [**length indicated on Drawings**].
 - 2. Map Hooks: [**Two**] **<Insert number>** map hooks for every [**48 inches (1200 mm)**] **<Insert dimension>** of display rail or fraction thereof.
 - 3. Map Hooks and Clips: [**Two**] **<Insert number>** map hooks with flexible metal clips for every [**48 inches (1200 mm)**] **<Insert dimension>** of display rail or fraction thereof.
 - 4. Flag Holder: [**One**] **<Insert number>** for each room.
 - 5. Tackboard Insert Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] **<Insert color>**.
 - 6. Aluminum Color: Match finish of visual display assembly trim.
- N. Paper Holder Display Rail: Extruded aluminum; designed to hold paper by clamping action.
- O. Special-Purpose Graphics: Fuse or paint [**semi-visible writing guidelines**] [**penmanship lines**] [**music staff lines**] [**grid, 1 inch (25 mm) square**] [**rectangular graph coordinates**] [**polar graph coordinates**] [**horizontal lines, 2 inches (50 mm) o.c.**] [**USA map**] [**world map**] [**soccer field**] [**football field**] [**basketball court**] **<Insert description of special-purpose graphics>** graphic onto surface of porcelain-enamel visual display unit[, in locations indicated].

2.4 FLOOR-TO-CEILING VISUAL DISPLAY ASSEMBLIES

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Floor-to-Ceiling Markerboard Panel Assemblies: Consisting of markerboard panels with [**porcelain-enamel**] [**high-pressure-laminate**] facing on core indicated, fabricated for floor-to-ceiling assemblies.
 - 1. Color: [**White**] [**Beige**] [**Tan**] [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] **<Insert color>**.

- C. Floor-to-Ceiling Tackboard Panel Assemblies: Consisting of tackboard panels with **[natural-cork]** **[plastic-impregnated-cork]** **[vinyl-fabric]** **[polyester-fabric]** facing on core indicated, fabricated for floor-to-ceiling assemblies.
1. Edge Treatments:
 - a. Panel-Joint Edges: **[Wrapped with fabric]** **[Concealed by fabric-covered trim]**.
 - b. Top-of-Wall Edges: **[Wrapped with fabric]** **[Concealed by fabric-covered trim]**.
 - c. Bottom-of-Wall Edges: **[Wrapped with fabric]** **[Concealed by fabric-covered trim]**.
 - d. Corners: **[Wrapped with fabric]** **[Concealed by fabric-covered trim]**.
 2. Color: **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from full range of industry colors]** **<Insert color>**.
- D. Width: **[Full width of wall]** **[As indicated on Drawings]** **<Insert dimension>**.
- E. Height: **[Full height of wall]** **[Full height of wall above base]** **[As indicated on Drawings]** **<Insert dimension>**.
- F. Joint Accessories: Manufacturer's standard, **[exposed color-matched trim]** **[fabric-covered trim]** **[concealed aluminum or steel spline]** at butt joints.

2.5 RAIL SUPPORT SYSTEM FOR VISUAL DISPLAY BOARD ASSEMBLIES

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Support Rails: Horizontal, wall-mounted, extruded-aluminum rails designed to receive hanger clip and to support visual display boards**[; and capable of gripping and suspending paper directly from rail]**.
1. Finish: **[Clear anodic]** **[Color anodic]** **[Manufacturer's standard baked enamel or powder coat]**.
 2. Color and Gloss: **[Light bronze]** **[Medium bronze]** **[Dark bronze]** **[Black]** **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color and gloss>**.
- C. Hanger Clips: Extruded aluminum with finish to match rails; designed to support independent visual display board assemblies by engaging support rail and top trim of board.
- D. Visual Display Board Assemblies: Fabricated from not less than **3/8-inch- (9.5-mm-)** thick, kraft-paper honeycomb core; designed to be rigid and to resist warpage, and with aluminum trim designed to engage hanger clips.

2.6 MODULAR SUPPORT SYSTEM FOR VISUAL DISPLAY BOARD ASSEMBLIES

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Standards: **72-inch-** (1829-mm-) long extruded-aluminum slotted standards designed for supporting visual display boards on panel clips. Space slots at not less than [**4 inches (100 mm)**] **<Insert dimension>** o.c.
 - 1. Finish: [**Clear anodic**] [**Color anodic**] [**Manufacturer's standard baked enamel or powder coat**].
 - 2. Color and Gloss: [**Light bronze**] [**Medium bronze**] [**Dark bronze**] [**Black**] [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] **<Insert color and gloss>**.
- C. Panel Clips: Extruded aluminum or steel with finish to match standards.

2.7 SLIDING VISUAL DISPLAY UNITS

- A. Horizontal-Sliding Visual Display Units: Factory-fabricated units consisting of extruded-aluminum tubular frame, fixed rear visual display panel, aluminum-framed horizontal-sliding visual display panels, and extruded-aluminum fascia that conceals overhead sliding track; designed for recessed mounting. Provide panels that operate smoothly without vibration or chatter.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 - 2. Two-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide two sliding panels, each equal to not less than one-half of overall length of unit.
 - 3. Three-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide three sliding panels, each equal to not less than [**one-third**] [**one-half**] of overall length of unit.
 - 4. Four-Track Units: Fabricate unit with fixed rear panel centered in and covering not less than one-half of rear surface, and fixed front panel on each side of unit equal to not less than one-quarter of overall length of unit. Provide four sliding panels, each equal to not less than one-quarter of overall length of unit.
 - a. Swinging Doors: Fabricated from same construction as sliding panels and supported on full-height continuous hinges. Provide visual display panel on both faces of each door.
 - 5. Hardware: Manufacturer's standard, extruded-aluminum overhead track and channel-shaped bottom guides; with two nylon ball-bearing carriers and two nylon rollers for each sliding panel.
 - 6. Overall Width: [**As indicated on Drawings**] **<Insert dimension>**.
 - 7. Overall Height: [**As indicated on Drawings**] **<Insert dimension>**.
- B. Vertical-Sliding Visual Display Units: Factory-fabricated units consisting of extruded-aluminum tubular frame, fixed rear visual display panel, and aluminum-framed vertical-sliding

panels; **[motor operated];** designed for recessed mounting. Provide panels that operate smoothly without vibration or chatter.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
2. Type: Tubular frame on **[four sides]** **[top and two sides, with sides extending to floor; with kick panel to conceal sliding panels]**. Design unit to support panels independently of wall.
3. Two-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide two sliding panels, each equal to not less than one-half of overall height of unit.
4. Three-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide three sliding panels, each equal to not less than one-half of overall height of unit.
5. Four-Track Units: Fabricate unit with fixed rear panel centered in and covering not less than one-half of rear surface. Provide four sliding panels, each equal to not less than one-half of overall height of unit.
6. Hardware: Manufacturer's standard, neoprene ball-bearing end rollers, four on each side of each sliding panel. Counterbalance each sliding panel with counterweights supported by steel aircraft cable over ball-bearing sheaves; with removable cover plate for access to counterweights. Provide rubber bumpers at top and bottom for each sliding panel.
7. Motorized Operation: Provide not less than one motor with gearhead reducers for each sliding panel, mounted above visual display unit and connected to sliding panels with steel aircraft cable. Provide removable cover plate for access to motor. Equip motors with limit switches to automatically stop motor at each end of travel.
 - a. Electric Motors: UL approved or recognized, totally enclosed, complying with NEMA MG 1, with thermal-overload protection; 1/15 hp, single phase, **[110]** **[220]** V, 60 Hz.
 - b. Control Station: Three-position, **[maintained]** **[momentary]** contact, switch-operated control station with open, close, and off functions; with NEMA ICS 6, Type 1 enclosure. Provide **[one]** **<Insert number>** control station(s) for each sliding panel unit.
 - c. Key Switch: Provide supplementary key switch for each control station. Furnish two keys for each control station, keyed alike.
8. Overall Width: **[As indicated on Drawings]** **<Insert dimension>**.
9. Overall Height: **[As indicated on Drawings]** **<Insert dimension>**.

C. Panels and Accessories:

1. Sliding Chalkboard Panel: **[Porcelain-enamel-faced]** **[High-pressure laminate-faced]** chalkboard panel on kraft-paper honeycomb core designed to be rigid and to resist warpage, not less than **[3/8 inch (9.5 mm) thick]** **<Insert dimension>**.
 - a. Color: **[Green]** **[Blue]** **[Brown]** **[Black]** **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from full range of industry colors]** **<Insert color>**.

2. Sliding Markerboard Panel: [**Porcelain-enamel-faced**] [**High-pressure laminate-faced**] markerboard panel on kraft-paper honeycomb core designed to be rigid and to resist warpage, not less than [**3/8 inch (9.5 mm) thick**] <Insert dimension>.
 - a. Color: [**White**] [**Beige**] [**Tan**] [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <Insert color>.
3. Sliding Tackboard Panel: [**Natural-cork**] [**Plastic-impregnated-cork**] [**Vinyl-fabric-faced**] [**Polyester-fabric-faced**] tackboard panel on kraft-paper honeycomb core designed to be rigid and to resist warpage, not less than [**3/8 inch (9.5 mm) thick**] <Insert dimension>.
 - a. Color and Pattern: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**].
4. Fixed Rear Chalkboard Panel: [**Porcelain-enamel-faced**] [**High-pressure laminate-faced**] chalkboard panel on core indicated.
 - a. Color: [**Green**] [**Blue**] [**Brown**] [**Black**] [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <Insert color>.
5. Fixed Rear Markerboard Panel: [**Porcelain-enamel-faced**] [**High-pressure laminate-faced**] markerboard panel on core indicated.
 - a. Color: [**White**] [**Beige**] [**Tan**] [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] <Insert color>.
6. Fixed Rear Tackboard Panel: [**Natural-cork**] [**Plastic-impregnated-cork**] [**Vinyl-fabric-faced**] [**Polyester-fabric-faced**] tackboard panel on core indicated.
 - a. Color and Pattern: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**].
7. Kick Panel: Manufacturer's standard [**fabric-covered cork**] [**low-pressure laminate**].
 - a. Color and Pattern: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**].
8. Accessories: [**Chalktray**] [**locks**] [**and**] [**easel pad clamps**].
9. Display Rail: Manufacturer's standard, extruded-aluminum display rail with [**plastic-impregnated-cork**] <Insert material> insert, end stops, [**and continuous paper holder,**] designed to hold accessories.

- a. Size: [**1 inch (25 mm)**] [**2 inches (50 mm)**] [**3 inches (75 mm)**] high by full length of visual display unit.
 - b. Map Hooks: [**Two**] **<Insert number>** map hooks for every [**48 inches (1200 mm)**] **<Insert dimension>** of display rail or fraction thereof.
 - c. Flag Holder: [**One**] **<Insert number>** for each sliding visual display unit.
 - d. Tackboard Insert Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from full range of industry colors**] **<Insert color>**.
10. Aluminum Trim: [**Factory applied**] [**Field applied**]; in [**manufacturer's standard**] **<Insert description>** size and profile; with [**clear anodic**] **<Insert description>** finish.

2.8 VISUAL DISPLAY CONFERENCE UNITS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Visual Display Conference Units: Factory-fabricated units consisting of hinged-door wood cabinet with perimeter face frame, sides, and back; not less than **3-inch (75-mm)** interior depth and designed for surface wall mounting. Fabricate inside of cabinet and cabinet doors with fixed visual display units.
1. Wood Cabinets: Fabricated from solid wood with integral, solid-wood marker tray. Fabricate hinged door panels with solid-wood frame and wood-veneer exterior surface.
 - a. Species and Finish: [**Red oak**] [**Walnut**] [**Mahogany**] **<Insert species>** with [**natural lacquered**] [**oiled**] [**stained**] finish.
 2. Plastic-Laminate Cabinets: Cabinet and hinged door panels fabricated from manufacturer's standard, high-pressure, plastic-laminate-finished wood panels; with integral marker tray.
 - a. Color: [**Match Architect's sample**] [**As indicated by referencing manufacturer's designations**] [**As selected by Architect from full range of industry colors**] **<Insert color>**.
 3. Cabinet Corners: [**Square**] [**Rounded**].
 4. Hardware: Manufacturer's standard, full-height continuous hinges[, **wire door pulls**,] and door bumpers.
 5. Fixed Rear Panel: Manufacturer's standard [**porcelain-enamel**] [**high-pressure-laminate**] markerboard panel.
 - a. Color: [**White**] [**Beige**] [**Tan**] [**Match Architect's sample**] [**As indicated by referencing manufacturer's designations**] [**As selected by Architect from full range of industry colors**] **<Insert color>**.
 6. Inside Surface of Doors: Same as fixed rear panel.

7. Inside Surface of Doors: Tackboard panel consisting of [natural-cork] [plastic-impregnated-cork] [vinyl-fabric] [polyester-fabric] facing on manufacturer's standard core.
 - a. Color: [Match Architect's sample] [As indicated by referencing manufacturer's designations] [As selected by Architect from full range of industry colors] <Insert color>.
8. Projection Screen: Manufacturer's standard, pull-down, matte, white projection screen, not less than 8 inches (200 mm) smaller in each direction than overall cabinet size, and mounted above rear visual display panel.
9. Fluorescent Light: Manufacturer's standard, not less than 24 inches (610 mm) long, and mounted above rear visual display panel.
10. Width: [48 inches (1219 mm)] [As indicated on Drawings] <Insert dimension>.
11. Height: [36 inches (914 mm)] [48 inches (1219 mm)] [72 inches (1829 mm)] [As indicated on Drawings] <Insert dimension>.
12. Accessories: [Cylinder lock] [and] [flip-chart pad clamp].

2.9 NATURAL-SLATE CHALKBOARDS

- A. Manufacturers: Subject to compliance with requirements, [provide products by the following] [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:
 1. <Insert manufacturer's name>.
- B. Natural Slate: Select grade, resurfaced, natural slate; free from ribbons and other natural marks that impair their functional use and durability as a writing surface.
 1. Thickness: Not less than 1/4 inch (6 mm) or more than 3/8 inch (9.5 mm) thick with maximum deviation of 1/16 inch (1.6 mm) when an average thickness of at least 1/4 inch (6 mm) is maintained.
- C. Surface slate panels to a natural plane. Grind and hone to smooth, uniform finish equivalent to that obtained by minimum 180 grit and maximum 220 grit.
 1. Cut joints straight and true. Space joints symmetrically. Fit and match panels before shipment to provide continuous, uniform writing surface.
 2. Provide writing surface free of tooling marks, pits, chipping, scratches, and surface spalls in excess of those that can be easily corrected; and free of surface-applied stain, dye, or other artificial coloring.
 3. Length: Furnish panels approximately equal in length with permissible variation not more than 3 inches (75 mm) in either direction of equal spacing. Allow 1/4-inch (6-mm) clearance at trim in length and width for fitting. Provide lengths of panels in each space as follows:
 - a. Up to 5 feet (1.5 m); one panel.
 - b. More than 5 feet (1.5 m) but less than 9 feet (2.7 m); two panels.

- c. More than 9 feet (2.7 m) but less than 13.5 feet (4.1 m); three panels.
- d. More than 13.5 feet (4.1 m) but less than 18 feet (5.5 m); four panels.
- e. More than 18 feet (5.5 m) but less than 22.5 feet (6.9 m); five panels.
- f. More than 22.5 feet (6.9 m) but less than 27 feet (8.2 m); six panels.

- D. Aluminum: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; [of size and shape indicated on Drawings] <Insert size and shape>; [snap-on type with no visible screws or exposed joints] [screw-on type with Phillips flat-head screws].
- E. Wood Trim: Comply with requirements specified in [Section 062023 "Interior Finish Carpentry."] [Section 064600 "Wood Trim."]

2.10 GLASS MARKERBOARDS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Glass Markerboards: 6-mm tempered glass markerboard, with smooth polished edge and [rounded] [eased] corners; color coated on back surface].
- C. Mounting: Round, stainless-steel standoffs, holding glass approximately 1 inch (25 mm) from wall surface; [mounted through holes in markerboard] [mounted in notches in standoffs at top and bottom edges of markerboard].
- D. Color and Surface: [Glossy] [Matte] [white] [gray] [translucent] [clear] [black] [red] [blue].
- E. Marker Tray: Glass, supported by stainless-steel clips.
- F. Size: [18 by 24 inches (457 by 610 mm)] [24 by 36 inches (610 by 914 mm)] [36 by 48 inches (914 by 1219 mm)] [48 by 96 inches (1219 by 2438 mm)] <Insert dimensions>.

2.11 DISPLAY RAILS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Aluminum Display Rail: Manufacturer's standard, extruded-aluminum display rail with [plastic-impregnated-cork] <Insert material> tackable insert, [and continuous paper holder,]designed to hold accessories.
- C. Paper Holder Display Rail: Extruded aluminum; designed to hold paper by clamping action.
 - 1. Aluminum Finish: [Clear anodic] <Insert description> finish.
- D. Wood Display Rail: Manufacturer's standard wood display rail with [plastic-impregnated-cork] <Insert material> insert.
 - 1. Finish: [Natural oak] <Insert finish>.

- E. Tackable Insert Color: [Tan] [Gray] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert color>.
- F. Size: [1 inch (25 mm)] [2 inches (50 mm)] [3 inches (75 mm)] high by length indicated on Drawings.
- G. End Stops: [Aluminum] [Not required].
- H. Accessories:
 - 1. [Metal] [Plastic] Map Hooks: Include [two] <Insert number> map hooks per [room] [20 feet (6 m)] <Insert dimension> [of installed display rail].
 - 2. Roller Brackets: Include [two] <Insert number> roller brackets per [room] [20 feet (6 m)] <Insert dimension> [of installed display rail].
 - 3. Flag Holders: Include [one] <Insert number> flag holder per [room] [20 feet (6 m)] <Insert dimension> [of installed display rail].

2.12 CHALKBOARD PANELS

- A. Porcelain-Enamel Chalkboard Panels: High-pressure, factory-laminated chalkboard panels of balanced three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with matte finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.
 - 1. Face Sheet Thickness: [0.021 inch (0.53 mm)] [0.013 inch (0.33 mm)] uncoated base metal thickness.
 - 2. Manufacturer's Standard Core: Minimum 1/4 inch (6 mm) thick, with manufacturer's standard moisture-barrier backing.
 - 3. Hardboard Core: 1/4 inch (6 mm) thick; with [0.005-inch- (0.127-mm-) thick, aluminum foil] [0.015-inch- (0.38-mm-) thick, aluminum sheet] [0.0129-inch- (0.33-mm-) thick, galvanized-steel sheet] backing.
 - 4. Particleboard Core: 3/8 inch (9.5 mm) thick; with [0.005-inch- (0.127-mm-) thick, aluminum foil] [0.015-inch- (0.38-mm-) thick, aluminum sheet] [0.0129-inch- (0.33-mm-) thick, galvanized-steel sheet] backing.
 - 5. Fiberboard Core: [3/8 inch (9.5 mm)] [1/2 inch (13 mm)] thick; with [0.001-inch- (0.025-mm-) thick, aluminum foil] [0.015-inch- (0.38-mm-) thick, aluminum sheet] [0.0129-inch- (0.33-mm-) thick, galvanized-steel sheet] backing.
 - 6. Medium-Density Fiberboard Core: 7/16 inch (11 mm) thick; with manufacturer's standard moisture-barrier backing.
 - 7. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.
- B. High-Pressure-Laminate Chalkboard Panels: Factory-laminated chalkboard panels of balanced three-ply construction, consisting of backing, fiberboard core material, and high-pressure-laminate writing surface.

- C. Melamine Chalkboard Panels: Fabricated from **1/4-inch- (6-mm-)** thick, sealed and primed hardboard core permanently bonded with thermally fused, melamine-impregnated decorative paper writing surface complying.
- D. Painted-Finish Chalkboard Panels: Fabricated from **[two plies of] 1/4-inch- (6-mm-)** thick, treated, tempered hardboard core permanently surfaced with manufacturer's standard, heat-cured organic coating formulated for chalk-receptive matte finish.

2.13 MARKERBOARD PANELS

- A. Porcelain-Enamel Markerboard Panels: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with **[high-gloss] [low-gloss]** finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.
 - 1. Face Sheet Thickness: **[0.021 inch (0.53 mm)] [0.013 inch (0.33 mm)]** uncoated base metal thickness.
 - 2. Manufacturer's Standard Core: Minimum **1/4 inch (6 mm)** thick, with manufacturer's standard moisture-barrier backing.
 - 3. Hardboard Core: **1/4 inch (6 mm)** thick; with **[0.005-inch- (0.127-mm-) thick, aluminum foil] [0.015-inch- (0.38-mm-) thick, aluminum sheet] [0.013-inch- (0.33-mm-) thick, galvanized-steel sheet]** backing.
 - 4. Particleboard Core: **[3/8 inch (9.5 mm)] [1/2 inch (13 mm)]** thick; with **[0.005-inch- (0.127-mm-) thick, aluminum foil] [0.015-inch- (0.38-mm-) thick, aluminum sheet] [0.013-inch- (0.33-mm-) thick, galvanized-steel sheet]** backing.
 - 5. Fiberboard Core: **[3/8 inch (9.5 mm)] [1/2 inch (13 mm)]** thick; with **[0.001-inch- (0.025-mm-) thick, aluminum foil] [0.015-inch- (0.38-mm-) thick, aluminum sheet] [0.013-inch- (0.33-mm-) thick, galvanized-steel sheet]** backing.
 - 6. Medium-Density Fiberboard Core: **7/16 inch (11 mm)** thick; with manufacturer's standard moisture-barrier backing.
 - 7. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.
- B. High-Pressure-Laminate Markerboard Panels: Factory-laminated markerboard panel of three-ply construction, consisting of backing, fiberboard core material, and high-pressure-laminate writing surface.
- C. Melamine Markerboard Panels: Fabricated from **1/4-inch- (6-mm-)** thick, sealed and primed hardboard panels permanently bonded with thermally fused, melamine-impregnated decorative paper writing surface.

2.14 TACKBOARD PANELS

- A. Tackboard Panels:
 - 1. Facing: **[1/16-inch- (1.6-mm-) thick] [1/8-inch- (3-mm-) thick] [1/4-inch- (6-mm-) thick] [natural cork] [plastic-impregnated cork]**.
 - 2. Facing: **[Vinyl] [Polyester]** fabric.

3. Facing: [Vinyl] [Polyester] fabric factory laminated to [1/16-inch- (1.6-mm-) thick] [1/8-inch- (3-mm-) thick] [1/4-inch- (6-mm-) thick] cork sheet.
4. Core: Manufacturer's standard.
5. Core: [3/8-inch- (9.5-mm-) thick] [7/16-inch- (11-mm-) thick] fiberboard.
6. Core: 1/4-inch- (6-mm-) thick [hardboard] [or] [particleboard].

2.15 MATERIALS

- A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- B. High-Pressure Plastic Laminate: NEMA LD 3.
- C. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish[**with surface-burning characteristics indicated**].
- D. Plastic-Impregnated-Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout[**with surface-burning characteristics indicated**].
- E. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, [burlap weave] <Insert texture or pattern>; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface-burning characteristics indicated.
- F. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.
- G. Hardboard: ANSI A135.4, tempered.
- H. Particleboard: ANSI A208.1, Grade M-1[.], [made with binder containing no urea formaldehyde.], [that complies 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."]
- I. Medium-Density Fiberboard: ANSI A208.2[.]; [made with binder containing no urea formaldehyde.]; [that complies 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."]
- J. Fiberboard: ASTM C 208 cellulosic fiber insulating board.
- K. Clear Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality Q3, with exposed edges seamed before tempering.
- L. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.

- M. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.
 - 1. Adhesives shall have a VOC content of [50] <Insert value> g/L or less.
 - 2. Adhesives 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."
- N. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in [Section 099123 "Interior Painting"] <Insert Section number and title> and recommended in writing by visual display unit manufacturer for intended substrate.

2.16 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.17 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603, except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.

- B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of motorized, sliding visual display units.
- C. Examine walls and partitions for proper preparation and backing for visual display units.
- D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prime wall surfaces indicated to receive **[visual display units] [direct-applied floor-to-ceiling visual display assemblies]** and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.
- E. Prepare recesses for sliding visual display units as required by type and size of unit.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Field-Assembled Visual Display Board Assemblies: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.
 - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, **[balanced around center of board, as acceptable to Architect] [as indicated on approved Shop Drawings]**.
 - 2. Where size of visual display board assemblies or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
- C. Factory-Fabricated Visual Display Board Assemblies: Adhere to wall surfaces with **[egg-size]** **<Insert coverage>** adhesive gobs at **16 inches (400 mm)** o.c., horizontally and vertically.

- D. Factory-Fabricated Visual Display Board Assemblies: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than **16 inches (400 mm)** o.c. Secure tops and bottoms of boards to walls.
- E. Natural-Slate Chalkboards: Align and level joints between adjoining panels, and apply manufacturer's recommended joint-filler compound. Hone and finish joints to continuous even plane.
- F. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings, or if not indicated, at heights indicated below.
1. Mounting Height [for Grades K through 3] <Insert description>: **[24 inches (610 mm)]** <Insert dimension> above finished floor to top of chalktray.
 2. Mounting Height [for Grades 4 through 6] <Insert description>: **[28 inches (711 mm)]** <Insert dimension> above finished floor to top of chalktray.
 3. Mounting Height [for Grades 7 and Higher] <Insert description>: **[36 inches (914 mm)]** <Insert dimension> above finished floor to top of chalktray.
- G. Display Rails: Install rails at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with fasteners at not more than **16 inches (400 mm)** o.c.
1. Mounting Height: **[48 inches (1219 mm)]** **[60 inches (1524 mm)]** **[72 inches (1829 mm)]** <Insert dimension> above finished floor to top of rail.
- H. Floor-to-Ceiling Markerboard Panels: Attach panels to wall surface with egg-size adhesive gobs at **16 inches (400 mm)** o.c., horizontally and vertically.
1. Join adjacent panels with concealed steel splines for smooth alignment.
 2. Join adjacent panels with exposed, H-shaped aluminum trim painted to match wall panel.
- I. Floor-to-Ceiling Tackboard Panels: Attach panels to wall surface with egg-size adhesive gobs at **16 inches (400 mm)** o.c., horizontally and vertically.
1. Install wrapped-edge panels with butt joints between adjacent wall panels.
 2. Join adjacent panels with exposed, H-shaped aluminum trim covered with same fabric as wall panels.
- J. Rail Support System: Install horizontal support rail at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall with fasteners at **12 inches (300 mm)** o.c.
1. Mounting Height: **[72 inches (1829 mm)]** <Insert dimension> above finished floor to top of rail.
 2. Hang visual display units on rail support system.
- K. Modular Support System: Install adjustable standards at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Install standards at **48 inches (1200 mm)** o.c.

mm) o.c., vertically aligned and plumb, and attached to wall with fasteners at 12 inches (300 mm) o.c.

1. Mounting Height: [12 inches (305 mm)] <Insert dimension> above finished floor to bottom of standard.
2. Install single-slotted standard at each end of each run of standards and double-slotted standards at intermediate locations.
3. Provide locking screw at top corner of visual display board at each standard.
4. Hang visual display units on modular support system.

L. Sliding Visual Display Units: Install units at mounting heights indicated. Attach to wall framing with fasteners at not more than 16 inches (400 mm) o.c.

1. Adjust panels to operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

M. Visual Display Conference Units: Install units at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with [fasteners through back of cabinet] [concealed brackets screwed to wall] [concealed wood cleats screwed to wall].

1. Mounting Height: [72 inches (1829 mm)] <Insert dimension> above finished floor to top of cabinet.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

3.5 DEMONSTRATION

- A. [Engage a factory-authorized service representative to train] [Train] Owner's maintenance personnel to adjust, operate, and maintain motorized, sliding visual display units.

END OF SECTION 10 11 00

SECTION 10 14 16 - PLAQUES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plaques.
- B. Related Requirements:
 - 1. Section 101423 "Panel Signage" for signs, with or without frames, that are made of materials other than solid metal.
 - 2. [Section 142100 "Electric Traction Elevators"] [Section 142400 "Hydraulic Elevators"] [Section 143100 "Escalators"] [Section 143200 "Moving Walks"] [Section 144200 "Wheelchair Lifts"] for code-required conveying equipment signage.
 - 3. Section 220553 "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 4. Section 230553 "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
 - 5. Section 260553 "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.

1.2 ALLOWANCES

- A. Allowances for [plaques] [plaques used for room identification] <Insert item description> are specified in Section 012100 "Allowances."
- B. <Insert product or material> [is] [are] part of <Insert name of allowance>.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured materials. Include statement indicating cost for each regionally manufactured material.

- a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
 2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 3. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - C. Shop Drawings: For plaques.
 1. Include fabrication and installation details and attachments to other work.
 2. Show plaque mounting heights, locations of supplementary supports to be provided by others, and accessories.
 3. Show message list, typestyles, graphic elements[, **including raised characters and Braille**], and layout for each plaque at least [**half size**] **<Insert scale>**.
 - D. Samples for Initial Selection: For each type of plaque, exposed component, and exposed finish.
 1. Include representative Samples of available typestyles and graphic symbols.
 - E. Samples for Verification: For each type of plaque showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 1. Plaques: [**Full-size Sample**] [**Half-size Sample**] **<Insert size>**.
 2. Exposed Accessories: [**Full-size Sample**] [**Half-size Sample**] **<Insert size>** of each accessory type.
 - F. Plaque Schedule: Use same designations specified or indicated on Drawings or in a plaque or sign schedule.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For [**Installer**] [**and**] [**manufacturer**].
 - B. Sample Warranty: For special warranty.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For plaques to include in maintenance manuals.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: [**Manufacturer of products**] [**An entity that employs installers and supervisors who are trained and approved by manufacturer**].

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 2. Warranty Period: **[Five]** **<Insert number>** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLAQUES, GENERAL

- A. Regional Materials: Plaques shall be manufactured within **500 miles (800 km)** of Project site.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in **[the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities]** **[and]** **[ICC A117.1]** for signs.

2.3 PLAQUES

- A. Cast Plaque **<Insert drawing designation>**: Plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
 2. Plaque Material: Cast **[aluminum]** **[brass]** **[bronze]** **[zinc]** **<Insert material>**.
 3. Plaque Thickness: **[0.153 inch (3.89 mm)]** **[0.25 inch (6.35 mm)]** **[0.50 inch (12.7 mm)]** **<Insert dimension>**.
 4. Finishes:
 - a. Integral Metal Finish: **[Mill]** **[Antique oxidized]** **[Mill finish raised surface with dark oxidized background]** **[As indicated by manufacturer's designation]** **[Match Architect's sample]** **[As selected by Architect from full range of industry finishes]** **<Insert finish>**.
 - b. Integral Aluminum Finish: **[Clear anodized]** **[Light bronze anodized]** **[Medium bronze anodized]** **[Match Architect's sample]** **[Anodized color as selected by Architect from full range of industry colors and color densities]** **<Insert finish>**.

- c. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
 - d. Overcoat: [Manufacturer's standard baked-on clear coating] [Clear organic coating] <Insert requirement>.
5. Background Texture: [Smooth] [Pebble] [Leatherette] [Matte] [Stipple] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert description>.
 6. Integrally Cast Border Style: [As indicated] [Square cut without border] [Square single line, polished] [Square double line, polished] [Plain bevel, brushed] [Plain bevel, polished] [Projected bevel] [Raised flat band] [Double-raised line border] <Insert description>.
 7. Applied Frame Material, Style, and Finish: [As indicated] <Insert description>.
 8. Mounting: [As indicated] [Concealed studs] [Rosette-head through fasteners] [Countersunk flathead through fasteners] [Adhesive] [Two-face tape] <Insert requirement>.
 9. Text and Typeface: [Accessible raised characters and Braille] [Times Roman] [typeface as indicated by manufacturer's designation] [typeface matching Architect's sample] [typeface as selected by Architect from manufacturer's full range] [and] [variable content as scheduled] <Insert requirement>.[Finish raised characters to contrast with background color, and finish Braille to match background color.]
- B. Etched Plaque <Insert drawing designation>: Chemically etched or photochemically engraved metal sheet or plate with texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 2. Plaque Material: Sheet or plate [aluminum] [brass] [bronze] [copper] [stainless steel] [zinc] <Insert material>.
 3. Plaque Thickness: [0.064 inch (1.63 mm)] [0.125 inch (3.18 mm)] [0.153 inch (3.89 mm)] [0.250 inch (6.35 mm)] <Insert dimension>.
 4. Finishes:
 - a. Integral Metal Finish: [Mill] [Antique oxidized] [Mill finish raised surface with dark oxidized background] [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert finish>.
 - b. Integral Aluminum Finish: [Clear anodized] [Light bronze anodized] [Medium bronze anodized] [Match Architect's sample] [Anodized color as selected by Architect from full range of industry colors and color densities] <Insert finish>.
 - c. Integral Stainless-Steel Finish: [No. 4] [No. 8] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert description>.

- d. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
 - e. Overcoat: [Manufacturer's standard baked-on clear coating] [Clear organic coating] <Insert requirement>.
- 5. Integral Edge Style: [As indicated] [Square cut, polished] [Plain bevel, brushed] <Insert description>.
 - 6. Applied Frame Material, Style, and Finish: [As indicated] <Insert description>.
 - 7. Mounting: [As indicated] [Concealed studs] [Rosette-head through fasteners] [Countersunk flatheads through fasteners] [Adhesive] [Two-face tape] <Insert requirement>.
 - 8. Text and Typeface: [Accessible raised characters and Braille] [Times Roman] [typeface as indicated by manufacturer's designation] [typeface matching Architect's sample] [typeface as selected by Architect from manufacturer's full range] [and] [variable content as scheduled] <Insert requirement>.[Finish raised characters to contrast with background color, and finish Braille to match background color.]

2.4 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, alloy and temper recommended by plaque manufacturer for casting process used and for type of use and finish indicated.
- B. Aluminum Sheet and Plate: **ASTM B 209** (**ASTM B 209M**), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Aluminum Extrusions: **ASTM B 221** (**ASTM B 221M**), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Brass Castings: ASTM B 584, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C85200 (high-copper yellow brass)] <Insert requirement>.
- E. Brass Sheet (Yellow Brass): ASTM B 36/B 36M, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C26000 (yellow brass)] <Insert requirement>.
- F. Bronze Castings: ASTM B 584, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C86500 (No. 1 manganese bronze)] <Insert requirement>.
- G. Bronze Plate: ASTM B 36/B 36M, [alloy recommended by manufacturer and finisher for finish indicated] [lead-free alloy recommended by manufacturer and finisher for finish indicated] [Alloy UNS No. C22000 (commercial bronze)] <Insert requirement>.
- H. Copper Sheet: ASTM B 152/B 152M.

- I. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, [Type 304,] [Type 316,] stretcher-leveled standard of flatness.
- J. Zinc Castings: ASTM B 240, alloy and temper recommended by plaque manufacturer for type of use and finish indicated.
- K. Zinc Sheet: [ASTM B 69] <Insert standard>, alloy and temper recommended by plaque manufacturer for type of use and finish indicated.

2.5 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish [nonferrous-metal] [stainless-steel] [or] [hot-dip galvanized] <Insert requirement> devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use [flathead] [or] [oval countersunk] <Insert shape> screws and bolts with tamper-resistant [Allen-head] [spanner-head] [or] [one-way-head] <Insert slot design> slots unless otherwise indicated.
 - 4. Plaque Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque, unless otherwise indicated.
 - b. Through Fasteners: Exposed metal fasteners matching plaque finish, with type of head indicated, installed in predrilled holes.
- B. Adhesives: As recommended by plaque manufacturer and with a VOC content of [70] <Insert value> g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Adhesives: As recommended by plaque manufacturer and that 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."
- D. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
1. Preassemble plaques in the shop to greatest extent possible. Disassemble plaques only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
 6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.
- C. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted plaques to suit plaque construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish [**to match plaque-background color**] [**to match Architect's sample**] <Insert requirement> color unless otherwise indicated.
 2. Stainless-Steel Brackets: Factory finish brackets [**to match plaque background**] [**to match Architect's sample**] [**with No. 4**] <Insert finish> finish unless otherwise indicated.

2.7 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker.
- B. Color Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.9 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. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 2. Directional Satin Finish: No. 4.
 - 3. Dull Satin Finish: No. 6.
 - 4. Reflective, Directional Polish: No. 7.
 - 5. Mirrorlike Reflective, Nondirectional Polish: No. 8.

2.10 CLEAR ORGANIC COATING FOR COPPER-ALLOY FINISHES

- A. Clear Organic Coating: Clear, waterborne, air-drying, acrylic lacquer called "Incralac"; specially developed for coating copper-alloy products; consisting of a solution of methyl methacrylate copolymer with benzotriazole to prevent breakdown of the film in UV light; shop applied in two uniform coats per manufacturer's written instructions, with interim drying between coats and without runs or other surface imperfections, to a total dry film thickness of 1 mil (0.025 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of plaque work.
- B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
 - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Plaques Used for Room Identification[**and Other Accessible Plaques**]: Install in locations on walls [**as indicated**] [**and**] [**according to accessibility standard**] <Insert requirement>.
- C. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
 - 2. Through Fasteners: Drill holes in substrate using predrilled holes in plaque as template. Countersink holes in plaque if required. Place plaque in position and flush to surface. Install through fasteners and tighten.
 - 3. Brackets: Remove loose debris from substrate surface and install bracket supports in position so that plaque is correctly located and aligned.

4. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of plaque and of suitable quantity to support weight of plaque after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as plaque is applied and to prevent visibility of cured adhesive at plaque edges. Place plaque in position, and push to engage adhesive. Temporarily support plaque in position until adhesive fully sets.
5. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of plaque and of suitable quantity to support weight of plaque without slippage. Keep strips away from edges to prevent visibility at plaque edges. Place plaque in position, and push to engage tape adhesive.
6. Shim-Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach plaques to plate using [method specified above] <Insert requirement>.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as plaques are installed.
- C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 16

SECTION 10 14 23 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Panel signs.
2. Illuminated panel signs.
3. Room-identification signs.
4. Field-applied, vinyl-character signs.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
2. Section 015639 "Temporary Tree and Plant Protection" for temporary protection-zone signage.
3. Section 101300 "Directories" for building directories.
4. Section 101426 "Post and Panel/Pylon Signage" for freestanding signs.
5. [Section 142100 "Electric Traction Elevators"] [Section 142400 "Hydraulic Elevators"] [Section 143100 "Escalators"] [Section 143200 "Moving Walks"] [Section 144200 "Wheelchair Lifts"] for code-required conveying equipment signage.
6. Section 220553 "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
7. Section 230553 "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
8. Section 260553 "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
9. Section 265100 "Interior Lighting" for illuminated, self-luminous, and photoluminescent exit sign units.

1.2 ALLOWANCES

- A. Allowances for **[signage]** **[room-identification signs]** **<Insert item description>** are specified in Section 012100 "Allowances."
- B. **<Insert product or material>** **[is]** **[are]** part of **<Insert name of allowance>**.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

- B. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.
- B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured materials. Include statement indicating cost for each regionally manufactured material.
 - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
 - 2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 - 3. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 3. Show message list, typestyles, graphic elements[, **including raised characters and Braille**], and layout for each sign at least [**half size**] <Insert scale>.
 - 4. Show locations of electrical service connections.
 - 5. Include diagrams for power, signal, and control wiring.
- D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 - 1. Include representative Samples of available typestyles and graphic symbols.
- E. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Panel Signs: **[Full-size Sample]** **[Not less than 12 inches (300 mm) square, including corner]** **<Insert size>**.
 2. Room-Identification Signs: **[Full-size Sample]** **<Insert size>**.
 3. Field-Applied, Vinyl-Character Signs: **[Full-size Sample of characters on glass]** **<Insert requirement>**.
 4. Variable Component Materials: **[Full-size Sample]** **[8-inch (200-mm) Sample]** **<Insert size>** of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
 5. Exposed Accessories: **[Full-size Sample]** **[Half-size Sample]** **<Insert size>** of each accessory type.
- F. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.
- G. Delegated-Design Submittal: For **[signs indicated in "Performance Requirements" Article]** **<Insert sign designations>**.
1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For **[Installer]** **[and]** **[manufacturer]**.
 - B. Sample Warranty: For special warranty.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For signs to include in maintenance manuals.
- 1.8 QUALITY ASSURANCE
- A. Installer Qualifications: **[Manufacturer of products]** **[An entity that employs installers and supervisors who are trained and approved by manufacturer]**.
- 1.9 FIELD CONDITIONS
- A. Field Measurements: Verify locations of **[anchorage devices]** **[and]** **[electrical service]** embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.
- 1.10 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
2. Warranty Period: **[Five]** **<Insert number>** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL SIGNS, GENERAL

- A. Regional Materials: Panel signs shall be manufactured within **500 miles (800 km)** of Project site.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage of **[rooftop]** **[illuminated panel]** **<Insert description>** sign type(s) **<Insert drawing designation of sign(s)>** to withstand design loads **[as indicated on Drawings]** **<Insert loads>**.
- B. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change: **[120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces]** **<Insert temperature change>**.
- C. Accessibility Standard: Comply with applicable provisions in **[the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities]** **[and]** **[ICC A117.1]** for signs.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 SIGNS

- A. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**
- B. Panel Sign **<Insert drawing designation>**: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 1. Basis-of-Design Product: **[Indicated on Drawings]** **<Insert manufacturer's name; product name or designation>**.

2. Illuminated Panel Sign: Backlight construction with [fluorescent tube] [fiber-optic] [LED] [neon tube] <Insert requirement> lighting including transformers, insulators, and other accessories for operability, with provision for servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from sign surfaces as needed to illuminate evenly.
 - a. Power: [As indicated on electrical Drawings] [120 V, 60 Hz, 1 phase, 15 A] <Insert requirement>.
 - b. Weeps: Provide weep holes to drain water at lowest part of exterior signs. [Equip weeps with permanent baffles to block light leakage without inhibiting drainage.]
3. Solid-Sheet Sign[and Returns][, Returns, and Back]: [Aluminum] [Brass] [Bronze] [Copper] [Steel] [Stainless-steel] [Acrylic] [Fiberglass] [PVC] <Insert material> sheet with finish specified in "Surface Finish and Applied Graphics" Subparagraph below and as follows:
 - a. Thickness: [As indicated] [Manufacturer's standard for size of sign] [0.060 inch (1.52 mm)] [0.080 inch (2.03 mm)] [0.125 inch (3.18 mm)] [0.25 inch (6.35 mm)] <Insert dimension>.
 - b. Surface-Applied Graphics: Applied [vinyl film] [baked enamel or powder coat] [paint] [photo image] <Insert requirement>.
 - c. Etched and Filled Graphics: Sign face etched or routed to receive enamel-paint infill.
 - d. Inset, Cutout Characters: Sign face routed to receive push-through acrylic graphics [flush with] [slightly projecting from] the sign panel.
4. Laminated Aluminum-Sheet Sign: Aluminum sheet laminated to both sides of [acrylic] [phenolic] <Insert material> core sheet[with painted edges].
 - a. Composite-Sheet Thickness: [As indicated] [Manufacturer's standard for size of sign] [0.125 inch (3.18 mm)] [0.25 inch (6.35 mm)] <Insert dimension>.
 - b. Surface-Applied Graphics: Applied [vinyl film] [paint] [photo image] <Insert requirement>.
5. Laminated-Sheet Sign: [Photopolymer] [Sandblasted polymer] <Insert material> face sheet with raised graphics laminated[over subsurface graphics] to [acrylic] [phenolic] <Insert material> backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: [As indicated] [Manufacturer's standard for size of sign] [0.125 inch (3.18 mm)] [0.25 inch (6.35 mm)] <Insert dimension>.
 - b. Surface-Applied Graphics: Applied [vinyl film] [paint] [photo image] <Insert requirement>.
 - c. Subsurface Graphics: [Reverse halftone or dot-screen image] [Reverse etch image] [Snap-in changeable insert beneath removable face sheet] [Slide-in changeable insert] <Insert requirement>.

6. Composite Phenolic-Core Sign: Solid phenolic panel core with integral subsurface graphic image covered with integral, polymeric face layer.
 - a. Composite-Sheet Thickness: [As indicated] [Manufacturer's standard for size of sign] [0.5 inch (12.7 mm)] [1 inch (25.4 mm)] <Insert dimension>.
7. Laminated Polycarbonate-Sheet Sign: Polycarbonate face sheet laminated to each side of [phenolic] <Insert material> base sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: [As indicated] [Manufacturer's standard for size of sign] [0.125 inch (3.18 mm)] [0.25 inch (6.35 mm)] <Insert dimension>.
 - b. Surface-Applied Graphics: Applied [vinyl film] [paint] [photo image] <Insert requirement>.
 - c. Subsurface Graphics: [Reverse halftone or dot-screen image] [Reverse etch image] <Insert requirement>.
8. Engraved Plastic-Laminate Sign: Plastic-laminate face laminated to contrasting phenolic core to produce composite sheet.
 - a. Composite-Sheet Thickness: [As indicated] [Manufacturer's standard for size of sign] [0.125 inch (3.18 mm)] [0.25 inch (6.35 mm)] <Insert dimension>.
 - b. Engraved Graphics: Characters engraved through plastic-laminate face sheet to expose contrasting phenolic core.
 - c. Plastic-Laminate Color and Pattern: [As indicated by manufacturer's designation] [As selected by Architect from manufacturer's full range] <Insert color and pattern>.
 - d. Core Color: Manufacturer's standard [dark color] <Insert color>.
9. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition[, Vertical Edges][, Horizontal Edges]: [As indicated] [Square cut] [Beveled] [Bullnosed] <Insert requirement>.
 - b. Corner Condition in Elevation: [As indicated] [Square] [Rounded to radius indicated] <Insert requirement>.
10. Frame: [Entire perimeter] [Horizontal retainers] [Vertical retainers] [to hold changeable sign panel] <Insert description>.
 - a. Material: [Aluminum] [Brass] [Bronze] [Steel] [Stainless steel] [PVC] <Insert material>.
 - b. Material Thickness: <Insert dimension>.
 - c. Frame Depth: [As indicated] <Insert dimension>.
 - d. Profile: [Square] [Beveled] [Rounded] <Insert requirement>.
 - e. Corner Condition in Elevation: [Square] [Mitered] [Rounded to radius indicated] <Insert requirement>.
 - f. Finish and Color: [Mill] [Painted, matte black color] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert requirement>.

11. Mounting: [As indicated] [Manufacturer's standard method for substrates indicated] [Surface mounted to wall] [Projecting from wall] [Suspended] [Aluminum bracket] [Stainless-steel bracket] <Insert requirement> with [concealed anchors] [countersunk flathead through fasteners] [adhesive] [two-face tape] [hook-and-loop tape] [or] [magnetic tape].
 12. Surface Finish and Applied Graphics:
 - a. Integral Metal Finish: [Mill] [Antique oxidized] [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert finish>.
 - b. Integral Aluminum Finish: [Clear anodized] [Light bronze anodized] [Medium bronze anodized] [Match Architect's sample] [Anodized color as selected by Architect from full range of industry colors and color densities] <Insert finish>.
 - c. Integral Stainless-Steel Finish: [No. 4] [No. 8] [Match Architect's sample] [As selected by Architect from full range of industry finishes] <Insert description>.
 - d. Integral [Acrylic] [Fiberglass] [PVC] Sheet Color: [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from full range of industry colors] <Insert color>.
 - e. Baked-Enamel or Powder-Coat Finish and Graphics: Manufacturer's standard, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
 - f. Painted Finish and Graphics: Manufacturer's standard, factory-applied [exterior-grade sign paint] [acrylic polyurethane] <Insert requirement>, in color [as indicated by manufacturer's designation] [matching Architect's sample] [as selected by Architect from manufacturer's full range] <Insert color>.
 - g. Photo-Image Graphics: Manufacturer's standard [black-and-white] [multicolor], [600-dpi] <Insert value> halftone or dot-screen image.
 - h. Overcoat: [Manufacturer's standard baked-on clear coating] <Insert requirement>.
 13. Text and Typeface: [Accessible raised characters and Braille] [Times Roman] [typeface as indicated by manufacturer's designation] [typeface matching Architect's sample] [typeface as selected by Architect from manufacturer's full range] [and] [variable content as scheduled] <Insert requirement>.[Finish raised characters to contrast with background color, and finish Braille to match background color.]
 14. Flatness Tolerance: Sign panel shall remain flat or uniformly curved under installed conditions as indicated and within a tolerance of plus or minus [1/16 inch (1.5 mm)] <Insert dimension> measured diagonally from corner to corner.
- C. Room-Identification Sign <Insert drawing designation>: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.

2. Laminated-Sheet Sign: **[Photopolymer]** **[Sandblasted polymer]** **<Insert material>** face sheet with raised graphics laminated **[over subsurface graphics]** to **[acrylic]** **[phenolic]** **<Insert material>** backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: **[As indicated]** **[Manufacturer's standard for size of sign]** **[0.125 inch (3.18 mm)]** **[0.25 inch (6.35 mm)]** **<Insert dimension>**.
 - b. Surface-Applied Graphics: Applied **[vinyl film]** **[paint]** **[photo image]** **<Insert requirement>**.
 - c. Subsurface Graphics: **[Reverse halftone or dot-screen image]** **[Reverse etch image]** **[Snap-in changeable insert beneath removable face sheet]** **[Slide-in changeable insert]** **<Insert requirement>**.
 - d. Color(s): **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert requirement>**.
3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition: **[As indicated]** **[Square cut]** **[Beveled]** **[Bullnosed]** **<Insert requirement>**.
 - b. Corner Condition in Elevation: **[As indicated]** **[Square]** **[Rounded to radius indicated]** **<Insert requirement>**.
4. Frame: **[Aluminum]** **<Insert material>**.
 - a. Material Thickness: **<Insert dimension>**.
 - b. Frame Depth: **[As indicated]** **[Convex-curved frame to receive removable face sheet and changeable subsurface graphics]** **<Insert dimension>**.
 - c. Profile: **[Square]** **[Beveled]** **[Rounded]** **<Insert requirement>**.
 - d. Corner Condition in Elevation: **[Square]** **[Mitered]** **[Rounded to radius indicated]** **<Insert requirement>**.
 - e. Finish and Color: **[Mill]** **[Painted, matte black color]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert requirement>**.
5. Mounting: **[Manufacturer's standard method for substrates indicated]** **[Surface mounted to wall]** with **[concealed anchors]** **[countersunk flathead through fasteners]** **[adhesive]** **[two-face tape]** **[hook-and-loop tape]** **[or]** **[magnetic tape]**.
6. Text and Typeface: **[Accessible raised characters and Braille]** **[Times Roman]** **[typeface as indicated by manufacturer's designation]** **[typeface matching Architect's sample]** **[typeface as selected by Architect from manufacturer's full range]** **[and]** **[variable content as scheduled]** **<Insert requirement>**. **[Finish raised characters to contrast with background color, and finish Braille to match background color.]**

2.4 FIELD-APPLIED, VINYL-CHARACTER SIGNS

- A. Field-Applied, Vinyl-Character Sign **<Insert drawing designation>**: Prespaced characters die cut from **[3- to 3.5-mil (0.076- to 0.089-mm)]** **<Insert dimensions>** thick, weather-resistant

vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
2. Size: [As indicated] [As scheduled] <Insert requirement>.
3. Substrate: [As indicated] [As scheduled] [Glass] [Doors] [Walls] <Insert substrate>.
4. Text and Font: [As indicated] [As scheduled] <Insert requirement>.

2.5 PANEL-SIGN MATERIALS

- A. Aluminum Sheet and Plate: **ASTM B 209** (**ASTM B 209M**), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: **ASTM B 221** (**ASTM B 221M**), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Brass Sheet (Yellow Brass): ASTM B 36/B 36M, [**alloy recommended by manufacturer and finisher for finish indicated**] [**lead-free alloy recommended by manufacturer and finisher for finish indicated**] [**Alloy UNS No. C26000 (yellow brass)**] <Insert requirement>.
- D. Bronze Plate: ASTM B 36/B 36M, [**alloy recommended by manufacturer and finisher for finish indicated**] [**lead-free alloy recommended by manufacturer and finisher for finish indicated**] [**Alloy UNS No. C22000 (commercial bronze)**] <Insert requirement>.
- E. Copper Sheet: ASTM B 152/B 152M.
- F. Steel Materials:
 1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, [**G90** (**Z275**)] <Insert coating designation> coating, either commercial or forming steel.
 2. Steel Sheet: [**Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, Type B, exposed**] [or] [**electrolytic zinc-coated, ASTM A 879/A 879M, Coating Designation 08Z** (**24G**), with steel-sheet substrate according to ASTM A 1008/A 1008M, commercial steel, exposed].
 3. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, **42,000-psi** (**290-MPa**) minimum yield strength.
 4. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- G. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, [**Type 304,**] [**Type 316,**] stretcher-leveled standard of flatness.
- H. Acrylic Sheet: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).

- I. Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II (coated, mar-resistant, UV-stabilized polycarbonate), with coating on both sides.
- J. Fiberglass Sheet: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.
- K. PVC Sheet: Manufacturer's standard, UV-light stable, PVC plastic.
- L. Plastic-Laminate Sheet: NEMA LD 3, general-purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.
- M. Vinyl Film: UV-resistant vinyl film of nominal thickness indicated, with pressure-sensitive, permanent adhesive on back; die cut to form characters or images as indicated and suitable for exterior applications.
- N. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.6 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 - 1. Use concealed fasteners and anchors unless indicated to be exposed.
 - 2. For exterior exposure, furnish **[nonferrous-metal]** **[stainless-steel]** **[or]** **[hot-dip galvanized]** **<Insert requirement>** devices unless otherwise indicated.
 - 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - b. Fastener Heads: For nonstructural connections, use **[flathead]** **[or]** **[oval countersunk]** **<Insert shape>** screws and bolts with tamper-resistant **[Allen-head]** **[spanner-head]** **[or]** **[one-way-head]** **<Insert slot design>** slots unless otherwise indicated.
 - 4. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
 - 5. Inserts: Furnish inserts to be set by other trades into concrete or masonry work.

- B. Adhesives: As recommended by sign manufacturer and with a VOC content of [70] <Insert value> g/L or less for adhesives used inside the weatherproofing system and applied on-site when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Adhesives: As recommended by sign manufacturer and that 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."
- D. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
- E. Hook-and-Loop Tape: Manufacturer's standard two-part tape consisting of hooked part on sign back and looped side on mounting surface.
- F. Magnetic Tape: Manufacturer's standard magnetic tape with adhesive on one side.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.7 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 - 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 - 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 - 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 - 5. Internally brace signs for stability and for securing fasteners.
 - 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.
 - 1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.
 - 2. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.
 - 3. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with manufacturer's standard enamel. Apply manufacturer's standard opaque background color coating to back face of acrylic sheet.

4. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.
- C. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- D. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.
- E. Shop- and Subsurface-Applied Vinyl: Align vinyl film in final position and apply to surface. Firmly press film from the middle outward to obtain good bond without blisters or fishmouths.
- F. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
 1. For snap-in changeable inserts beneath removable face sheet, furnish one suction or other device to assist in removing face sheet. Furnish initial changeable insert. **[Subsequent changeable inserts are by Owner] [Furnish two blank inserts for each sign for Owner's use] <Insert requirement>.**
 2. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. **[Subsequent changeable inserts are by Owner] [Furnish two blank inserts for each sign for Owner's use] <Insert requirement>.**
 3. For frame to hold changeable sign panel, fabricate frame without burrs or constrictions that inhibit function. Furnish initial sign panel. **[Subsequent changeable sign panels are by Owner] <Insert requirement>.**
- G. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
 1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish **[to match sign-background color] [to match Architect's sample] <Insert requirement>** color unless otherwise indicated.
 2. Stainless-Steel Brackets: Factory finish brackets **[to match sign background] [to match Architect's sample] [with No. 4] <Insert finish>** finish unless otherwise indicated.

2.8 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker.
- B. Color Anodic Finish: AAMA 611, [Class I, 0.018 mm] [Class II, 0.010 mm] or thicker.
- C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.10 METALLIC-COATED STEEL FINISHES

- A. Surface Preparation: Clean surfaces of oil and other contaminants. Use cleaning methods that do not leave residue. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A 780/A 780M.
- B. Factory Prime Finish: After cleaning and pretreating, apply an air-dried primer compatible with the organic coating to be applied over it.
- C. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0.05 mm).

2.11 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, and prepare for coating according to coating manufacturer's written instructions.
 - 1. For Baked-Enamel or Powder-Coat Finish: After cleaning, apply a conversion coating compatible with the organic coating to be applied over it.
- B. Factory Prime Finish: After surface preparation and pretreatment, apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer.
- C. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils (0.05 mm).

2.12 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 2. Directional Satin Finish: No. 4.
 - 3. Dull Satin Finish: No. 6.
 - 4. Reflective, Directional Polish: No. 7.
 - 5. Mirrorlike Reflective, Nondirectional Polish: No. 8.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchor inserts are correctly sized and located to accommodate signs.
- D. Verify that electrical service is correctly sized and located to accommodate signs.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Room-Identification Signs[**and Other Accessible Signage**]: Install in locations on walls [**as indicated**] [**and**] [**according to accessibility standard**] **<Insert requirement>**.

C. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.
2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.
4. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
6. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position, and push to engage tape adhesive.
7. Hook-and-Loop Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply sign component of two-part tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage; push to engage tape adhesive. Keep tape strips [0.250 inch (6.35 mm)] <Insert dimension> away from edges to prevent visibility at sign edges when sign is initially installed or reinstalled. Apply substrate component of tape to substrate in locations aligning with tape on back of sign; push and rub well to fully engage tape adhesive to substrate.
8. Magnetic Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign in position.

9. Shim-Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using <Insert mounting method> method specified above.
- D. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.
- E. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23

SECTION 10 21 13 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes toilet compartments and screens as follows:
 - 1. Type: Stainless steel.
 - 2. Compartment Style: Ceiling hung with intermittent floor support every 2-3 compartments.
 - 3. Screen Style: Wall hung.

1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include plans, elevations, sections, details of installation, and attachments to other work and hardware.

NOTE: The shop drawings shall accurately indicate existing field conditions. Perform a dimensional field survey of as-built conditions prior to submitting shop drawings.

- C. Samples: For each exposed finish and for each color and pattern required.
- D. Maintenance manuals

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's Americans with Disabilities Act (ADA), Architectural Barriers Act (ABA), and Accessibility Guidelines for Buildings and Facilities and the City of Los Angeles Building Code.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to approval by LAWA.
 - 1. Hadrian Manufacturing- Stainless Steel Embossed
 - a. Approved Equal subject to review and approval by LAWA
 - 1) Bradley Corporation - Stainless Steel 5WL texture
 - 2) Metpar Corporation – Stainless Steel 5SM pattern

2.2 MATERIALS

- A. Panel, Pilaster, Screen and Door Material:
 - 1. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled flatness, patterned.
 - 2. Submit sample to LAWA for pattern approval.

2.3 FABRICATION

- A. Toilet Compartments: Ceiling hung with intermittent floor support every 2-3 compartments. Floor support pilaster to have stainless steel shoes that completely surrounds the pilaster without any voids.
- B. Urinal Screens: Wall hung, with continuous stainless steel support angles with stainless steel vandal resistant screws.
- C. Metal Units: Internally reinforce metal panels for hardware, accessories, and grab bars.
- D. Doors: Unless otherwise approved by LAWA, 24 inch wide out-swinging doors for standard toilet compartments and 36 inch wide out-swinging doors with a minimum 32 inch wide clear opening for compartments indicated to be accessible to people with disabilities.
 - 1. In new construction, one set of 48 inch out-swinging doors shall be provided in compartments indicated to be accessible to people with disabilities.
- E. Door Hardware: Stainless steel. Provide units that comply with accessibility requirements of authorities having jurisdiction at compartments indicated to be accessible to people with disabilities.
- F. Accessible Toilet Stalls shall display a rectangular decal, 9"W x 3"H, white letters on blue background specifying "PRIORITY FOR PERSONS WITH DISABILITIES"

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units rigid, straight, level, and plumb, with not more than 1/4 inch between pilasters and panels and not more than 3/4 inch between panels and walls. Provide brackets, pilaster shoes, bracing, and other components required for a complete installation. Use theft-resistant exposed

fasteners finished to match hardware. Use sex-type bolts for through-bolt applications.

NOTE:

Partition Pilasters supporting adjacent partitions with accessible grab bars will extend to the floor with a stainless steel shoe. Floor to ceiling pilasters shall be located at all corners of toilet stall partition that are not supported by adjacent wall.

Locked partition doors shall be removable by lifting the door up and off the hinges with special tools. Doors at unoccupied stalls will be held partially open (30 degrees) in a consistent and uniform position and shall open out of the stall.

Coat hooks will be installed inside of each compartment wall at centerline and 6 inches below top of door except at accessible stalls where the maximum is 48" above finish floor. Coat hooks shall bear a minimum of 150 lbs.

Coordinate with the structural specifications for the steel member concealed in the ceiling that supports the ceiling hung toilet compartments. Structural beams shall be installed for anchoring ceiling hung partitions. Indicate this steel support on the drawings.

END OF SECTION 10 21 13

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SECTION 10 21 16 - SHOWER AND DRESSING COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Shower compartments fabricated from **[steel] [stainless steel] [solid phenolic] [solid polymer]**.
2. Dressing compartments fabricated from **[steel] [stainless steel] [solid phenolic] [solid polymer] [plastic laminate]**.
3. Shower receptors.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for supports that attach floor-and-ceiling-anchored compartments to overhead structural system.
2. **[Section 061000 "Rough Carpentry"] [Section 061053 "Miscellaneous Rough Carpentry"]** for **[blocking] [and] [overhead support of floor-and-ceiling-anchored compartments]**.
3. Section 102800 "Toilet, Bath, and Laundry Accessories" for grab bars, purse shelves, and similar accessories.
4. Section 224100 "Residential Plumbing Fixtures" for shower heads, valves, and controls.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. LEED Submittals:

1. Product Data for Credit IEQ 4.4: For particleboard, documentation indicating that product contains no urea formaldehyde.
2. Laboratory Test Reports for Credit IEQ 4: For **[adhesives] [and] [composite wood products]**, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For shower and dressing compartments. Include plans, elevations, sections, details, and attachments to other work.

1. Show locations of cutouts for compartment-mounted accessories.

2. Show locations of reinforcements for compartment-mounted grab bars.
 3. Show locations of centerlines of drains.
 4. Show[**ceiling grid and**] overhead support or bracing locations.
- D. Samples for Initial Selection: For each type of compartment indicated. Include Samples of hardware and accessories for material and color selection.
- E. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
1. Each type of material, color, and finish required for compartments, prepared on **6-inch- (152-mm-)** square Samples of same thickness and material indicated for the Work.
 2. Each type of hardware and accessory.
 3. Curtain Fabric: **12-inch- (305-mm-)** square swatch or larger as required to show complete pattern repeat, from dye lot used for the Work, with specified treatments applied. Mark top and face of material.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of shower and dressing compartment, from manufacturer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For shower and dressing compartments to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: **[25] [75] [200]** or less.
 2. Smoke-Developed Index: 450 or less.
- 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]** for shower and dressing compartments designated as accessible.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with shower and dressing compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: **ASTM B 221** (**ASTM B 221M**).
- C. Brass Castings: ASTM B 584.
- D. Brass Extrusions: ASTM B 455.
- E. Steel Sheet: ASTM A 653/A 653M, either hot-dip galvanized or galvanized; mill phosphatized and selected for smoothness.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- G. Stainless-Steel Castings: ASTM A 743/A 743M.
- H. Particleboard: ANSI A208.1, Grade M-2 with **45-lb** (**20.4-kg**) density[.], **made with binder containing no urea formaldehyde.**[, **that complies 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."**]
- I. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, **0.048-inch** (**1.2-mm**) nominal thickness.
- J. Adhesives: Manufacturer's standard product that complies 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."

2.2 STEEL COMPARTMENTS <Insert drawing designation>

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Configuration: **[Shower compartment] [Shower and dressing compartments] [Shower compartment with two dressing compartments] [As shown on Drawings]**.
- C. Enclosure Style: **[Overhead braced] [Floor and ceiling anchored]** <Insert style>.
- D. Panel and Pilaster Construction: Seamless metal facing sheets, pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures and with corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces

shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

1. Core Material: Manufacturer's standard, sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch (25 mm)** for panels and **1-1/4 inches (32 mm)** for pilasters.
2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on compartments.
3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to compartments.

E. Door Construction: Match panels; **1-inch (25-mm)** finished thickness.

F. Facing Sheets and Closures: Hot-dip galvanized-steel sheet with nominal base-metal (uncoated) thicknesses as follows:

1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than **0.036 inch (0.91 mm)**.
2. Panels: [**Manufacturer's standard thickness, but not less than 0.030 inch (0.76 mm)**] [**0.036 inch (0.91 mm)**].
3. Doors: Manufacturer's standard thickness, but not less than **0.030 inch (0.76 mm)**.

G. Pilaster [**Shoes**] [**and**] [**Sleeves (Caps)**]: Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.

H. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; [**clear-anodized aluminum**] **<Insert material>**.
2. Stirrup Type: Ear or U-brackets; [**clear-anodized aluminum**] [**stainless steel**] [**chrome-plated brass**].
3. Dressing-Compartment Brackets: Match toilet-compartment brackets.

I. Steel-Sheet Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on finish, including thermosetting, electrostatically applied, and powder coatings. Comply with coating manufacturer's written instructions for applying and baking. Apply [**one color**] [**two colors**] in each room.

1. Color: [**As indicated by manufacturer's designations**] [**As selected by Architect from manufacturer's full range**] [**Match steel toilet compartments**] **<Insert color>**.

2.3 STAINLESS-STEEL COMPARTMENTS **<Insert drawing designation>**

A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

B. Configuration: [**Shower compartment**] [**Shower and dressing compartments**] [**Shower compartment with two dressing compartments**] [**As shown on Drawings**].

- C. Enclosure Style: **[Overhead braced] [Floor and ceiling anchored]** <Insert style>.
- D. Panel and Pilaster Construction: Seamless metal facing sheets, pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures and with corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
1. Core Material: Manufacturer's standard, sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch (25 mm)** for panels and **1-1/4 inches (32 mm)** for pilasters.
 2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on compartments.
 3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to compartments.
- E. Door Construction: Match panels; **1-inch (25-mm)** finished thickness.
- F. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than **0.038 inch (0.95 mm)**.
 2. Panels: **[Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm)] [0.038 inch (0.95 mm)]**.
 3. Doors: Manufacturer's standard thickness, but not less than **0.031 inch (0.79 mm)**.
- G. Pilaster **[Shoes] [and] [Sleeves (Caps)]**: Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
- H. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; **[clear-anodized aluminum]** <Insert material>.
 2. Stirrup Type: Ear or U-brackets; **[clear-anodized aluminum] [stainless steel] [chrome-plated brass]**.
 3. Dressing-Compartment Brackets: Match toilet-compartment brackets.
- I. Stainless-Steel Finish: **[No. 4, bright, directional polish] [Manufacturer's standard textured finish] [Match stainless-steel toilet-compartment finish]** <Insert finish> on exposed faces. Protect exposed surfaces from damage by applying strippable, temporary protective covering before shipment.
- 2.4 PHENOLIC-CORE COMPARTMENTS <Insert drawing designation>
- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

- B. Configuration: **[Shower compartment] [Shower and dressing compartments] [Shower compartment with two dressing compartments] [As shown on Drawings]**.
- C. Enclosure Style: **[Overhead braced] [Floor and ceiling anchored] <Insert style>**.
- D. Panel and Pilaster Construction: Solid phenolic material consisting of solid phenolic-core panel with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated) and with eased and polished edges. Provide minimum **3/4-inch- (19-mm-)** thick pilasters and minimum **1/2-inch- (13-mm-)** thick panels.
- E. Door Construction: Match panels; **3/4-inch (19-mm)** minimum thickness.
- F. Pilaster **[Shoes] [and] [Sleeves (Caps)]**: Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
- G. Brackets (Fittings):
 - 1. Full-Height (Continuous) Type: Manufacturer's standard design; **[clear-anodized aluminum] <Insert material>**.
 - 2. Stirrup Type: Ear or U-brackets; **[clear-anodized aluminum] [stainless steel] [chrome-plated brass]**.
 - 3. Dressing-Compartment Brackets: Match toilet-compartment brackets.
- H. Phenolic-Core-Panel Finish:
 - 1. Facing Sheet Finish: **[One color and pattern] [Two colors and patterns]** in each room.
 - 2. Color and Pattern: **[As indicated by manufacturer's designations,] [As selected by Architect from manufacturer's full range,] [Match phenolic-core toilet compartments] <Insert color and pattern>** with manufacturer's standard **[dark-color core] [through-color core matching face sheet]**.

2.5 SOLID-POLYMER COMPARTMENTS <Insert drawing designation>

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Configuration: **[Shower compartment] [Shower and dressing compartments] [Shower compartment with two dressing compartments] [As shown on Drawings]**.
- C. Enclosure Style: **[Overhead braced] [Floor and ceiling anchored] <Insert style>**.
- D. Panel and Pilaster Construction: Solid HDPE panel material, not less than **1 inch (25 mm)** thick, seamless, with eased edges and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.

2. Heat-Sink Strip: Manufacturer's standard, continuous, [**clear-anodized extruded-aluminum**] [**or**] [**stainless-steel**] strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
 3. Color and Pattern: [**One color and pattern**] [**Two colors and patterns**] in each room; [**as indicated by manufacturer's designations**] [**as selected by Architect from manufacturer's full range**] [**match solid-polymer toilet compartments**] <Insert color and pattern>.
- E. Door Construction: Match panels.
- F. Pilaster [**Shoes**] [**and**] [**Sleeves (Caps)**]: Manufacturer's standard design; [**polymer**] [**or**] [**stainless steel**].
1. Polymer Color and Pattern: [**Match pilaster**] [**Contrast with pilaster, as indicated by manufacturer's designations**] [**Contrast with pilaster, as selected by Architect from manufacturer's full range**] [**Match solid-polymer toilet compartments**] <Insert color and pattern>.
- G. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; [**polymer or clear-anodized extruded aluminum**] [**polymer**] [**clear-anodized extruded aluminum**] <Insert material>.
 - a. Polymer Color and Pattern: [**Match panel**] [**Contrast with panel, as indicated by manufacturer's designations**] [**Contrast with panel, as selected by Architect from manufacturer's full range**] [**Match solid-polymer toilet compartments**] <Insert color and pattern>.
 2. Stirrup Type: Ear or U-brackets; [**clear-anodized aluminum**] [**stainless steel**] [**chrome-plated brass**].
 3. Dressing-Compartment Brackets: Match toilet-compartment brackets.
- 2.6 PLASTIC-LAMINATE-FACED DRESSING COMPARTMENTS <Insert drawing designation>
- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
 - B. Configuration: Dressing compartment attached to [**steel**] [**stainless-steel**] [**phenolic-core**] [**solid-polymer**] shower compartment as shown on Drawings.
 - C. Enclosure Style: [**Overhead braced**] [**Floor and ceiling anchored**] <Insert style>.
 - D. Panel and Pilaster Construction: One-piece, plastic-laminate facing sheets pressure laminated to core material without splices or joints in facings or cores; with [**laminate**] [**stainless-steel edge trim 0.050 inch (1.27 mm) thick**] applied to edges before faces to seal edges and prevent

laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture.

1. Core Material: Particleboard.
2. Panels: Finished to not less than **1 inch (25 mm)** <Insert dimension> thick.
3. Pilasters: Comply with **one of** the following:
 - a. Finished to not less than **1-1/4 inches (32 mm)** thick **[and with internal, nominal 0.134-inch- (3.42-mm-) thick, steel-sheet reinforcement]**.
 - b. Finished to not less than **1 inch (25 mm)** thick and with internal, nominal **0.120-inch- (3.04-mm-) thick, steel-sheet reinforcement**.

E. Door Construction: Match panels.

F. Pilaster **[Shoes]** **[and]** **[Sleeves (Caps)]**: Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.

G. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; **[clear-anodized aluminum]** <Insert material>.
2. Stirrup Type: Ear or U-brackets; **[clear-anodized aluminum]** **[stainless steel]** **[chrome-plated brass]**.

H. Plastic-Laminate Finish: **[One color and pattern]** **[Two colors and patterns]** in each room.

1. Color and Pattern: **[As indicated by manufacturer's designations]** **[As selected by Architect from manufacturer's full range]** **[Match toilet compartments]** <Insert color and pattern>.

2.7 SHOWER RECEPTORS

A. General: Manufacturer's standard, prefabricated, terrazzo receptor complete with integral drain.

1. Curb: Not less than **2 inches (51 mm)** and not more than **9 inches (229 mm)** deep when measured from the top of the curb to the top of the drain; with curb threshold not less than **1 inch (25 mm)** below the sides and back of the receptor **[; and with a ramped entrance surface for accessible compartments]**.
2. Floor: Finished, sloping uniformly toward the drain and not less than 1/4 unit vertical in 12 units horizontal and not more than **1/2 inch (13 mm)**.
3. Drain Strainer: Manufacturer's standard, removable **[brass strainer]** **[chrome strainer]** **[stainless-steel strainer]** **[plastic strainer, matching the receptor]** <Insert description>.
4. Drain Gasket: Manufacturer's standard gasket sized to fit waste pipe.
5. Waterstop: Manufacturer's standard, continuous **[galvanized-steel flange]** **[or]** **[rabbeted groove]** to receive panels and create a waterstop when panels are in place.

- B. Finish: Manufacturer's standard finish on exposed surfaces, [**matching the enclosure panels**] [**contrasting with the enclosure panels, as indicated by manufacturer's designations**] [**contrasting with the enclosure panels, as selected by Architect from manufacturer's full range**] <Insert finish> and with slip-resistant floor surface texture.

2.8 ACCESSORIES

- A. Door Hardware and Accessories: Manufacturer's standard design, heavy-duty, operating hardware and accessories.
1. Material: [**Clear-anodized aluminum**] [**Stainless steel**] [**Chrome-plated brass**].
 2. Hinges: Manufacturer's standard, [**paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees**] [**continuous, cam type that swings to a closed or partially open position**] [**continuous, spring-loaded type**] [**integral hinge for solid-polymer doors**] <Insert requirement>.
 3. Latch and Keeper: Manufacturer's standard, [**recessed**] [**surface-mounted**] latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility[**at each compartment, accessible or not**] [**at compartments designated as accessible**].
 4. Clothing Hooks: Manufacturer's standard clothing hooks in each dressing compartment[; **include one combination hook and rubber-tipped bumper at in-swinging doors, sized to prevent door from hitting wall panel or compartment-mounted accessories**].
 5. Door Bumper: Manufacturer's standard, rubber-tipped bumper at out-swinging doors.
 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard, continuous, extruded-aluminum head rail or cap with antigrip profile; in manufacturer's standard finish.
- C. Head Rail with Hooks: Manufacturer's standard, continuous, extruded-aluminum head rail or cap with curtain hooks running in concealed track; with antigrip profile; in manufacturer's standard finish.
- D. Curtain Rod with Hooks: Manufacturer's standard, **1-inch- (25-mm-)** diameter, [**stainless-steel**] <Insert material> curtain rod with matching hooks.
- E. Curtain: Flame-resistant, [**polyester-reinforced vinyl fabric**] [**manufacturer's standard fabric**] <Insert fabric> that is stain resistant, self-sanitizing, antistatic, and antimicrobial; launderable to a temperature of not less than [**90 deg F (32 deg C)**] <Insert temperature>.
1. Flame Resistance: Passes NFPA 701 tests when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Labeling: Identify fabrics with appropriate markings of applicable testing and inspecting agency.

3. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than **6 inches (152 mm)** o.c.; machined into top hem.
 4. Length: Where curtain extends to a floor surface, size so that bottom hem clears finished floor by not more than **1 inch (25 mm)** and not less than **1/2 inch (13 mm)** above floor surface. Where curtains extend to a shower-receptor curb, size so that bottom hem hangs above curb line and clears curb line by not more than **1/2 inch (13 mm)**.
 5. Color and Pattern: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] <Insert color and pattern>.**
- F. Soap Holder: **[Surface-mounted] [Recessed]**, seamless **[stainless-steel] <Insert material>** soap dish.
- G. Seats: Manufacturer's standard, **[panel-mounted] [wall-mounted] [or] [floor-mounted]** benches.
1. Material: **[Wood] [Solid phenolic] [Molded plastic] [Stainless steel] <Insert material>.**
 2. Operation: **[Fixed] [Folding].**
 3. Finish: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] [Match enclosure panels] <Insert finish>.**
- H. Anchorages and Fasteners: Manufacturer's standard, exposed fasteners of stainless steel, chrome-plated steel, or solid brass, finished to match the items they are securing; with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.9 FABRICATION

- A. Overhead-Braced Compartments: Provide manufacturer's standard, corrosion-resistant supports, leveling method, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling method.
- B. Floor-and-Ceiling-Anchored Compartments: Provide manufacturer's standard, corrosion-resistant anchoring assemblies at pilasters and walls with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
- C. Door Sizes and Swings: Unless otherwise indicated, provide **24-inch- (610-mm-)** wide, in-swinging doors for standard shower and dressing 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

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install compartments rigid, straight, level, and plumb. Secure compartments in position with manufacturer's recommended anchoring devices.
1. Maximum Clearances for Dressing Compartment:
 - a. Pilasters and Panels: **1/2 inch (13 mm)**.
 - b. Panels and Walls: **1 inch (25 mm)**.
 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than **[two brackets attached] [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. Overhead-Braced Compartments: Secure pilasters to floor, and level, plumb, and tighten. Set pilasters with anchors penetrating not less than **1-3/4 inches (44 mm)** into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. **[Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.]**
- C. Floor-and-Ceiling-Anchored Compartments: Secure pilasters to supporting construction, and level, plumb, and tighten. **[Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.]**
- D. Curtains: Install curtains to specified length and verify that they hang vertically without stress points or diagonal folds.
- E. Shower Receptors: Install prefabricated shower receptors with drain gasket compression fit to outside diameter of waste pipe.

3.2 ADJUSTING

- A. Curtain Adjustment: After hanging curtains, test and adjust each track or rod to produce unencumbered, smooth operation. Steam and dress down curtains as required to produce crease- and wrinkle-free installation. Remove and replace curtains that are stained or soiled or that have stress points or diagonal folds.
- B. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open

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approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10 21 16

SECTION 10 22 13 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Standard-duty wire mesh partitions.
2. Wire mesh ceilings.

1.2 DEFINITIONS

A. As defined in ASTM E 2016:

1. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.
2. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for wire mesh items.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 1. Include clearances required for operation of doors and gates.
- C. Setting Drawings: For anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry.
- D. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wire mesh unit hardware to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

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1. Installer's responsibilities include fabricating and installing wire mesh items and providing professional engineering services needed to assume engineering responsibility.
- B. Source Limitations: Obtain wire mesh items from single source from single manufacturer.
- 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, "Structural Welding Code - Sheet Steel."
- D. Pre-installation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped to provide protection during transit and Project-site storage. Use vented plastic.
- B. Inventory wire mesh partition door hardware on receipt and provide secure lockup for wire mesh partition door hardware delivered to Project site.
 1. Tag each item or package separately with identification and include basic installation instructions with each item or package.
- C. Deliver keys to Owner by registered mail or overnight package service.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

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. Acorn Wire & Iron Works, Inc.
 2. American Woven Wire Corporation.
 3. California Wire Products Corporation.
 4. Central Wire and Iron.
 5. Donaldson, R. J., Inc.
 6. Folding Guard Corporation.
 7. G-S Company (The).
 8. Indiana Wire Products, Inc.

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9. Jesco Industries, Inc.
10. Kenco Wire and Iron Products Inc.
11. Kentucky Metal Products Co.
12. King Wire Partitions, Inc.
13. Lakeside Wire and Iron Company.
14. Miller Wire Works, Inc.
15. Newark Wire Works Inc.
16. Standard Wire & Steel Works.
17. Wire Crafters, LLC.

2.2 MATERIALS

- A. Steel Wire: ASTM A 510
- B. Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M.
- C. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- D. Steel Pipe: ASTM A 53/A 53M, Schedule 40 unless another weight is indicated or required by structural loads.
- E. Square Steel Tubing: ASTM A 500, cold-formed structural-steel tubing.
- F. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.
- G. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.
- H. Postinstalled Expansion Anchors: With capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 1. Carbon Steel: Zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
 2. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
- I. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated and 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 wire mesh construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- J. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer, complying with MPI#79.
 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

2.3 STANDARD-DUTY WIRE MESH PARTITIONS

- A. Mesh: 0.135-inch- diameter, intermediate-crimp steel wire woven into 1-1/2-inch diamond mesh.
- B. Vertical Panel Framing: 1-1/4-by-5/8-by-0.097-inch cold-rolled, C-shaped steel channels with 1/4-inch diameter bolt holes spaced not more than 18 inches o.c. along center of framing.
- C. Horizontal and Vertical Panel Framing: 1-by-1/2-by-1/8-inch cold-rolled steel channels.
- D. Horizontal Panel Stiffeners: 2 cold-rolled steel channels, not less than 1 by 3/8 by 1/8 inch, bolted or riveted toe to toe through mesh or 1-by-1/2-by-1/8-inch cold-rolled steel channels with wire woven through.
- E. Top Capping Bars: 2-1/4-by-1-inch cold-rolled steel channels.
- F. Posts for 90-Degree Corners: 1-1/4-by-1-1/4-by-1/8-inch steel angles with 1/4-inch- diameter bolt holes aligning with bolt holes in vertical framing; with floor anchor clips.
- G. Posts for Other-Than-90-Degree Corners: Manufacturer's standard steel pipe or tubing with 1/4-inch- diameter bolt holes aligning with bolt holes in vertical framing.
 - 1. Partitions up to 12 Feet High: 1-1/4-inch OD.
 - 2. Partitions up to 20 Feet High: 2-1/2-inch OD.
- H. Adjustable Corner Posts: 2, manufacturer's standard steel pipe or tubing posts connected by steel hinges at 36 inches o.c. attached to posts; with 1/4-inch- diameter bolt holes aligning with bolt holes in vertical framing.
- I. Line Posts: 3-inch-by-4.1-lb or 3-1/2-by-1-1/4-by-0.127-inch steel channels; with 5-by-18-by-1/4-inch steel base plates punched for attachment to floor.
- J. Three- and Four-Way Intersection Posts: 1-1/4-by-1-1/4-inch tubular steel, with 1/4-inch-diameter bolt holes aligned for bolting to adjacent panels.
- K. Floor Shoes: Steel, cast iron, or cast aluminum, not less than 2 inches high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
- L. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch steel channels or C-channels, banded with 1-1/4-by-1/8-inch flat steel bar cover plates on 3 sides, and with 1/8-inch- thick angle strike bar and cover on strike jamb.
 - 1. Hinges: Full-surface type, 3-by-3-inch steel, 1-1/2 pairs per door; bolted, riveted, or welded to door and jamb framing.
 - 2. Cylinder Lock: Mortise type with manufacturer's standard cylinder; operated by key outside and lever inside.
 - 3. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.
- M. Accessories:

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1. Sheet Metal Base: Not less than 0.060-inch- thick, cold-rolled steel sheet.
2. Adjustable Filler Panels: Not less than 0.060-inch- thick, cold-rolled steel sheet; capable of filling openings from 2 to 12 inches.
3. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to 1 inch of adjustment.

N. Finish for Uncoated Ferrous Steel: Hot-dip galvanized unless otherwise indicated.

2.4 WIRE MESH CEILINGS

- A. Mesh, Framing, and Stiffeners: Fabricated from same mesh and framing as wire mesh partition panels.
- B. Perimeter Partition Supports: 1-1/2-by-1-1/2-by-1/8-inch steel angle, with 1/4-inch-diameter bolt holes aligned for bolting to top of wire mesh partitions and to sides of wire mesh ceiling panels.
- C. Wall Supports: 1-1/2-by-1-1/2-by-1/8-inch steel angle punched for attachment to wall and wire mesh ceiling panels.
- D. Intermediate Supports: Steel I-beam, as recommended by manufacturer.
- E. Intermediate Support Posts: 2-by-2-by-1/8-inch steel pipe or tubing.
- F. Finishes: Match adjacent wire mesh partitions.

2.5 FABRICATION

- A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. As required for complete installation, provide bolts, hardware, and accessories with manufacturer's standard finishes.
 1. Fabricate wire mesh items to be readily disassembled.
 2. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint.
- B. Standard-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 1. Mesh: Securely clinch mesh to framing.
 2. Framing: Fabricate framing with mortise and tenon corner construction.
 - a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.

- b. Fabricate three- and four-way intersections using manufacturer's standard connecting clips and fasteners.
 - c. Fabricate partition and door framing with slotted holes for connecting adjacent panels.
- 3. Fabricate wire mesh partitions with 3 inches of clear space between finished floor and bottom horizontal framing.
- 4. Doors: Align bottom of door with bottom of adjacent panels.
 - a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
- 5. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.
- C. Wire Mesh Ceilings: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 - 1. Mesh: Securely clinch mesh to framing.
 - 2. Framing: Fabricate framing with mortise and tenon corner construction.
 - a. Provide stiffeners as indicated or, if not indicated, as required by panel span and as recommended by wire mesh ceiling manufacturer. Weld stiffeners to framing.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.7 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron components.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
 - 3. Preparation for Shop Priming: After galvanizing, thoroughly clean wire mesh components of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- D. Shop Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard one-coat, shop-coat finish suitable for use intended. Comply with paint manufacturer's written instructions for applying and curing.
1. Color and Gloss: As selected by Architect from manufacturer's full range.
- E. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-on finish, suitable for use indicated, consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil (0.025 mm) for topcoat.
1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine floors for suitable conditions where wire mesh items will be installed.
- C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRE MESH PARTITIONS ERECTION

- A. Anchor wire mesh partitions to floor with 3/8-inch-diameter, post-installed expansion anchors at 12 inches o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.
 1. Anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if indicated on Shop Drawings.

- B. Anchor wire mesh partitions to floor with 3/8-inch-diameter, post-installed expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.
 - 1. Anchors may be set with power-actuated fasteners instead of post-installed expansion anchors if indicated on Shop Drawings.
- C. Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing and as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - 4. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - 5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
- D. Secure top capping bars to top framing channels with 1/4-inch-diameter "U" bolts spaced not more than 28 inches o.c.
- E. Provide line posts at locations indicated or, if not indicated, as follows:
 - 1. On each side of sliding door openings.
 - 2. For partitions that are 7 to 9 feet high, spaced at 15 to 20 feet o.c.
 - 3. For partitions that are 10 to 12 feet high, located between every other panel.
 - 4. For partitions that are more than 12 feet high, located between each panel.
- F. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.
- G. Install doors complete with door hardware.
- H. Weld or bolt sheet metal bases to wire mesh partitions and doors where indicated.
- I. Bolt accessories to wire mesh partition framing.

3.3 WIRE MESH CEILINGS ERECTION

- A. Anchor wall support angle to walls at 12 inches o.c. and as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.

3. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
- B. Attach wire mesh ceiling panels to wall support angles with bolts at 12 inches o.c.
- C. Attach wire mesh ceiling panels to wire mesh partitions with slotted angles bolted to sides of ceiling panels and to top of partitions at 12 inches o.c.
- D. Attach wire mesh ceiling panels to intermediate supports as recommended by manufacturer.

3.4 ADJUSTING AND CLEANING

- A. Adjust doors and gates to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Remove and replace defective work including doors and framing that are warped, bowed, or otherwise unacceptable.
- C. 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.
- D. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 10 22 13

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WIRE MESH PARTITIONS

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SECTION 10 22 39 - FOLDING PANEL PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated, acoustical panel partitions.
2. Electrically operated, acoustical panel partitions.
3. Manually operated, fire-rated panel partitions.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.
2. Section 092900 "Gypsum Board" for fire-rated assemblies and sound barrier construction above the ceiling at track.
3. Section 102239.13 "Folding Glass-Panel Partitions" for operable panel partitions made of glass panels.
4. Electrical and communications Sections for electrical service and connections for motor operators, controls, and limit switches and for system disconnect switches.

1.2 DEFINITIONS

- A. NIC: Noise Isolation Class.
- B. NRC: Noise Reduction Coefficient.
- C. STC: Sound Transmission Class.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Certificates for Credit MR 7: Chain-of-custody certificates certifying that operable panel partitions comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
3. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that products contain no urea formaldehyde.
4. Laboratory Test Reports for Credit IEQ 4.4: For composite wood products used in operable panel partitions, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: For operable panel partitions.

1. Include plans, elevations, sections, details, [**numbered panel installation sequence,**] and attachments to other work.
2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
3. Include diagrams for power, signal, and control wiring.

D. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.

1. Include Samples of accessories involving color selection.

E. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:

1. Textile Facing Material: Full width by not less than **36-inch- (914-mm-)** long section of [fabric] [carpet] from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat.
2. Panel Facing Material: Manufacturer's standard-size unit, not less than **3 inches (75 mm)** square.
3. Panel Edge Material: Not less than **3 inches (75 mm)** long.
4. Chair Rail: Manufacturer's standard-size unit, **6 inches (150 mm)** long.
5. Glass: Units **12 inches (300 mm)** square.
6. Hardware: One of each exposed door-operating device.

F. Delegated-Design Submittal: For operable panel partitions.

1. Include design calculations for seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Partition track, track supports and bracing, switches, turning space, and storage layout.
 2. Suspended ceiling components.
 3. Structural members to which suspension systems are attached.
 4. Size and location of initial access modules for acoustical tile.
 5. Items penetrating finished ceiling, including the following:
 - a. Lighting fixtures.
 - b. HVAC ductwork, outlets, and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Smoke detectors.
 - f. Access panels.
 - g. **<Insert item>**.
 6. Plenum **[fire]** **[smoke]** **[and]** **[acoustical]** barriers.
- B. Setting Drawings: For embedded items and cutouts required in other work[, **including support-beam, mounting-hole template**].
- C. Qualification Data: For qualified **[Installer]** **[testing agency]** **[manufacturer]** **[and]** **[vendor]**.
- D. Seismic Qualification Certificates: For operable panel partitions, tracks, accessories, and components, from manufacturer. Include seismic capacity of partition assemblies to remain in vertical position during a seismic event and the following:
1. Basis for Certification: Indicate whether certification is based on analysis, testing, or experience data, according to ASCE/SEI 7.
 2. Detailed description of partition anchorage devices on which the certification is based and their installation requirements.
- E. Product Certificates: For each type of operable panel partition.
1. Include approval letter signed by manufacturer acknowledging Owner-furnished panel facing material complies with requirements.
- F. Product Test Reports: For each operable panel partition, for tests performed by a qualified testing agency.
- G. Field quality-control reports.
- H. Sample Warranty: For manufacturer's special warranty.
- 1.6 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - b. Seals, hardware, track, track switches, carriers, and other operating components.
 - c. Electric operator and controls.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of operable panel partitions.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
 2. Warranty Period: [**Two**] <Insert number> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic bracing of tracks to structure above.
- B. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to [ASCE/SEI 7] <Insert requirement>.
 - 1. The term "withstand" means "the partition panels will remain in place without separation of any parts from the system when subjected to the seismic forces specified."
- C. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - 1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
 - 2. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated.
 - 3. Noise-Isolation Requirements: Installed operable panel partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for [10 dB less than STC value indicated] <Insert value>.
- D. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: [25] <Insert value> or less.
 - b. Smoke-Developed Index: [450] <Insert value> or less.
 - 2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to [NFPA 265 Method B Protocol] [or] [NFPA 286].
- E. Fire Resistance: Provide fire-rated operable panel partition assemblies[including pass doors] complying with NFPA 80, based on testing according to UL 10B for fire-rated door assemblies.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

2. Pass doors in fire-rated operable panel partition assemblies shall meet positive-pressure requirements.

- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 OPERABLE ACOUSTICAL PANELS

- A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Panel Operation: **[Manually operated, individual] [Manually operated, paired] [Manually operated, continuously hinged] [Electrically operated, continuously hinged]** panels.
- C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 1. Panel Width: **[Standard widths] [Equal widths] [As indicated]**.
- E. STC: Not less than **[38] [41] [45] [47] [50] [52] [54] <Insert number>**.
- F. NRC: Not less than **[0.50] [0.60] [0.65] [0.90] <Insert number>**.
- G. Panel Weight: **[8 lb/sq. ft. (40 kg/sq. m)] [10 lb/sq. ft. (50 kg/sq. m)] [12 lb/sq. ft. (59 kg/sq. m)] <Insert value>** maximum.
- H. Panel Thickness: Not less than **[3 inches (75 mm)] [3-1/2 inches (89 mm)] [4 inches (102 mm)] <Insert dimension>**.
- I. Panel Materials:
 1. Certified Wood: Wood for operable panel partitions shall be certified as "FSC Pure"[**or "FSC Mixed Credit"**] according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
 2. Recycled Content of Operable Panel Partitions:
 - a. Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **[25] <Insert number>** percent by weight.

- b. Recycled Content of Aluminum: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **<Insert number>** percent by weight.
 - c. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **<Insert number>** percent by weight.
 - 3. Steel Frame: Steel sheet, **[manufacturer's standard]** **[0.0508-inch (1.3-mm)]** **[0.0641-inch (1.6-mm)]** **[0.0747-inch (1.9-mm)]** **<Insert dimension>** nominal minimum thickness for uncoated steel.
 - 4. Steel Face/Liner Sheets: Tension-leveled steel sheet, **[manufacturer's standard]** **[0.0299-inch (0.75-mm)]** **[0.0359-inch (0.9-mm)]** **[0.0478-inch (1.2-mm)]** **[0.0598-inch (1.5-mm)]** **[0.0747-inch (1.9-mm)]** **<Insert dimension>** minimum nominal thickness for uncoated steel.
 - 5. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; **ASTM B 221 (ASTM B 221M)** for extrusions; manufacturer's standard strengths and thicknesses for type of use.
 - a. Frame Reinforcement: Manufacturer's standard steel or aluminum.
 - 6. Gypsum Board: ASTM C 1396/C 1396M.
 - 7. Cement Board: ASTM C 1288.
 - 8. Particleboard: ANSI A208.1[, **made with binder containing no urea formaldehyde**].
 - 9. Medium-Density Fiberboard: ANSI A208.2[, **made with binder containing no urea formaldehyde**].
 - 10. Plywood: DOC PS 1[; **made with adhesive containing no urea formaldehyde**].
 - 11. Composite Wood Products: Products 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."
- J. Panel Closure: Manufacturer's standard unless otherwise indicated.
- 1. Initial Closure: **[Flexible, resilient PVC, bulb-shaped acoustical seal]** **[Fixed jamb]** **[As indicated]** **<Insert description>**.
 - 2. Final Closure: **[Constant-force, lever-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal]** **[Hinged jamb closure]** **[Hinged communicating panel]** **[Fixed jamb]** **[Angle jamb]** **[Flexible, resilient PVC, bulb-shaped acoustical seal]** **<Insert description>**.
- K. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
- 1. Hinges: **[Manufacturer's standard]** **[Concealed (invisible)]** **<Insert type>**.
 - 2. **<Insert hardware requirement>**.

2.3 OPERABLE FIRE-RATED PANELS

- A. Operable Fire-Rated Panels: Fire-rated, acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Panel Operation: Manually operated, **[individual]** **[paired]** panels.
- C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable fire-rated panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
1. Panel Width: **[Standard widths]** **[Equal widths]** **[As indicated]**.
- E. Fire Rating: **[1]** **<Insert number>** hour(s).
- F. STC: Not less than **[38]** **[41]** **[45]** **[47]** **[50]** **[52]** **[54]** **<Insert number>**.
- G. NRC: Not less than **[0.50]** **[0.60]** **[0.65]** **[0.90]** **<Insert number>**.
- H. Panel Weight: **[8.5 lb/sq. ft. (41.5 kg/sq. m)]** **[10 lb/sq. ft. (50 kg/sq. m)]** **[12 lb/sq. ft. (59 kg/sq. m)]** **<Insert value>** maximum.
- I. Panel Thickness: Not less than **[3 inches (75 mm)]** **[3-1/2 inches (89 mm)]** **[4 inches (102 mm)]** **<Insert dimension>**.
- J. Panel Materials:
1. Recycled Content of Operable Panel Partitions:
- a. Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than **[25]** **<Insert number>** percent by weight.
2. Steel Frame: Steel sheet, **[manufacturer's standard]** **[0.0508-inch (1.3-mm)]** **[0.0641-inch (1.6-mm)]** **[0.0747-inch (1.9-mm)]** **<Insert dimension>** nominal minimum thickness for uncoated steel.
3. Steel Face/Liner Sheets: Tension-leveled steel sheet, **[manufacturer's standard]** **[0.0299-inch (0.75-mm)]** **[0.0359-inch (0.9-mm)]** **[0.0478-inch (1.2-mm)]** **[0.0598-inch (1.5-mm)]** **[0.0747-inch (1.9-mm)]** **<Insert dimension>** minimum nominal thickness for uncoated steel.
- K. Panel Closure: Manufacturer's standard fire-rated closure unless otherwise indicated.

1. Initial Closure: **[Flexible, resilient PVC, bulb-shaped acoustical seal] [Fixed jamb] [As indicated] <Insert description>.**
 2. Final Closure: Fire-rated, **[constant-force, lever-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal] [hinged jamb closure] [hinged communicating panel] [fixed jamb] [angle jamb] [flexible, resilient PVC, bulb-shaped acoustical seal] <Insert description>.**
- L. Hardware: Manufacturer's standard as required to operate fire-rated operable panel partition and accessories; with decorative, protective finish.
1. Hinges: **[Manufacturer's standard] [Concealed (invisible)] <Insert type>.**
 2. **<Insert hardware requirement>.**

2.4 SEALS

- A. General: Provide seals that produce operable panel partitions complying with performance requirements and the following:
1. Manufacturer's standard seals unless otherwise indicated.
 2. Seals made from materials and in profiles that minimize sound leakage.
 3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.
- B. Vertical Seals: Deep-nesting, interlocking[**steel**] astragals mounted on each edge of panel, with continuous PVC acoustical seal.
- C. Horizontal Top Seals: **[Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track] [or] [PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended].**
- D. Horizontal Bottom Seals: Manufacturer's standard continuous-contact seal exerting uniform constant pressure on floor.
- E. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.
1. Mechanically Operated for Acoustical Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than **[1-1/2 inches (38 mm)] [2 inches (50 mm)] [4 inches (102 mm)] [6 inches (152 mm)]** between retracted seal and floor finish.
 2. Mechanically Operated for Fire-Rated Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than **[1-1/2 inches (38 mm)] [2 inches (50 mm)] [4 inches (102 mm)]** between retracted seal and floor finish.
 3. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than **[1**

inch (25 mm)] [1-1/2 inches (38 mm)] [2 inches (50 mm)] between retracted seal and floor finish.

2.5 PANEL FINISH FACINGS

- A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.
1. Apply[**one-piece, seamless**] facings free of air bubbles, wrinkles, blisters, and other defects, [**with edges tightly butted, and**] [**with invisible seams complying with Shop Drawings for location, and**] with no gaps or overlaps. Horizontal [**butted edges**] [**seams**] are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
 2. Where facings with [**directional or repeating patterns or directional weave**] [**directional, repeating, or matching grain**] are indicated, mark facing top and attach facing in same direction.
 3. Match facing pattern **72 inches (1830 mm)** above finished floor.
- B. Owner-Furnished Facing Material: **<Insert requirements>**.
- C. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with CFFA-W-101-D for type indicated; Class A.
1. Total Weight: **<Insert value>**.
 2. Antimicrobial Treatment: Additives capable of inhibiting growth of bacteria, fungi, and yeasts.
 3. Color/Pattern: [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] **<Insert color/pattern>**.
- D. Carpet Wall Covering: Manufacturer's standard[**nonwoven, needle-punched carpet with fibers fused to backing**], from same dye lot, treated to resist stains.
1. Color/Pattern: [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] **<Insert color/pattern>**.
- E. Fabric Wall Covering: [**Manufacturer's standard fabric**] [**100 percent polyolefin woven fabric**] **<Insert fabric description>**, from same dye lot, treated to resist stains.
1. Color/Pattern: [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] **<Insert color/pattern>**.
- F. High-Pressure Decorative Laminate: NEMA LD 3, Horizontal grade.
1. Color/Pattern: [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] **<Insert color/pattern>**.

- G. Wood Veneer: Laminated to **[noncombustible]** **[fire-retardant-treated wood]** core with moisture-resistant adhesive.
1. Species and Cut: **[Maple, plain sliced]** **[Poplar, plain sliced]** **[White oak, rift cut]** **[White ash, plain sliced]** **[As indicated]** **[As selected by Architect from manufacturer's full range]** **<Insert species and cut>**.
 2. Matching of Adjacent Veneer Leaves: **[Book]** **[Slip]** **[Random]** match.
 3. Veneer Matching within Panel Face: **[Running]** **[Balance]** **[Center-balance]** match.
 4. Panel-Matching Method: **[No matching between panels is required. Select and arrange panels for similarity of grain pattern and color between adjacent panels]** **<Insert requirement>**.
 5. Vertical Panel-Matching Method: **[Continuous match; veneer leaves of upper panels are continuations of veneer leaves of lower panels]** **[Vertical book match; veneer leaves are individually book matched from lower panels to upper panels]** **[Vertical slip match; veneer leaves are individually slip matched from lower panels to upper panels]** **[Panel vertical book match; panels are book matched from lower panels to upper panels]** **[Panel vertical slip match; panels are slip matched from lower panels to upper panels]**.
 6. Wood-Veneer Finish: **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]**, as follows:
 - a. Type: **[Transparent finish]** **[Transparent finish over stain]** **<Insert finish>** over wood variety indicated.
 7. Wood-Veneer Finish: **[As specified in Section 099300 "Staining and Transparent Finishing."]** **<Insert description.>**
- H. Paint: Manufacturer's standard **[factory-]** **[field-]** painted finish.
1. Color: **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert color>**.
- I. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing, finished as follows:
1. Steel, Painted: Finished with manufacturer's **[standard neutral color]** **[color matching Architect's sample]** **[color as selected by Architect from manufacturer's full range]**.
 2. Aluminum: Finished with manufacturer's standard **[mill]** **[clear anodic]** **[color anodic]** finish.
- J. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.6 SUSPENSION SYSTEMS

- A. Tracks: Steel or aluminum **[mounted directly to overhead structural support,]** **[with adjustable steel hanger rods for overhead support,]** designed for operation, size, and weight

of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than **0.10 inch (2.54 mm)** between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Aluminum guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish.
 2. Head Closure Trim: As required for acoustical performance; **[with factory-applied, decorative, protective finish] [primed for field finish]**.
- B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.
1. Multidirectional Carriers: Capable of negotiating intersections without track switches.
- C. Track Intersections, Switches, and Accessories: As required for operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.
1. Curve-and-Diverter Switches: Allow radius turns to divert panels to an auxiliary track.
 2. L Intersections: Allow panels to change 90 degrees in direction of travel.
 3. T Intersections: Allow panels to pass through or change 90 degrees to another direction of travel.
 4. X Intersections: Allow panels to pass through or change travel direction full circle in 90-degree increments, and allow one partition to cross track of another.
 5. Multidirectional Switches: Adjustable switch configuring track into L, T, or X intersections and allowing panels to be moved in all pass-through, 90-degree change, and cross-over travel direction combinations.
 6. Center carrier stop.
- D. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.
- E. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.7 ELECTRIC OPERATORS

- A. General: Factory-assembled electric operation system of size and capacity recommended and provided by operable panel partition manufacturer for partition specified; with electric motor and factory-prewired motor controls, speed reducer, chain drive, control stations, control devices, and accessories required for operation. Include wiring from control stations to motor. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
- B. Comply with NFPA 70.

- C. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6.
- D. Motor Electrical Characteristics:
 - 1. Horsepower: **[Manufacturer's standard]** **<Insert value>**.
 - 2. Volts: **[120]** **[208]** **<Insert value>**.
 - 3. Phase: **[Single]** **[Poly]**.
 - 4. Hertz: 60.
- E. Control Stations: Two single-key-operated, constant-pressure control stations located remotely from each other on opposite sides and opposite ends of partition run. Wire in series to require simultaneous activation of both key stations to operate partition. Each three-position control station labeled "Open," "Close," and "**[Off]** **[Stop]**." Furnish two keys per station.
- F. Obstruction-Detection Devices: Equip each motorized operable panel partition with indicated automatic safety sensor that causes operator to immediately **[shut off motor]** **[stop and reverse direction]**.
 - 1. Sensor Edge: Contact-pressure-sensitive safety edge along partition's leading edge.
 - 2. Sensor Mat: Electrically operated, contact-weight-sensitive safety mat in storage pocket area.
 - 3. Infrared Sensor System: Designed to detect an obstruction in partition's path and sound an audible alarm, without obstruction contacting partition.
- G. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop operable panel partition at fully extended and fully stacked positions.
- H. Emergency Release Mechanism: Quick disconnect-release of electric-motor drive system, permitting manual operation in event of operating failure.
- I. Electric Interlock: Equip each motorized operable panel partition with electric interlocks at locations indicated, to prevent operation of operable panel partition under the following conditions:
 - 1. On storage pocket door, to prevent operation if door is not in fully open position.
 - 2. On partitions at location of convergence by another partition, to prevent operation if merging partitions are in place.

2.8 ACCESSORIES

- A. Pass Doors: Swinging door built into and matching panel **[materials,]** **[construction,]** **[acoustical qualities,]** **[fire rating,]** finish and thickness, complete with frames and operating hardware. Hinges finished to match other exposed hardware.
 - 1. Accessibility Standard: Fabricate doors to comply with applicable provisions in **[ICC A117.1]** **[and]** **[the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities]** **<Insert requirements of authorities having jurisdiction>**.

2. Single Pass Door: **[36 by 80 inches (914 by 2032 mm)] [36 by 84 inches (914 by 2134 mm)]** **<Insert dimensions>**.
 3. Double Pass Door: **[72 by 80 inches (1829 by 2032 mm)] [72 by 84 inches (1829 by 2134 mm)]** **<Insert dimensions>**.
 4. Pass-Door Hardware: Equip pass door with the following:
 - a. Door Seals: **[Mechanically operated floor seal on panels containing pass doors]** **[Sweep floor seals]**.
 - b. **[Panic]** **[Fire exit]** hardware.
 - c. Concealed door closer.
 - d. Door Viewer: Installed with view in direction of swing.
 - e. Exit Sign: Recessed, self-illuminated.
 - f. Latchset: Passage set.
 - g. Lock: Key-operated lock with cylinder[, **keyed to master key system,**] operable from both sides of door. Include two keys per lock.
 - h. Lock: Deadlock to receive cylinder, operable from both sides of door. See **[Section 087100 "Door Hardware"] [Section 087111 "Door Hardware (Descriptive Specification)"]** for lock cylinder and keying requirements.
- B. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware**[and acoustical seals at soffit, floor, and jambs]**. Hinges in finish to match other exposed hardware.
1. Manufacturer's standard method to secure storage pocket door in closed position.
 2. Rim Lock: Key-operated lock cylinder[, **keyed to master key system,**] to secure storage pocket door in closed position. Include two keys per lock.
 3. Rim Lock: Deadlock to receive cylinder, to secure storage pocket door in closed position. See **[Section 087100 "Door Hardware"] [Section 087111 "Door Hardware (Descriptive Specification)"]** for lock cylinder and keying requirements.
- C. Windows: **[Manufacturer's standard]** **[As indicated]** **<Insert requirement>**.
1. Glass: Safety glass **[matching Architect's sample]** **[as selected by Architect from manufacturer's full range]** **<Insert requirement>**.
 2. Safety Glass Standard for Partition Panels: Provide glass products complying with testing requirements in 16 CFR 1201, Category II, or ANSI Z97.1, Class A.
 3. Safety Glass Standard for Pass Doors: Provide glass products complying with testing requirements in 16 CFR 1201, Category II.
- D. Work Surfaces: Quantities, placement, and size indicated.
1. Surface: **[Porcelain steel marker/projection surface]** **[Self-healing, tackable, vinyl-coated fabric wall covering, complying with CFFA-W-101-D, Type II, and indicated fire-test-response characteristics; laminated to natural cork tackboard]** **<Insert description>**.
 2. Surface Color: **[Matching Architect's sample]** **[As selected by Architect from manufacturer's full range]** **<Insert manufacturer's designation for color>**.

3. Size: **[Full width and height of panel] [Full width of panel by 48 inches (1219 mm)] [48 by 48 inches (1219 by 1219 mm)] [As indicated on Drawings] <Insert dimensions>.**
 4. Trim: **[Aluminum slip-on or snap-on trim with no visible screws or exposed joints and with corners mitered to a neat, hairline joint] <Insert description>.**
- E. Chalk Tray **[and Eraser Pocket]**: Aluminum with **[mill] [clear anodic] [color anodic]** finish.
- F. Chair Rails: **<Insert material, finish, dimensions, and other characteristics not indicated on Drawings>.** **[Recessed] [Surface mounted]** in locations indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.
- B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.
- C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.
- E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.
- F. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals. **[Perform test and make adjustments before NIC testing.]**

3.3 FIELD QUALITY CONTROL

- A. NIC Testing: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections.

1. Testing Extent: Testing agency shall randomly select [**one**] <Insert number> operable panel partition installation(s) for testing.
 2. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E 336, determined by ASTM E 413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.
- B. An operable panel partition installation will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.
- B. Adjust [**pass doors**] [**and**] [**storage pocket doors**] to operate smoothly and easily, without binding or warping.
- C. Verify that safety devices are properly functioning.

3.5 MAINTENANCE SERVICE

- A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include [**three**] [**six**] [**nine**] [**12**] months' full maintenance by manufacturer's authorized service representative. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operable-partition operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 10 22 39

SECTION 10 26 00 – WALL AND DOOR PROTECTION

NOTE: This guide specification covers the basic requirements for Decorative Metals.

Incorporate this information into the specifications for your project. For any deviations, please discuss with your designated LAWA representative.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Decorative wall protection.
2. Metal base.

NOTE: All walls within the public areas are to receive stainless steel wall and corner protection including a 12 inch high stainless steel base. This protection is deemed necessary for the walls of the public areas in order to protect the wall finish from luggage carts and other sources of high impact.

1.2 ACTION SUBMITTALS

A. Shop Drawings: Show fabrication and installation details for decorative metal.

1. Include plans, elevations, component details, and attachments to other work.
2. Indicate materials, gauges and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

B. Samples for Verification: For each type of exposed finish required.

1. Sections of linear shapes.
2. Samples of welded joints showing quality of workmanship.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing decorative metal similar to that

indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

1.5 COORDINATION

- A. Coordinate installation of anchorages for decorative metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.2 STAINLESS STEEL

- A. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20.
- B. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.

2.3 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Stainless-Steel Items: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
- C. Provide concealed fasteners for interconnecting components and for attaching decorative metal items to other work unless exposed fasteners are unavoidable.
 - 1. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2.4 MISCELLANEOUS MATERIALS

- A. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal and that will prevent telegraphing and oil canning and is compatible with substrate and noncombustible after curing.
 - 1. Contact Adhesive: VOC content of not more than 80 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 FABRICATION, GENERAL

- A. Assemble items 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.
- B. 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.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- D. Form simple and compound curves in bars 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.
- E. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- F. Mill joints to a tight, hairline fit.
- G. Grind smooth and polish exposed metal edges and corners.
- H. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.
- I. Comply with AWS for recommended practices in shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
 - 1. 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.
- J. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair

strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.

2.6 DECORATIVE WALL PROTECTION

- A. Bumper Rail: Assembly consisting of continuous metal bars and wall brackets; designed to withstand impacts.
1. Rail: Stainless steel flat bar, in dimensions and profiles indicated on Drawings.
 2. Wall Bracket: Cast stainless-steel shape, in dimensions and profiles indicated on Drawings
 3. Finish: Directional satin, No. 4.
 4. Accessories: Anchors to connect bumper rail to other work.
 5. Mounting: Surface mounted directly to wall.
- B. Surface-Mounted, Metal Corner Guards: Fabricated from metal bars welded to two mounting brackets. Interconnect corner guard components with full-length, full penetration welds. Use welding method that is appropriate for metal and finish indicated and that develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.
1. Material: Stainless steel, Type 304.
 2. Bar: 1/2-inch-diameter stainless-steel bar.
 3. Mounting Brackets: Fabricated from one-piece, formed or extruded stainless steel with formed edges; with 90- or 135-degree turn to match wall condition
 - a. Wing Size: 1-1/2 inches high by 1 inch wide.
 - b. Corner Radius: 1/8 inch.
 - c. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.

2.7 METAL BASE

- A. Form metal base from stainless-steel sheet, No. 4 finish, thickness as indicated on Drawings.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.9 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

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.
- B. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.
- D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- E. 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.
 1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude non-uniform oxidation and discoloration.

3.3 DECORATIVE WALL PROTECTION INSTALLATION

- A. General: Install decorative wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

1. Install decorative wall protection units in locations and at mounting heights indicated on Drawings.
2. Provide mounting hardware, anchors, and other accessories required for a complete installation.

3.4 METAL BASE INSTALLATION

- A. Install metal base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- B. Tightly adhere metal base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- C. On masonry surfaces or other similar irregular substrates, fill voids along top edge of metal base with manufacturer's recommended adhesive filler material.

3.5 CLEANING AND PROTECTION

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Protect finishes of decorative metal from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.
- C. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 10 26 00

SECTION 10 28 00 – TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories
 - 2. Warm-air dryers
 - 3. Childcare accessories
 - 4. Under lavatory guards

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated, include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Samples: Full size, for each accessory item to verify design, operation, and finish requirements.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
- D. Warranty: Sample of special warranty.
- E. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.4 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

NOTE: Indicate all accessories on drawings with an accessory schedule. All accessories shall be recessed or semi-recessed. Verify wall thickness for all recessed accessories.

1.5 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A153/A153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: Subject to LAWA approval, provide and indicate on the drawings

the following products:

1. Bobrick Washroom Equipment, Inc.
 2. Bradley Corporation
 3. Koala Bear Kare
 4. Toto USA, Inc.
- B. Toilet Tissue (Jumbo-Roll) Dispenser:
1. Basis-of-Design Product: Bobrick 2892.
 2. Description: Stainless Steel Twin – Jumbo Roll Toilet tissue dispenser.
 3. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Paper Towel Dispenser:
1. Basis-of-Design Product: Bobrick 29744
 2. Mounting: Semi Recessed.
 3. Material and Finish: Stainless steel, No. 4 finish (satin).
 4. Power Supply: Bobrick AC External Adapter (6V) 3974-55
- D. Recessed Paper Towel Dispenser and Waste Receptacle:
1. Basis-of-Design Product: Bobrick 3974
 2. Mounting: Semi Recessed.
 3. Material and Finish: Stainless steel, No. 4 finish (satin).
 4. Power Supply: Bobrick AC External Adapter (6V) 3974-55
- E. Recessed Waste Receptacle:
1. Basis-of-Design Product: Bobrick B-3644.
 2. Mounting: Recessed.
 3. Material and Finish: Stainless steel.
- F. Semi Recessed Waste Receptacle:
1. Basis-of-Design Product: Bradley 334-10
 2. Mounting: Semi Recessed.
 3. Material and Finish: Stainless steel.
- G. Waste Receptacle Large Capacity, Stand Alone:
1. Basis-of-Design Product: Bobrick B-2280
 2. Mounting: Stand Alone.
 3. Material and Finish: Stainless steel.

H. Liquid-Soap Dispenser:

1. Basis-of-Design Product: Bobrick B-830.
2. Description: Sureflo Soap Dispensing System.

NOTE: Clear vinyl tubing with a 3/8" inside dimension is required to connect the Bobrick Sureflo liquid soap reservoir to the Lovair wall mounted soap dispensers. Install zinc plated adjustable hose clamp at each t-barb tubing connection. No exceptions.

I. Grab Bar (corner):

1. Basis-of-Design Product: Bobrick B-68137.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: Corner, 36" x 54".

J. Grab Bar (straight):

1. Basis-of-Design Product: Bobrick B-6806 x 36.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: Straight Bar – 36" long.

K. Vendor:

1. Basis-of-Design Product: Bobrick B-2706 25.
2. Type: Sanitary napkin and tampon.
3. Mounting: Fully recessed.
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).

L. Vendor (alternate):

1. Basis-of-Design Product: Bobrick B-3706 25.
2. Type: Sanitary napkin and tampon.
3. Mounting: Fully recessed.
4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).

M. Seat-Cover Dispenser:

1. Basis-of-Design Product: Bobrick B – 4221, Contura Series

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2. Mounting: Surface mounted.
 3. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
- N. Seat-Cover Dispenser (alternate):
1. Basis-of-Design Product: Bobrick B – 221, Classic Series
 2. Mounting: Surface Mounted
 3. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
- O. Mirror Unit:
1. Basis-of-Design Product: Bobrick B-290.
 2. Mounting: Mechanical adhered. Bottom of mirror frame will be 1” - 2” above backsplash or horizontal surface to limit water accumulation and desilvering.
 3. Frame: Stainless-steel angle.
- P. Air Freshener:
1. Basis-of-Design Product: Technical Concepts – Model no. 401375.
 2. Description: Automatic Air Freshener.

2.3 WARM-AIR DRYERS

- A. Hand Dryer:
1. Basis-of-Design Product: Toto USA ‘Clean Dry’ HDR110#SS (LAWA Standard)
 2. Mounting: Recessed.
 3. Exposed Material and Finish: Stainless steel

2.4 CHILDCARE ACCESSORIES

- A. Diaper-Changing Station:
1. Basis-of-Design Product: Koala Bear Kare – KB110SSRE.
 2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
 3. Mounting: Recessed.
 4. Operation: concealed pneumatic cylinder with hinge structure.
 5. Material and Finish: Stainless steel, No. 4 finish (satin), exterior shell with high density grey polyethylene interior.

2.5 UNDER LAVATORY GUARDS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

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1. Plumberex Specialty Products, Inc.
 2. Truebro by IPS Corporation.
- B. Underlavatory Guard:
1. Basis-of-Design Product: Truebro Lav Guard 2 E-Z.
 2. 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.
 3. Material and Finish: Antimicrobial, molded plastic, white.

2.6 CUSTODIAL ACCESSORIES (Not Used)

2.7 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. The total number of keys for each accessory shall be determined by LAWA.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 28 00

SECTION 10 43 13 - DEFIBRILLATOR CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Custom fabricated automated external defibrillator (AED) cabinets.
2. Automated external defibrillators (AED's).

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for AED cabinets.

1. Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
2. Automated External Defibrillator

B. Shop Drawings: For AED cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For each type of fire protection cabinet indicated.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Size: 6 by 6 inches square.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For AED cabinets and AED's.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to AED cabinets including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.5 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 AED cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Tempered Float Glass: ASTM C 1048, Kind KT, Condition A, Type I, Quality q3, 1/8 inch, Class I (clear).

2.2 AED CABINET

- A. Cabinet Type: Suitable for mounting AED with emergency telephone and alarm; match existing AED cabinets;
 - 1. Basis of Design Product: Potter Roemer LLC; Model HSSS7063-D-LAWA-modified as described herein or a comparable product by one of the following:
 - a. J. L. Industries, Inc., a division of Activar Construction Products Group;.
 - b. Larsen's Manufacturing Company;.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Interior Size: 14 inches wide by 22 inches high by 6 inches deep, as required to incorporate AED and specified features. All cabinet components and equipment shall be accessible, removable and replaceable with the cabinet door in a 90 degree position.
- D. Cabinet Material: Stainless-steel sheet.
- E. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim.
- F. Cabinet Trim Material: Stainless-steel sheet.
- G. Door Material: Stainless-steel sheet.
- H. Door Style: Provide limited visibility window to match existing.
- I. Door Glazing: Tempered float glass.

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- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide manufacturer's standard.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. Accessories:
 - 1. Identification: Manufacturer's standard.
- L. Finishes:
 - 1. Manufacturer's standard baked-enamel paint for the interior of cabinet.
 - 2. Stainless Steel: No. 4.
- M. Cabinet Interior Features:
 - 1. Emergency Phone Box.
 - 2. Cable Access Box
 - 3. Raceway
- N. Alarm:
 - 1. Circuitry Board.
 - 2. Alarm Circuitry
 - 3. Alarm Key Switch and Key:
 - 4. Control for Visual Alarm, Audio Alarm and Relay Closures:
- O. Power Requirements for Alarm Board, Siren and LED:

2.3 AUTOMATED EXTERNAL DEFIBRILLATOR (AEDS)

- A. Provide the following:
 - 1. Philips Heartstart OnSite (HS1) Defibrillator

2.4 FABRICATION

- A. AED 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.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install AED cabinets in locations and at mounting heights, at heights acceptable to the Los Angeles Fire Department.
- B. AED Cabinets: Fasten cabinets to structure, square and plumb.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

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- B. Adjust cabinet doors to operate easily without binding.
- C. On completion of cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by AED cabinet and mounting bracket manufacturers.
- E. Replace AED cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

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DEFIBRILLATOR CABINETS

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SECTION 10 44 13 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire protection cabinets for the following:
 - a. Portable fire extinguishers.

NOTE: Indicate on the drawings a fire extinguisher in a cabinet within a 75 foot travel distance to all portions of the building on each floor. Keep in mind that additional fire extinguishers and cabinets may be required as dictated by the Fire Department Field Inspector.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For each type of fire protection cabinet indicated.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 1. Size: 6 by 6 inches square.
- E. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

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- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Pre-installation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire protection cabinets including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.5 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008 /A1008M, Commercial Steel (CS), Type B.
- B. Stainless-Steel Sheet: ASTM A666, Type 304.
- C. Transparent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), 1/4 inch-thick, mm thick, with Finish 1 (smooth or polished).

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. J. L. Industries, Inc., a division of Activar Construction Products Group
 - b. Larsen's Manufacturing Company
 - c. Potter Roemer LLC
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Stainless-steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.

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- D. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim.
- E. Cabinet Trim Material: Stainless-steel sheet.
- F. Door Material: Stainless-steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide manufacturer's standard.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Identification: Comply with the Los Angeles Fire Department Requirements.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Engraved.
 - 3) Lettering Color: Black.
 - 4) Orientation: Vertical.
- K. Finishes:
 - 1. Manufacturer's standard baked-enamel paint for the interior of cabinet.
 - 2. Stainless Steel: No. 4.

2.3 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. Prepare doors and frames to receive locks.
 - 4. 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 selected.

- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights, at heights acceptable to the Los Angeles Fire Department.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

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SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to the Los Angeles Fire Department.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fails in materials or workmanship within specified warranty

period.

1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - b. Larsen's Manufacturing Company.
 - c. Potter Roemer LLC.
 2. Valves: Manufacturer's standard.
 3. Handles and Levers: Manufacturer's standard.
 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - b. Larsen's Manufacturing Company.
 - c. Potter Roemer LLC.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

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SECTION 111113 – COMPRESSED AIR SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes furnishing and installing the compressed air system as shown on the contract drawings and as specified herein, including but not limited to the following.
 - 1. Compressor.
 - 2. Compressed air refrigerated dryer.
 - 3. Compressed air manual valves.
 - 4. Compressed air solenoid valves.
 - 5. Compressed air piping.
 - 6. Pressure regulating valves and gauges.
 - 7. Compressed air hose reels and vehicle service equipment.
 - 8. Compressed air system labeling and operational signage.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 136101, Gasoline Electrical System

1.3 REFERENCES

- A. API: American Petroleum Institute
- B. ASME: American Society for Mechanical Engineers
 - 1. ASME B16.3: Malleable Iron Threaded Fittings: Classes 150 and 300
 - 2. ASME B36.10M: Welded and Seamless Wrought Steel Pipe
 - 3. ASME B40.100: Pressure Gauges and Gauge Attachments
- C. ASTM: American Society for Testing and Materials
 - 1. ASTM A53: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - 2. ASTM A197: Standard Specification for Cupola Malleable Iron
- D. CBC: 2013 California Building Code
- E. FM: Factory Mutual Association
- F. National Certified Pipe Welding Bureau
- G. NFPA: National Fire Protection Association
- H. OSHA: Occupational Safety and Health Act

- I. SSPC: Society for Protective Coatings
 - 1. SSPC SP2: Surface Preparation Specification No. 2: Hand Tool Cleaning
- J. UL: Underwriter's Laboratories

1.4 SUBMITTALS

- A. Shop drawings: Submit sealed shop drawings with seismic anchoring details complying with the Quality Control section. Shop drawings shall be stamped and signed by a professional structural engineer licensed in the state of California.
- B. Calculations: Submit seismic calculations indicating restraint loadings from design seismic forces in the Quality Control section. Calculations shall include proper anchorage details and when applicable shall include consideration of types of concrete. Calculations shall be stamped and signed by a professional structural engineer licensed in the state of California.
- C. Test Data: Submit test data for the following:
 - 1. Pressure test report for the compressed air piping system.
 - 2. Certified copies of factory test reports.
- D. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by the Project.
- E. No welder will be employed on the work who has not been fully qualified under the herein specified procedures and so certified by the local chapter of the National Certified Pipe Welding Bureau or similar testing authority.
 - 1. Each operator's certificate shall be on file at the site and shall be made available upon request.
- F. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the compressed air system installation. Verification of permits shall be submitted.
- G. Provide certification that inspections and tests, as described in Part 3 of this Section, have been performed and the system has passed specified testing requirements.

1.5 QUALITY CONTROL

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project:
 - 1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.
 - 2. National Fire Protection Association (NFPA).
 - 3. Occupational Safety and Health Act (OSHA).
 - 4. Factory Mutual Association (FM).
 - 5. Underwriter's Laboratories (UL).
 - 6. American Petroleum Institute (API).

- B. Contractor Qualifications: Company specializing in performing Work of this section with minimum five years documented experience.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of experience.
- D. Permanent equipment shall be seismically anchored to resist the total design seismic force prescribed in the CBC. Seismic restrains shall be designed by a registered professional structural engineer licensed in the state of California. Design shall include:
 - 1. Number, size, capacity, and location of anchors for floor mounted equipment.
 - 2. For units with a weight greater than 2500 pounds, provide substantiating calculations the floor can accept the prescribed seismic forces

1.6 EXTRA MATERIALS AND SPARE PARTS

- A. Submit 25 spare tire chucks to the LAWA at date of operational occupancy.
- B. Submit 10 spare regulator assemblies and 10 spare filters to LAWA at the date of operational occupancy.

1.7 PERMITS AND SUBMISSIONS

- A. The Contractor shall provide all permits and notifications required by state and local codes and regulations. Specifically at a minimum, the Contractor shall make the following submission:
 - 1. Cal OSHA, Pressure Vessel District Office, Pressure Vessel Inspection Request form
- B. Copies of all permits/registrations received shall be provided as part of the closeout documentation.

PART 2 - PRODUCTS

2.1 COMPRESSOR

- A. Packaged, duplex, reciprocating, UL listed air compressor unit rated for no less than 50 ACFM @175 psig.
- B. Manufacturers: Quincy, Ingersol Rand, Champion, or equal.
- C. Basis of Design Model
 - 1. Quincy QP-15, or equal.
 - 2. Tank Orientation: Horizontal.
 - 3. Intake: Filtered muffler.
 - 4. Configuration: Reciprocating, Tank Mounted.
 - 5. Size: 15 HP.
 - 6. Drive: Electric, 480V/3P.

7. Tank Size: 120 Gallon.
 8. Receiver tank shall be ASME certified.
 9. Receiver tank shall be California Code 462L OSHA approved.
- D. Controls: Unit shall include control panel with control power transformer.
- E. Accessories:
1. Compressor after-coolers.
 2. Provide a receiver drain valve.
 3. Provide a receiver pressure gauge.
 4. Air receiver relief valve.
 5. Dual (5 micron/1 micron) filter assembly rated for one larger nominal size than the maximum flow rate rating of the compressor.
- F. Contractor shall provide air compressors with appropriate seismic anchoring systems to comply with requirements in the Quality Control section.

2.2 COMPRESSED AIR REFRIGERATED DRYER

- A. Refrigerated dryer shall be of the same manufacturer as the Air Compressor and shall have integrated equipment, including: air-cooled aftercooler, refrigerated dryer, moisture separator, electronic adjustable drain valve and coalescer.
- B. Refrigerated air dryer shall cool compressed air to between 33-39 degree F pressure dew point. Condensed water shall be removed through an automatic drain valve.
- C. Refrigerant shall be R134A.
- D. Maximum inlet pressure is 200 psi and maximum inlet temperature is 140 degrees F.
- E. Dryer shall be rated for 75 CFM @100 psig.
- F. Dryer power requirements shall be 115 volts.

2.3 COMPRESSED AIR MANUAL VALVES

- A. Provide compressed air ball type valves.
- B. Provide bleed type on air workstations.

2.4 COMPRESSED AIR SOLENOID VALVES

- A. Provide UL listed 120V AC normally closed (powered open) solenoid valves.

2.5 COMPRESSED AIR PIPING

- A. Flexible Pipe Connectors: Stainless steel hose flexible connectors shall be corrugated, stainless steel tubing with stainless steel wire braid covering and ends welded to inner tube. Connectors shall be rated at 1000 psig minimum working pressure. End connections shall be threaded.
- B. Piping
 1. Piping shall be mild steel conforming to ASTM A53/ASME B36.10M, Schedule 40.
 2. Joints shall be threaded malleable iron conforming to ASME B16.3/ASTM A197, Class 150.
- C. Provide a braided flexible expansion loop for piping that crosses building shear joints as indicated in the drawings. Braided flexible expansion loops shall consist of two parallel sections of braided metal hose, a 180 degree return bend, with inlet and outlet 90 degree elbow connections. The loops shall be engineered to move in three planes and shall impart no loads to the anchors. Materials of construction of the braided metal hoses are to be stainless steel with stainless steel braid, 304L/316L. End fittings shall be threaded for connection to compressed air piping. Loop assembly shall be sized as indicated on the drawings. Expansion loops shall be rated for minimum of 450psi and accommodate a total movement of 1 inch between ends in any direction. Manufacturers: Flexicraft, Metraflex, or equal.

2.6 PRESSURE REGULATING VALVES WITH GAUGES

- A. Manufacturers: Graco, Alemite, Balcrank, or equal.
- B. Commercial pressure gauge complying with ASME B40.100. Pressure gauge shall have the following characteristics:
 1. Pressure Range: 0 – 200 psig.
 2. Dial Size: 1-1/2-inch.
 3. Operating Temperature: -40 – 150 degrees.
 4. Socket: Brass.
 5. Case: Steel.
 6. Accuracy: +/- 3 percent span.
 7. Graco 217073 (series) or equal.
- C. Pressure Regulating Valves: Spring loaded diaphragm design with the following performance characteristics:
 1. Adjustable Pressure Range: 0 -125 psig.
 2. Maximum Supply Pressure: 300 psig.
 3. Connections: NPT.
 4. Operating Temperature: 32 – 150 degrees F.
 5. 0-160 psig pressure gage.
 6. Complete with filter and lubricator (no lubricator on tire fill hose reels).
 7. Graco 217073 (series) or equal.

2.7 COMPRESSED AIR HOSE REELS AND VEHICLE SERVICE EQUIPMENT

- A. Manufacturers: Graco, Alemite, Balcrank, or equal.
- B. Hose Reels: Industrial Duty, Graco XD series or equal with dimensions as shown on the drawings (Q6.01).
- C. Quick Disconnect Fittings: Supply Graco 110200 or equal at all air workstations and general purpose hose reel connections
- D. Heavy Duty Tire Fill Chucks: Supply Graco 236206 or equal at every fuel island hose reel connection.

2.8 COMPRESSED AIR SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Provide designation labels on all equipment in this specification outlined on the related equipment designation drawings.
- B. Tag all valves, mechanical devices and components identified on system Process and Instrumentation Diagrams with permanent tags including function and designation number.
- C. Provide wall mounted, plain English, permanent signage at all fill ports, regulating valves, evacuation stations, manual emergency actuators, operating valves and any other mechanical/or electrical device that the rental car user would be expected to actuate or operate in the normal course of business or emergency situation.
- D. Identify piping, concealed or exposed, with plastic pipe markers. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- E. All wall mounted and equipment mounted designation tags shall be 2 or 3-ply phenolic, outdoor and long-life rated, non-flammable, non-conductive, 1/8 inch thick, engraved. All signage shall be 0.020 baked enamel aluminum sized appropriately for the lettering. Aluminum shall be mounted with stainless steel hardware. Designation labels and operating signage shall be white letters on black signage. All emergency, warning or other related signs shall be red signs with white letters. Designation label material shall be specifically designed to prevent static build-up, ES-1 Phenolic by NORPLEX, or equal. Lettering on designation labels shall be 1/2-inch in height. Lettering for operational signage shall be 3/4-inch in height unless otherwise designated in the drawings. Lettering for emergency signage shall be 1-inch in height unless otherwise designated in the drawings. Wall mounted signs shall be affixed with anchors and stainless steel screws. Equipment mounted signs shall be mounted with epoxy adhesive.
- F. Valve and component tags shall be hanging type, stainless steel, round with stamped lettering. Tag size shall be minimum 1-1/2 inches diameter with finished edges. Tags shall be affixed to valves with a clamped wire rope loop, such that it is not easily removable. Lettering shall be 1/4-inch in height unless otherwise designated in the construction drawings. Removable and adjustable ball-type chains or zip ties are not acceptable for mounting.

- G. Submit a typed list of all valve tags at completion of the project. This list shall include the valve tag number, type of valve, location of valve, and purpose of valve (i.e. isolation valve, bypass valve, etc.). This list shall be framed and provided to LAWA for installation. Submit copies of the valve list in the Operation and Maintenance Manuals as part of the project closeout.

PART 3 - EXECUTION

3.1 COMPRESSOR

- A. Install the compressor as shown on the drawings and in accordance with the manufacturer's instructions. Coordinate with Section 136101.
- B. Air compressors shall be seismically anchored to the requirements in the Quality Control section and as required by the CBC.
- C. Install and test all motor starters.

3.2 COMPRESSED AIR REFRIGERATED DRYER

- A. Install the compressed air refrigerated dryer as shown on the drawings and in accordance with the manufacturer's instructions.

3.3 COMPRESSED AIR MANUAL VALVES.

- A. Install the compressed air manual valves as shown on the drawings and in accordance with the manufacturer's instructions.

3.4 COMPRESSED AIR SOLENOID VALVES.

- A. Provide normally closed solenoid valve as indicated on drawing on compressed air systems which are connected to the fuel system emergency stop system which secures all air flow when the emergency stop system is actuated.

3.5 COMPRESSED AIR PIPING.

- A. Blow down all piping to clear debris prior to making equipment connections.
- B. Pneumatically test compressed air piping to a pressure of 150 psig for a period of 30 minutes witnessed by LAWA. Repair all identified leaks and retest until no leaks are present.
- C. Piping shall be installed to be protected from physical contact. Exposed piping shall be installed at right angles or parallel to building walls. Diagonal runs shall be prohibited unless indicated.

- D. Threaded joints shall only be made with PTFE sealing tape. Thread sealing compounds shall not be used.
- E. Only eccentric reducers shall be installed where compressed air piping is reduced in direction of flow, with bottoms of both pipes and reducers fitting flush.
- F. Isolation valves shall be provided at each point of use.
- G. Install flexible expansion loops in accordance with manufacturer's instructions.
- H. Install unions at each connection to valves, equipment and tanks. Soldered-to-threaded connections shall be made-up with male thread-to-solder adapters.
- I. Provide a 1/2-inch low point drain with capped valve at the end of each branch run. Slope all piping down to drains.
- J. Install all tee fittings vertically, to avoid collection of condensation in branch lines.
- K. Prepare all compressed air piping and hangars to a SSPC SP2 standard.
- L. Furnish a corrosion-preventative exterior alkyd primer intended for use on steel and ferrous metals and where a "hand-tool" or SSPC SP2 is acceptable surface preparation.
- M. Furnish glossy sheen, exterior, alkyd enamel compatible with the supplied primer and intended for use on ferrous metals. Paint all piping and pipe hangars with 2 top coats.

3.6 PRESSURE REGULATING VALVES AND GAUGES.

- A. Compressed Air Systems Normal Operating Pressure: 125 psi.
- B. Supply and install system relief valve set at 125 psi.
- C. Provide a pressure gauge at the end of each branch run, upstream of diaphragm pumps.
- D. Provide pressure regulators and gauges at each compressed air device, and at the beginning of the run serving the tire fill hose reels so that each compressed air user can independently set operating pressure independently from system pressure.

3.7 COMPRESSED AIR HOSE REELS AND VEHICLE SERVICE EQUIPMENT.

- A. Install, align and test equipment in accordance with the manufacturer's installation instructions and recommendations.

3.8 COMPRESSED AIR SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.
- C. All emergency signs shall be unobstructed and easily readable from as wide an area as possible.

3.9 TRAINING

- A. A factory representative shall be required for instruction on the maintenance and operation of the systems, when the system commences operation.
- B. Schedule training with Facility Manager at least 14 days in advance of training date.

3.10 COMMISSIONING

- A. The contractor shall commission the compressed air system. Commissioning shall include all testing, start-up, calibration, programming, and documentation. At the conclusion of the commissioning, the facility shall be ready for the owner and tenants to conduct unrestricted operations and use all systems to their full intended and designed capacity.
- B. The contractor shall submit a system commissioning plan to the owner and engineer for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The plan may be combined with commission plans for other vehicle service equipment systems.
- C. Commissioning of the system shall commence no less than 21 days prior to date of beneficial occupancy, and be completed prior to beneficial occupancy.
- D. Notify the engineer no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the contractor shall facilitate a final inspection by the engineer, and coordinate the attendance by the 3rd-party Facility Manager and all appropriate rental car industry representatives by making formal requests that include the final inspection schedule. The contractor shall have all necessary trade personnel on-site to operate equipment, open containment areas, and open electrical enclosures and equipment during the engineer's final Commissioning inspection. That final inspection shall include, but not be limited to:
 - 1. Operational test of all systems.
 - 2. Operational test of all safety devices;
 - 3. General review of the installation against plans, specs, and manufacturer requirements;
 - 4. Review of all test reports and manufacturer start-up reports;
 - 5. Closeout document requirements review; and
 - 6. Confirmation that system training has been completed.

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END OF SECTION 111113

SECTION 111119 - VEHICLE LUBRICATION AND USED OIL SYSTEM

PART 1 - GENERAL:

1.1 DESCRIPTION:

- A. Furnish and install the vehicle lubrication and used oil system as shown on the Contract Drawings and as specified herein, including but not limited to the following.
 - 1. Aboveground oil storage tank.
 - 2. Lube oil hose reel.
 - 3. Lube oil pump.
 - 4. Lube oil piping.
 - 5. Lube oil dispensing management system, including wireless transceivers, wireless nozzles, and tank level probes.
 - 6. Used oil pump and collection system.
 - 7. Overfill prevention and safety devices.
 - 8. Collection caddies.
 - 9. Lube oil/used oil systems labeling and signage.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. Section 111113, Compressed Air System

1.3 REFERENCES:

- A. ASME: American Society for Mechanical Engineers
 - 1. ASME B16.3: Malleable Iron Threaded Fittings: Classes 150 and 300
 - 2. ASME B31.3: Process Piping
 - 3. ASME B36.10M: Welded and Seamless Wrought Steel Pipe
 - 4. ASME Section IX: Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.
- B. ASTM: American Society for Testing and Materials
 - 1. ASTM A53: Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. ASTM A179: Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- C. CBC: 2013 California Building Code
- D. CEC: 2013 California Electrical Code
- E. FM: Factory Mutual Association

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- F. National Certified Pipe Welding Bureau
- G. NFPA: National Fire Protection Association
 - 1. NFPA 30: Flammable and Combustible Liquids Code
 - 2. NFPA 30A: Code for Motor Fuel Dispensing Facilities and Repair Garages
- H. OSHA: Occupational Safety and Health Act
- I. PEI: Petroleum Equipment Institute
 - 1. PEI - RP200 – Recommended Practice for the Installation of Aboveground Storage Systems.
 - 2. PEI RP700-09 – Recommended Practice for the Design and Maintenance of Fluid Distribution Systems at Vehicle Maintenance Facilities.
- J. SSPC: Society for Protective Coatings
 - 1. SSPC SP2: Surface Preparation Specification No. 2: Hand Tool Cleaning
- K. UL: Underwriter's Laboratories
 - 1. UL 2085: Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids

1.4 SUBMITTALS:

- A. Submit original copies of product data submittals for materials and equipment in Part 2 of this section including, but not limited to:
 - 1. Tanks.
 - 2. Tank accessories.
 - 3. Used and New Oil Pumps.
 - 4. Pump Controllers.
 - 5. Level Switches.
 - 6. Hose reels.
 - 7. Valves.
 - 8. Piping and Tubing.
 - 9. Motor Oil Management System, including software, transceivers, network equipment, wireless nozzles, tank gauges.
 - 10. Remote containment fill and evacuation boxes and connections.
- B. Calculations: Submit seismic calculations indicating restraint loadings from design seismic forces in the Quality Control section. Calculations shall include proper anchorage details and when applicable shall include consideration of types of concrete. Calculations shall be stamped and signed by a professional structural engineer licensed in the state of California.
- C. Test Data: Submit test data for the following:
 - 1. Submit written test results for piping system pressure tests.
- D. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by the Project.

- E. No welder will be employed on the work who has not been fully qualified under the herein specified procedures and so certified by the local chapter of the National Certified Pipe Welding Bureau or similar testing authority.
 - 1. Each operator's certificate must be on file at the site and must be made available upon request.
- F. At no expense to the City, the Contractor must obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the vehicle lubrication and used oil system installation. Verification of permits must be submitted.
- G. Provide certification that inspections and tests, as described in PART 3 of this Section, have been performed and the system has passed specified testing requirements.

1.5 QUALITY CONTROL:

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project:
 - 1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.
 - 2. National Fire Protection Association (NFPA).
 - 3. Occupational Safety and Health Act (OSHA).
 - 4. Factory Mutual Association (FM).
 - 5. Underwriter's Laboratories (UL).
 - 6. American Petroleum Institute (API).
- B. Contractor Qualifications: Company specializing in performing Work of this section with minimum ten years documented experience.
- C. Manufacturer Qualifications: Utilize companies specializing in manufacturing products specified in this section with minimum ten years documented experience.
- D. Permanent equipment shall be seismically anchored to resist the total design seismic force prescribed in the CBC. Seismic restrains shall be designed by a registered professional structural engineer licensed in the state of California. Design shall include:
 - 1. Number, size, capacity, and location of anchors for floor mounted equipment.
 - 2. For units with a weight greater than 2500 pounds, provide substantiating calculations the floor can accept the prescribed seismic forces

1.6 EXTRA MATERIALS AND SPARE PARTS:

- A. Provide Ten (10) spare lube oil metering dispensing wands.

PART 2 - PRODUCTS

2.1 ABOVEGROUND OIL STORAGE TANK

- A. Provide compartmentalized, rectangular double-walled UL-2085 steel tanks with tank and compartment volumes as shown on the contract drawings.
- B. Manufacturers: Containment Solutions/Hoover, Modern Welding, Highland Tank, or equal.
- C. Primary tank:
 - 1. The standard primary storage tank shall be rectangular in design. It shall be constructed of UL 2085 specified steel thickness, with continuous welds.
 - 2. The primary storage tank shall be constructed of steel.
 - 3. Refer to construction drawings for number and orientation of tank top fittings.
 - 4. The primary tank shall be pressure tested to UL 2085 Standard at the factory, and shall be field tested by the contractor to a maximum 3 psi.
- D. Secondary Leak Containment Tank:
 - 1. The secondary leak containment tank shall be rectangular in design and listed according to UL 2085 insulated secondary aboveground tanks for flammable and combustible liquids, protected type.
 - 2. The secondary tank shall be tested liquid tight at the factory (minimum 3 to maximum 5 psi), and shall also be field tested by the contractor to a maximum 3 psi.
 - 3. The secondary tank shall provide reinforcement for the lightweight concrete to remain in place around the primary tank.
 - 4. The secondary tank shall provide true 360° Radius "pressure testable" containment for the primary tank.
 - 5. The port openings in the top of the secondary tank shall be constructed with full welds to prevent moisture from seeping between the fire proofing material and secondary and primary tanks.
 - 6. The top of the secondary tank shall be sloped so that water will not accumulate on top of the tank.
 - 7. The secondary tank shall have a two (2) inch monitoring port including a tube which provides a means to detect product leakage from the primary tank into fire protection material that directly surrounds the primary tank.
- E. Coatings:
 - 1. The exterior surface of the secondary tank shall be cleansed of foreign material and coated with a corrosion resistant industrial paint (3 to 5 mils dry film thickness).
 - 2. The standard color shall be desert sand.
- F. Tank Appurtenances:
 - 1. The tank shall be equipped as shown on the construction drawings, which includes, but is not limited to:
 - a. The tank shall have an interstitial monitor, as shown on the construction drawings.

- b. The tank shall be equipped with remote spill and evacuation boxes, as shown on the construction drawings.
 - c. The fill tube bungs shall be 4" to accommodate a 2"x4" overfill protection device.
 - d. The tank shall be equipped with a steel primary and secondary working vents and vent caps, one per compartment and interstice.
 - e. The tank shall be equipped with primary and secondary emergency vents, one per compartment and interstice.
 - f. The tank shall be equipped with level sight gauges, as shown on the construction drawings, one per compartment.
 - g. The tank shall be equipped with an electronic level probe. One per compartment.
 - h. The tank shall be equipped with all code and industry standard safety and identification signage.
- G. Seismic Anchoring: The tank shall be seismically anchored to resist seismic forces prescribed in the Quality control section and the CBC.

2.2 LUBE OIL HOSE REEL

- A. Manufacturers: Graco, Alemite, Balcrank, or equal.
- B. Provide Graco XD series hose reels, or approved equal, with 2000 psi rating and 35' of ½" service hose and associated equipment. The hose reels will supply lube oil for vehicle service. The hose reels serve multiple uses – coordinate with other sections. Hose reels should be heavy-duty and designed for fleet facility use. Coordinate with other sections to provide same hose reel diameters for oil, compressed air, electric/light reels, and windshield washer fluid. Hose colors shall be product specific:
- C. Regular Motor Oil: Desert Sand or Equivalent
- D. Synthetic Motor Oil: White or Black or Equivalent
- E. Compressed Air: Blue (Shown for coordination only – refer to other sections)
- F. WWF: Yellow (Shown for coordination only – refer to other sections)

2.3 LUBE OIL PUMP

- A. Manufacturers: Graco, Alemite, Balcrank, or equal.
- B. General
 - 1. Pump shall be a pneumatic piston pump with a 10:1 ratio, Graco Fireball 425 or approved equal.
- C. Performance Characteristics
 - 1. Fluid flow rate shall be 3 gpm at 60 cycles per minute.

2. Cycles per gallon: 20

D. Construction

1. The pump shall be compatible with lube oil fluid.

E. Appurtenances

1. The air supply at the pump shall be equipped with a runaway valve which restricts flow in the event of a distribution pipe failure.
2. The air supply shall be equipped with a normally closed solenoid valve which closes when the emergency stop system is actuated.
3. A the normally closed solenoid valve will also shut down when the maintenance bay shutdown system on that level is actuated.
4. The pump shall be supplied with a pressure regulator, strainer, and gauge. Coordinate with section 11 11 13.
5. Each hose reel shall be equipped with a Presetable Electronic Metering wand, wireless, supplied as part of the motor oil management system.

2.4 LUBE OIL PIPING

- A. All aboveground **new** lube oil piping between the pump and hose reel shall be seamless carbon steel tubing conforming to ASTM A179. Tubing shall be rated for 2,000 psig; wall inch-thicknesses shall be 0.095 and 0.156 for nominal tube sizes 3/4" and 1-1/2", respectively. Fittings shall be compression type, rated for 2,000 psig.
- B. All aboveground **used** oil piping shall be carbon steel, conforming to ASTM A53 and ASME B36.10. Provide Schedule 40 piping for diameters 1" and smaller and Schedule 40 piping for diameters larger than 1". Fittings shall be socket welded, Class 3000 conforming to ASME B16.11.
- C. All carbon steel tubing and pipe shall be coated with one coat of alkyd primer and 2 coats of a high-gloss alkyd enamel. Color to match surrounding wall or ceiling.

2.5 LUBE OIL DISPENSING MANAGEMENT SYSTEM

- A. Manufacturers: Graco, Alemite, Balcrank, or equal.
- B. The new lube oil dispensing system shall be equipped with a revenue management system that tracks motor oil dispensed and provides the ability for the facility or fuel manager to invoice each rental car agency for the lubricating oil used, assuming that multiple rental car companies will be operating on the same floor, and sharing a single new motor oil tank compartment.
- C. Authorization to pump oil and tracking shall be governed by an HID reader or unique employee code. Each code or HID card shall be associated with an employee and rental car company, understanding that the system shall be capable of having multiple companies on a single system.

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- D. The system shall authorize then track motor oil dispensed when a valid code is entered or HID card presented.
- E. The system shall track motor oil to an accuracy of at least 0.1 gallons.
- F. The system shall be equipped with wireless technology, such that transceiver(s) placed in each maintenance area communicates with the metering dispensers.
- G. The transceiver shall be connected back to the fuel management computer, which is equipped with system software.
- H. The software shall be capable of generating invoices to specific rental car companies, listing each oil dispense transaction, the employee who executed the transaction, the time and date of transaction, the volume dispensed, cost per gallon, and total invoice cost.
- I. The fuel manager shall have the capability, through the system software, to de-authorize specific employees in the case of termination or other administrative action.
- J. The system shall have the capability of monitoring the liquid level in the ASTs, including waste oil levels.
- K. The system shall have overfill annunciators as shown on the construction drawings (one per each tank compartment).
- L. The system shall have the capability to remove supply air to the supply pump between dispensing authorizations.

2.6 USED OIL PUMP AND COLLECTION SYSTEM

- A. Manufacturers Graco, Alemite, Balcrank, or equal.
- B. Construction
 - 1. The pump shall be compatible with lube oil fluid.
- C. General
 - 1. The waste oil dispensing pump shall be a double acting, air operated diaphragm pump with a self-lubricating non stalling air valve.
 - 2. The pump shall be supplied with a wall mounted collection package, including amounting bracket, collection hoses and pumps (Graco 24E166 or approved equal).
- D. Performance Characteristics
 - 1. Performance shall be identical for all similar service pumps.
 - 2. Design pumping rate is 15 gpm. For alternate pump selections, provide pumps sized for a maximum air usage of 20 scfm at 125 psi inlet pressure while free-flow pumping at no less than 45 gpm..
- E. Appurtenances

1. Each air powered diaphragm pump shall be wall-mounted and have an upstream air filter, air regulator with pressure gauge, strainer, and an oil lubricator. Coordinate with section 11 11 13.
2. A float actuated shutoff valve shall be provided for remote shutdown of pumps when the tank is full. Valve shall have 200 psig pressure rating, 1/2-“ NPT fittings, Graco 116229 or approved equal. All air serving the waste oil collections pumps shall travel through these valves associated with the respective tanks.
3. The air supply shall be equipped with a normally closed solenoid valve that closes when the oil system emergency stop system is actuated.
4. The air supply to the collection pump shall have a ball valve to manually supply air to the pump when the user is conducting an oil evacuation. Ball valve shall be mounted 48” above finished floor and be in the immediate vicinity of the evacuation pump so that an operator can actuate the valve while standing in front of the evacuation station.
- 5.

2.7 OVERFILL PREVENTION AND SAFETY DEVICES

- A. An audible/visual high level alarm shall be mounted at each remote fill box for the new oil tanks. Each tank shall have a dedicated and labeled alarm. The alarm shall sound when the associated tank reached 90% full.
- B. An audible/visual high level alarm shall be mounted on the wall in close proximity to each used oil collection station. The alarm shall sound when the respective used oil collection tank compartment reaches 90% full.
- C. Each compartment of each tank shall be equipped with a 3” (fill) x 6” (bung) mechanical overfill protection device (OPW F-stop or approved equal).

2.8 COLLECTION CADDIES

- A. Supply one fluid reclaim collection caddy per maintenance bay (64 total).
- B. Caddy shall have a 25 gallon capacity, be mounted on wheels, and have a large collection funnel with used filter tray, Graco 238866 or approved equal.

2.9 LUBE OIL/USED OIL SYSTEMS LABELING AND OPERATIONAL SIGNAGE

- A. Provide designation labels on all equipment in this specification outlined on the related equipment designation drawings. All labels shall bear the abbreviations as described on those drawings and legends, and shall match exactly the designation abbreviations programmed into the Environmental Monitoring and Fuel Control System and the Fuel Management and Revenue Control System.
- B. Tag all valves, mechanical devices and components identified on system Process and Instrumentation Diagrams with permanent tags including function and designation number.

- C. Provide wall mounted, plain English, permanent signage at all fill ports, regulating valves, evacuation stations, manual emergency actuators, operating valves and any other mechanical/or electrical device that the rental car user would be expected to actuate or operate in the normal course of business or emergency situation.
- D. Identify piping, concealed or exposed, with plastic pipe markers. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- E. All wall mounted and equipment mounted designation tags shall be 2 or 3-ply phenolic, outdoor and long-life rated, non-flammable, non-conductive, 1/8" thick, engraved. All signage shall be 0.020 baked enamel aluminum sized appropriately for the lettering. Aluminum shall be mounted with stainless steel hardware. Designation labels and operating signage shall be white letters on black signage. All emergency, warning or other related signs shall be red signs with white letters. Designation label material shall be specifically designed to prevent static build-up, ES-1 Phenolic by NORPLEX, or approved equal. Lettering on designation labels shall be 1/2-inch in height. Lettering for operational signage shall be 3/4"-inch in height unless otherwise designated in the construction drawings. Lettering for emergency signage shall be 1-inch in height unless otherwise designated in the construction drawings. Wall mounted signs shall be affixed with anchors and stainless steel screws. Equipment mounted signs shall be mounted with epoxy adhesive.
- F. Valve and component tags shall be hanging type, stainless steel, round with stamped lettering. Tag size shall be minimum 1-1/2 inches diameter with finished edges. Tags shall be affixed to valves with a clamped wire rope loop, such that it is not easily removable. Lettering shall be 1/4-inch in height unless otherwise designated in the construction drawings. Removable and adjustable ball-type chains or zip ties are not acceptable for mounting.
- G. Provide a typed list of all valve tags at completion of the project. This list shall include the valve tag number, type of valve, location of valve, and purpose of valve (i.e. isolation valve, bypass valve, etc.). This list shall be framed and provided to the owner for installation. Provide copies of the valve list in the Operation and Maintenance Manuals as part of the project closeout.

PART 3 - EXECUTION

3.1 INSTALLATION – GENERAL

- A. Install all system components in accordance with PEI-RP 700-09, NFPA 30, and 30A, the California Electrical Code, and the California Building Code.

3.2 INSTALLATION – ABOVEGROUND LUBE OIL PIPING

- A. Install piping in accordance with NFPA 30 and NFPA 30A.

- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. In addition to pipe hangers, anchor all lube oil piping for lateral motion to accommodate pulsing of pneumatic pump.
- G. Sleeve pipe passing through partitions, walls and floors. Refer to project general requirements for wall penetrations.
- H. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to project general requirements.
- I. Provide clearance for access to valves and fittings.
- J. Provide access where valves and fittings are not exposed.
- K. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.
- L. Prepare uncoated pipe, fittings, supports and accessories to a hand tool clean finish. Apply primer and 2 top coats to match surrounding walls and ceilings.
- M. Install valves with stems upright or horizontal, not inverted.
- N. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- O. Soap/bubble test all aboveground piping to 150% of the system working pressure per NFPA 30.
- P. Remove all PVC plugs and replace with steel plugs.

3.3 INSTALLATION – LUBE OIL SYSTEM

- A. Install the lube oil pump control system, distribution system, distribution tanks, and alarm systems in accordance with manufacturer specifications, NFPA 30 and 30A, PEI RP-700-09, the California Electrical Code, the construction drawings, and the related specification sections outlined above. Test all safety devices. Provide reports of all pipe tests and safety device tests.

3.4 FIELD QUALITY CONTROL – LUBE OIL SYSTEM

- A. Test the supply and distribution piping systems in accordance with NFPA 30. Test the distribution tanks in accordance with manufacturer requirements.
- B. Flush all piping prior to introducing oil into the system. Dispose of all wastes in accordance with local, State, and Federal regulations.
- C. Test all leak detection sensors, level probes, safety devices, and overfill alarms. Provide a report to the owner.
- D. Provide documentation of all tests signed by certified personnel to the owner prior to the operation of the facility and in the closeout documents.
- E. The contractor shall be responsible for supplying all fluids required for startup and commissioning. Oil shall be 5W-30.

3.5 COMMISSIONING

- A. The contractor shall commission the lube oil system. Commissioning shall include all testing, start-up, calibration, programming, and documentation. At the conclusion of the commissioning, the facility shall be ready for the owner and tenants to conduct unrestricted operations and use all systems to their full intended and designed capacity.
- B. The contractor shall submit a system commissioning plan to the owner and engineer for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The contractor shall be responsible for supplying all fluids and commodities required to startup and calibrate systems. The plan may be combined with commission plans for other vehicle service equipment systems.
- C. Commissioning of the system shall commence no less than 21 days prior to date of beneficial occupancy, and be completed prior to beneficial occupancy.
- D. Notify the engineer no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the contractor shall facilitate a final inspection by the engineer. The contractor shall have all necessary trade personnel on-site to operate equipment, open containment areas, and open electrical enclosures and equipment during the engineer's final Commissioning inspection. That final inspection shall include, but not be limited to:
 - 1. Operational test of all systems.
 - 2. Operation test of all safety devices (e-stop switches, crash valves, overfill alarms);
 - 3. General review of the installation against plans, specs, and manufacturer requirements;
 - 4. Review of all test reports and manufacturer start-up reports;
 - 5. Test of all leak detection sensors;
 - 6. Closeout document requirements review;

7. Tank registration form review, to include all outstanding regulatory reports;
8. Inspect of all sumps and containment areas;
9. Review and validation of monitoring system programming; and
10. Confirmation that system training has been completed.

3.6 INSTALLATION – ABOVEGROUND USED OIL PIPING

- A. Install piping in accordance with NFPA 30 and NFPA 30A.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Sleeve pipe passing through partitions, walls and floors. Project general requirements.
- G. Install firestopping at fire rated construction perimeters and openings containing penetrating sleeves and piping. Refer to Project general requirements.
- H. Provide clearance for access to valves and fittings.
- I. Provide access where valves and fittings are not exposed.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.
- K. Prepare uncoated pipe, fittings, supports and accessories to a hand tool clean finish. Apply primer and 2 top coats to match surrounding walls and ceilings.
- L. Prep all pipe to a hand tool clean finish, apply primer and 2 top coats to all piping to match surrounding walls and ceilings.
- M. Install identification on piping systems including underground piping.
- N. Install valves with stems upright or horizontal, not inverted.
- O. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- P. Soap/bubble test all aboveground piping to 150% of the system working pressure per NFPA 30.
- Q. Remove all PVC plugs and replace with steel plugs.

3.7 INSTALLATION – USED OIL SYSTEM

- A. Install the waste oil pump control system, distribution system, distribution tanks, and alarm systems in accordance with manufacturer specifications, NFPA 30 and 30A, the California Electrical Code, the construction drawings, and the related specification sections outlined above. Test all safety devices. Provide reports of all pipe tests and safety device tests.

3.8 INSTALLATION – LUBE OIL DISPENSING MANAGEMENT SYSTEM

- A. Configure and mount overfill alarm annunciators. Mount used and lube oil annunciators as shown on the drawings in the oil tank rooms and remote fill boxes.
- B. Install the Lube Oil Dispensing Management System in accordance with manufacturer requirements, instructions, and recommendations, in accordance with the California Building Code, the California Electrical Code, and in accordance with NFPA 30A.
- C. Run wires, cables, conduits, and raceways as necessary to complete all system connections, including fiber optic pathways and converters where necessary.
- D. Make all connections to system to function as described above.
- E. Provide general purpose electrical receptacles as necessary for the transceivers. Provide power to all solenoid valves. Coordinate with other sections.
- F. Engage the services of a manufacturer field representative to program, start up, calibrate, and test the system and provide training to fuel management personnel on all system functionality. Complete sample transactions and generate sample invoices from those transactions. Provide new motor oil for the commissioning process sufficient to commission the system.
- G. Test dispensing authorization limit in the presence of the Engineer.
- H. Provide a written report to the owner documenting the system test and confirming that all required functionalities have been tested.
- I. Engage the service of an information technology professional to connect and configure the Lube Oil Dispensing Management System and provide all functionality as described above.
- J. Provide training and assist the fuel manager with initial startup and configuration of both fuel manager's computers. The system shall be configured and installed on both computers.
- K. Verify and test all required functionality described above.

3.9 FIELD QUALITY CONTROL – USED OIL SYSTEM

- A. Test the supply and distribution piping systems in accordance with NFPA 30. Test the distribution tanks in accordance with manufacturer requirements.

- B. Test all leak detection sensors, level probes, safety devices, and overfill protection alarms and devices. Provide a report to the owner.
- C. Provide documentation of all tests signed by certified personnel to the owner prior to the operation of the facility and in the closeout documents.

3.10 INSTALLATION – LUBE OIL/USED OIL SYSTEMS LABELING AND OPERATIONAL SIGNAGE

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.
- C. All emergency signs shall be unobstructed and easily readable from as wide an area as possible.
- D. Number every tank compartment, tank fill connection, tank evacuation connection, and evacuation station connection. Ensure tank compartment numbers match corresponding fill and evacuation stations.

3.11 COMMISSIONING

- A. The contractor shall commission the used oil system. Commissioning shall include all testing, start-up, calibration, programming, and documentation. At the conclusion of the commissioning, the facility shall be ready for the owner and tenants to conduct unrestricted operations and use all systems to their full intended and designed capacity.
- B. The contractor shall submit a system commissioning plan to the owner and engineer for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The contractor shall be responsible for supplying all fluids and commodities required to startup and calibrate systems. The plan may be combined with commission plans for other vehicle service equipment systems.
- C. Commissioning of the system shall commence no less than 21 days prior to date of beneficial occupancy, and be completed prior to beneficial occupancy. Coordinate with the owner and tenants for initial oil deliveries.
- D. The Contractor shall be available, after the date of operational occupancy and after the owner has generated used oil, to commission and test the used oil system.
- E. Notify the engineer no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the contractor shall facilitate a final inspection by the engineer. The contractor shall have all necessary trade personnel on-site to operate equipment, open containment

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areas, and open electrical enclosures and equipment during the engineer's final Commissioning inspection. That final inspection shall include, but not be limited to:

1. Operational test of all systems.
2. Operation test of all safety devices (e-stop switches, crash valves, overfill alarms);
3. General review of the installation against plans, specs, and manufacturer requirements;
4. Review of all test reports and manufacturer start-up reports;
5. Test of all leak detection sensors;
6. Closeout document requirements review;
7. Tank registration form review, to include all outstanding regulatory reports;
8. Inspect of all sumps and containment areas;
9. Review and validation of monitoring system programming; and
10. Confirmation that system training has been completed.

END OF SECTION 111119

SECTION 111126 – CAR WASH EQUIPMENT

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes furnishing and installing the car wash equipment as shown on the drawings and as specified herein, including but not limited to the following.
 - 1. Car wash performance requirements.
 - 2. Car wash equipment.
 - 3. Car wash system labeling and operational signage.
- B. This specification involves the supplying and installing of car wash equipment. It shall be used in conjunction with mechanical/plumbing and electrical specifications in other sections. The supporting mechanical and electrical equipment specified in other sections to support this equipment is typical and generic in nature. Because the Contractor has a choice of car wash vendors, it is the Contractor's sole responsibility to coordinate the installation of this equipment with the supporting electrical and mechanical infrastructure. It is the Contractor's responsibility to coordinate between the selected car wash equipment vendor and electrical and mechanical trades to provide a complete system, including changes to electrical and mechanical connection locations as required.

1.2 REFERENCES

- A. CBC: 2013 California Building Code
- B. CEC: 2013 California Electrical Code
- C. FM: Factory Mutual Association
- D. NEMA: National Electrical Manufacturers Association
- E. NFPA: National Fire Protection Association
- F. OSHA: Occupational Safety and Health Act
- G. UL: Underwriter's Laboratories

1.3 SUBMITTALS

- A. Shop drawings, product data, and samples: submit original copies of product data submittals for materials and equipment in Part 2 of this section including, but not limited to:
 - 1. All car wash equipment

2. Transfer pumps and controls
 3. Reclaim tanks
 4. Reverse osmosis system components
 5. Pipes, valves, and fittings
 6. Electrical components to include conduit, control panels, E-stops, and junction boxes
 7. Submit sealed shop drawings with seismic anchoring details complying with the Quality Control section. Shop drawings shall be stamped and signed by a professional structural engineer licensed in the state of California.
- B. Calculations: Submit seismic calculations indicating restraint loadings from design seismic forces in the Quality Control section. Calculations shall include proper anchorage details and when applicable shall include consideration of types of concrete. Calculations shall be stamped and signed by a professional structural engineer licensed in the state of California.
- C. Test Data: Submit test data for the following:
1. Submit written test results for piping system and tank system pressure and hydrostatic tests.
- D. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by the Project.
- E. No welder will be employed on the work who has not been fully qualified under the herein specified procedures and so certified by the local chapter of the National Certified Pipe Welding Bureau or similar testing authority.
1. Each operator's certificate shall be on file at the site and shall be made available upon request.
- F. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the car wash system installation. Verification of permits shall be submitted. Provide certification that inspections and tests, as described in Part 3 of this Section, have been performed and the system has passed specified testing requirements.
- G. Submit signed warranty to LAWA.

1.4 QUALITY CONTROL

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project:
1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.
 2. National Fire Protection Association (NFPA).
 3. Occupational Safety and Health Act (OSHA).
 4. Factory Mutual Association (FM).
 5. Underwriter's Laboratories (UL).

- B. Contractor Qualifications: Company specializing in performing Work of this section with minimum five years documented experience.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of experience.
- D. Permanent equipment shall be seismically anchored to resist the total design seismic force prescribed in the CBC. Seismic restrains shall be designed by a registered professional structural engineer licensed in the state of California. Design shall include:
 - 1. Number, size, capacity, and location of anchors for floor mounted equipment.
 - 2. For units with a weight greater than 2500 pounds, provide substantiating calculations the floor can accept the prescribed seismic forces

1.5 SERVICE WARRANTY

- A. The Contractor shall provide written 1-year preventive maintenance warranty and no-charge on-call service for the car wash system. The warranty shall indicate effective dates and be signed by the Contractor. In addition, the warranty shall be signed by a local manufacturer's representative involved in the installation and pledging support over the indicated duration.

1.6 EXTRA MATERIALS AND SPARE PARTS

- A. Supply soaps and cleaning chemicals associated with the system sufficient for start-up and for the initial 2 weeks of operation (12,950 cars per day).

PART 2 - PRODUCTS

2.1 CAR WASH PERFORMANCE REQUIREMENTS

- A. The car wash systems in Building A and Building B will be separate systems as depicted on the drawings. Building A is a multi-level system with aboveground clarifiers, and Building B is a single-level system with reclaim pits. Both systems will consist of reclaim tanks, reclaim pumps, Reverse Osmosis (RO) tanks, RO pumps, RO reject tanks, rinse pumps, and RO purification units in quantities, sizes, and locations as indicated on the drawings. Contractor shall supply all car wash, plumbing, mechanical, and electrical equipment to accommodate the configuration with the performance requirements below. The appropriate equipment including regulator and pumps shall be supplied such that each bay has the equivalent car wash system performance (wash and rinse water flow rates are equivalent).
- B. Sequence of operation
 - 1. Vehicle pulls into wash bay.
 - 2. Operator pre-washes car with tenant installed pressure washer, if desired.
 - 3. Wash sequence is automatically activated when car pulls forward
 - 4. Flooder arch pre-soaks the vehicle with detergent/water mixture

5. Vehicle proceeds through top brush and side wheels to clean top and sides of vehicle.
6. Vehicle activates rinse cycle and proceeds through rinse arch.
7. Vehicle activates reverse osmosis (RO) rinse cycle and proceeds through RO rinse arch
8. Vehicle activates blowers.
9. Vehicle is dried by installed blowers while exiting the wash bay.

C. Performance requirements

1. Each wash bay shall be capable of washing a minimum of 350 vehicles per day with a peak of 60 vehicles per hour. The vehicle wash shall remove all visible dirt accumulation and road film from vehicles. The evaluation of the system capability to remove road film shall be determined after vehicles have completed the wash sequence and have dried.
2. The system shall be designed for vehicles to travel through at a maximum rate of 1 foot per second. Total design time in automated car wash system shall be 1 minute.
3. The system shall be fully automatic and require no intervention from the driver/operator.
4. The system shall be designed to wash a variety of passenger vehicle sizes up to and including full size "SUVs" and 15 passenger vans (90 inches high by 102 inches wide). The system shall be capable of automatically adjusting to various vehicle sizes, providing full wash performance, without any user intervention.

2.2 CAR WASH EQUIPMENT

- A. Manufacturers: NS Wash ECO 5 System, or pre-bid approved equal.
- B. Provide pre-manufactured car wash equipment as shown on multiple sections (equipment, plumbing, electrical) on the drawings.
- C. Note: The basis of design is the NS Eco 5 System. If an alternate system is chosen, the Contractor is responsible for adjusting all electrical, plumbing, and structural infrastructure to match that system's needs.
- D. Complete systems shall include but not be limited to:
1. Flooder arch: Shall pre-soak the entire vehicle prior to entering the wash brush and spray area.
 2. 5-brush units (including a top brush): The top brush shall clean the top of vehicles and be carefully coordinated with the car wash structure so that adequate room is available for retraction. The side brushes shall be a minimum of 75 inches tall. They shall clean the sides and front and rear of vehicles and shall adjust to varying vehicle lengths, widths, and heights.
 3. Wash cycle electric eye activators: Activate the Flooder Arch and wash cycle.
 4. Machine and detergent pressure switch actuators.
 5. Detergent tanks and injectors: Injection pumps shall be self-metering and with stainless steel components for compatibility with both corrosive and caustic cleaning chemicals.
 6. Rinse arches providing 22 gallons per minute for 15 seconds.
 7. Reverse Osmosis System (RO) rinse arches providing 11 gallons per minute for 15 seconds.
 8. Reverse Osmosis systems in quantities and locations as shown on the drawings, sized to deliver 70,000 gallons per day in Building A, and 12,000 gallons per day in Building B.

9. Pre-RO treatment system, sized for the demands of the RO units.
10. UL-listed machine control panels.
11. Guide rails with protective covering to prevent damage to vehicle tires for entire length of car wash system (60 foot minimum), with angled entrances for ease of entry.
12. Rinse and RO rinse electric eye activators.
13. Control consoles with wash pumps.
14. Reclaim tanks and a reclaim system capable of filtering and reusing approximately 85 percent of captured wash water, including pumps, piping, and controls – Supply reclaim tanks in sizes and locations as shown on the drawings.
15. Duplex alternating reclaim transfer pump systems capable of supplying 140 psi reclaim wash water.
16. Reverse osmosis storage tanks in sizes and locations as indicated in the drawings, manifolded together, and with cross-connects to adjacent tanks for redundancy and individual tank isolation.
17. Reverse osmosis reject water storage tanks in sizes and locations as indicated on the drawings and manifolded together with cross-connects to adjacent tanks for redundancy and individual tank isolation. Reject water storage tanks are intended to capture RO concentrate from the RO filtration to be used in the fresh water rinse arch. RO reject storage tanks should have provisions to accept water input from a rainwater supply as supplemental water.
18. Pressure actuated, reverse osmosis reject water pumps with 25 gallon accumulators, capable of supplying 55-65 psi rinse water and controls to use RO reject water as fresh water rinse when water is available.
19. Float switches, 3-way valves, and controls capable of providing appropriate controls between RO reject rinse pumps, RO reject tanks and well water input. Provide controls in accordance with drawings.
20. Duplex alternating reverse osmosis rinse water transfer pumps capable of supplying 60 psi rinse water.
21. Additional equipment as necessary to meet the performance requirements of this specification, the drawings, and the intent of the system.
22. High Capacity Dryers and motor controllers: Dryers shall be designed to vehicles during one-minute overall car wash cycle. Each bay shall have future provisions for a minimum of five 10-HP blower units.
23. Infrastructure for tenant installed pressure washers. Pressure washers are tenant installed and not in this contract. Each 2 bays shall have provisions for 1 7.5 HP pressure washer with 30 gallon holding tank and 75 foot hose reel.
24. All interconnecting piping, valves, electrical equipment, and controls to provide a fully functioning system.
25. If the system requires pneumatic controls, the Contractor is responsible for providing a dedicated compressed air branch pipe run from the source piping located in the car wash area.
26. Provide all ancillary equipment not provided by manufacturer to provide a fully functional, code compliant system.
27. All electrical enclosures shall be NEMA 4x.
28. Supply all motors with disconnect switches per the California Electrical Code and the California Building Code.

29. Supply one emergency stop button in each car wash bay mounted in the vicinity of the car wash equipment.

2.3 CAR WASH SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Provide designation labels on all equipment in this specification outlined on the related equipment designation drawings. All labels shall bear the abbreviations as described on those drawings and legends.
- B. Tag all valves, mechanical devices and components indicated on system Process and Instrumentation Diagrams with permanent tags including function and designation number.
- C. Provide wall mounted, plain English, permanent signage at all fill ports, regulating valves, evacuation stations, manual emergency actuators, operating valves and any other mechanical/or electrical device that the rental car user would be expected to actuate or operate in the normal course of business or emergency situation.
- D. Identify piping, concealed or exposed, with plastic pipe markers. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- E. All wall mounted and equipment mounted designation tags shall be 2 or 3-ply phenolic, outdoor and long-life rated, non-flammable, non-conductive, 1/8-inch thick, engraved. All signage shall be 0.020 baked enamel aluminum sized appropriately for the lettering. Aluminum shall be mounted with stainless steel hardware. Designation labels and operating signage shall be white letters on black signage. All emergency, warning or other related signs shall be red signs with white letters. Designation label material shall be specifically designed to prevent static build-up, ES-1 Phenolic by NORPLEX, or equal. Lettering on designation labels shall be 1/2-inch in height. Lettering for operational signage shall be 3/4-inch in height unless otherwise designated in the construction drawings. Lettering for emergency signage shall be 1-inch in height unless otherwise designated in the drawings. Wall mounted signs shall be affixed with anchors and stainless steel screws. Equipment mounted signs shall be mounted with epoxy adhesive.
- F. Valve and component tags shall be hanging type, stainless steel, round with stamped lettering. Tag size shall be minimum 1-1/2 inches diameter with finished edges. Tags shall be affixed to valves with a clamped wire rope loop, such that it is not easily removable. Lettering shall be 1/4-inch in height unless otherwise designated in the construction drawings. Removable and adjustable ball-type chains or zip ties are not acceptable for mounting.
- G. Provide a typed list of all valve tags at completion of the project. This list shall include the valve tag number, type of valve, location of valve, and purpose of valve (i.e. isolation valve, bypass valve, etc.). This list shall be framed and provided to the LAWA for installation. Provide copies of the valve list in the Operation and Maintenance Manuals as part of the project closeout.

PART 3 - EXECUTION

3.1 SITE AND BUILDING PREPARATIONS

- A. The Contractor shall make all building and site preparations, including sumps, pits, plumbing systems, compressed air systems, electrical systems, reclaim tanks, Reverse Osmosis Treatment Systems, and structural systems in accordance with the appropriate building drawings (not in section).

3.2 CAR WASH EQUIPMENT INSTALLATION

- A. Interface with plumbing and electrical infrastructure, shown on plumbing and electrical drawings.
- B. Install the car wash system in strict compliance with manufacturer instructions and guidelines.
- C. Install reclaim pumps that supply water to the wash cycles from the final stage of reclaim tanks.
- D. Install RO pumps which supply clean, purified water from the RO tanks to the RO rinse arch.
- E. Install RO reject water pumps which supply RO concentrate from the RO reject tanks to the first rinse arch when RO reject water is available.
- F. Connect, program, and configure all control panels, sensors, electrical disconnects, and other control equipment.
- G. Anchor all equipment. Provide seismic anchoring for all storage tanks and permanent equipment required by the CBC in accordance with the Quality Control section and as required by the CBC. Coordinate with Structural drawings. Adjust quantity and location of structural provisions to meet the system specifics.
- H. Coordinate with mechanical, electrical, and plumbing sections to locate electrical panels and connections and locate plumbing connections.
- I. Coordinate with mechanical sections to ensure all reclaim wash water piping and RO water piping is freeze protected.
- J. Coordinate with civil and plumbing sections to provide provisions for water input to RO reject storage tanks for harvested rainwater when available.
- K. All connections to the car wash machine shall be flexible.
- L. All aboveground water pipe shall be schedule 80 PVC and in every case in accordance with local code.

- M. Anchor the car wash unit in accordance with manufacturer requirements. Insure that floor of car wash is waterproofed in accordance with structural specifications and drawings. Submit all mounting details to LAWA for approval.
- N. All electrical connections into the car wash control panel should be through the bottom of the enclosure.
- O. The Contractor shall coordinate directly with the manufacturer to provide and install all equipment necessary for the system.

3.3 CAR WASH THEORY OF OPERATION

- A. Refer to construction drawings for additional information on the control system required for rinse water distribution.

3.4 INSTALLATION – CAR WASH SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.

3.5 TRAINING

- A. A factory representative shall be required for instruction on the maintenance and operation of the systems, when the system commences operation.
- B. Schedule training with LAWA at least 14 days in advance of training date.

3.6 COMMISSIONING

- A. The Contractor shall commission the car wash system. Commissioning shall include all testing, start-up, calibration, programming, and documentation. At the conclusion of the commissioning, the facility shall be ready for LAWA and tenants to conduct unrestricted operations and use all systems to their full intended and designed capacity.
- B. The Contractor shall submit a system commissioning plan to LAWA for approval at least 30 days prior to commissioning the system. The plan may be combined with commission plans for other vehicle service equipment systems.
- C. Commissioning of the system shall commence no less than 21 days prior to date of beneficial occupancy, and be completed prior to beneficial occupancy.

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- D. Notify LAWA no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the Contractor shall facilitate a final inspection by LAWA, and coordinate the attendance by the 3rd-party Facility Manager and all appropriate rental car industry representatives by making formal requests that include the final inspection schedule. The Contractor shall have all necessary trade personnel on-site to operate equipment, open containment areas, and open electrical enclosures and equipment during LAWA's final Commissioning inspection. That final inspection shall include, but not be limited to:
1. Operational test of all systems.
 2. Operational test of all safety devices;
 3. General review of the installation against drawings, specs, and manufacturer requirements;
 4. Review of all test reports and manufacturer start-up reports;
 5. Closeout document requirements review; and
 6. Confirmation that system training has been completed.

END OF SECTION 111126

SECTION 111127 – WINDSHIELD WASHER FLUID SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes furnishing and installing the windshield washer fluid system as shown on the drawings and as specified herein, including but not limited to the following:
1. Underground Windshield Washer Fluid (WWF) storage tank
 2. Aboveground windshield washer fluid tanks
 3. Windshield washer fluid dispensing pump
 4. Windshield washer fluid transfer pump
 5. Windshield washer fluid transfer pump controller and level switches
 6. Valves
 7. Mechanical totalizers
 8. Windshield washer fluid aboveground piping
 9. Windshield washer fluid underground piping
 10. Hose Reels
 11. Windshield washer fluid labeling and operational signage

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 078400, Firestopping

1.3 REFERENCES

- A. ASME: American Society for Mechanical Engineers
1. ASME A13.1: Scheme for the Identification of Piping Systems
 2. ASME B16.34: Valves - Flanged, Threaded and Welded End
 3. ASME B31.3: Process Piping
 4. ASME B36.19: Stainless Steel Pipe
- B. ASTM: American Society for Testing and Materials
1. ASTM A312: Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
 2. ASTM A351: Standard Specification for Castings, Austenitic, for Pressure-Containing Parts
 3. ASTM A403: Standard Specification for Wrought Austenitic Stainless Steel Piping Fittings
- C. CBC: 2013 California Building Code
- D. CEC: 2013 California Electrical Code

- E. CFC: 2013 California Fire Code
- F. FM: Factory Mutual Association
- G. MSS: Manufacturers Standardization Society
 - 1. MSS SP-110: Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
- H. National Certified Pipe Welding Bureau
- I. NFPA: National Fire Protection Association
 - 1. NFPA 30: Flammable and Combustible Liquids Code
 - 2. NFPA 30A: Code for Motor Fuel Dispensing Facilities and Repair Garages
- J. OSHA: Occupational Safety and Health Association
- K. SSPC: Society for Protective Coatings
 - 1. SSPC PA1: Shop, Field, and Maintenance Painting of Steel
 - 2. SSPC SP1: Surface Preparation Standard No. 1: Solvent Cleaning
- L. UL: Underwriter's Laboratories
 - 1. UL 142: Steel Aboveground Tanks for Flammable and Combustible Liquids
 - 2. UL 2085: Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids

1.4 SUBMITTALS

- A. Shop drawings: Submit drawings for the following materials and equipment:
 - 1. Tanks: including model, dimensions, capacity, and finish.
 - 2. Tank top equipment.
 - 3. Piping: including materials, sizes, and fittings.
 - 4. Pumps: including model, dimensions, pump curves with performance characteristics, and system operating point.
 - 5. Regulators and safety devices.
 - 6. Level switches.
 - 7. Pipe hangers and cross bracing: including load capacity.
 - 8. Sealed shop drawings with seismic anchoring details complying with the Quality Control section. Shop drawings shall be stamped and signed by a professional structural engineer licensed in the state of California
- B. Calculations: Submit seismic calculations indicating restraint loadings from design seismic forces in the Quality Control section. Calculations shall include proper anchorage details and when applicable shall include consideration of types of concrete. Calculations shall be stamped and signed by a professional structural engineer licensed in the state of California.
- C. Test data: Submit written test report data for the following:
 - 1. Pressure test report for the windshield washer fluid piping system.

2. Overfill alarm operational test.
- D. Welders shall be certified by the local chapter of the National Certified Pipe Welding Bureau or similar testing authority.
 1. Each operator's certificate shall be on file at the site and shall be made available upon request.
- E. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the windshield washer fluid system installation. Verification of permits shall be submitted.
- F. Provide certification that inspections and tests, as described in Part 3 of this Section, have been performed and the system has passed specified testing requirements.

1.5 QUALITY CONTROL

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project:
 1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.
 2. National Fire Protection Association (NFPA).
 3. Occupational Safety and Health Act (OSHA).
 4. Factory Mutual Association (FM).
 5. Underwriter's Laboratories (UL).
 6. American Petroleum Institute (API).
- B. Contractor Qualifications: Company specializing in performing work of this section with minimum ten years documented experience.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years of experience.
- D. Permanent equipment shall be seismically anchored to resist the total design seismic force prescribed in the CBC. Seismic restrains shall be designed by a registered professional structural engineer licensed in the state of California. Design shall include:
 1. Number, size, capacity, and location of anchors for floor and wall mounted equipment. For units with a weight greater than 2,500 pounds, provide substantiating calculations the floor can accept the prescribed seismic forces
 2. Number, size, capacity, and location of braces and anchors for suspended piping on as-built plan drawings. The Contractor shall select a seismic restraint system pre-designed to meet requirements of the CBC. Maximum seismic loads shall be indicated on the drawings at each brace location. Drawings shall bear the stamp and signature of the registered professional structural engineer licensed in the state of California who designed the layout of the braces.

1.6 EXTRA MATERIALS AND SPARE PARTS

- A. Submit 10 extra windshield washer dispensing valves.

PART 2 - PRODUCTS

2.1 UNDERGROUND WINDSHIELD WASHER FLUID STORAGE TANK

- A. Refer to Section 13 61 00 Gasoline Fuel System, for the supply and installation specifications of the underground windshield washer fluid bulk storage tank. The primary tank shall be manufactured with a reinforced striker plate capable of supporting the WWF submersible pump. Ensure plate has provisions to secure submersible pump mounting stand. Supply a mechanical overfill protection device designed for pressure deliveries, OPW F-Stop or approved equal. Supply an appropriate tight fill adaptor based on the selected WWF supplier's delivery equipment. Supply a manufactured shelf

2.2 ABOVEGROUND WINDSHIELD WASHER FLUID TANKS

- A. Manufacturers: Containment Solutions/Hoover, Modern Welding, Highland Tank, or equal.
- B. Provide UL 2085 listed vaulted tank with 304 or 316 UL 142 stainless steel primary storage vessel compatible with 100 percent methanol or any mixture of water and methanol. Tank shall include lightweight concrete between primary tank and allow detection of leaks from the primary tank. Anchoring tie downs shall be welded to the bottom of the secondary tank. All openings shall be on the top of the tank as indicated on the drawings and shall have threaded NPT risers. Tanks shall have a 30 year warranty.
- C. Coating: The exterior surface of the secondary tank shall be cleansed of foreign material and coated with a corrosion resistant industrial paint (3 to 5 mils dry film thickness). Color shall be sand, or as otherwise approved. The tank shall include clear signage including product, NFPA diamond, hazard classifications, and safe fill heights.
- D. Accessories: The tank shall be equipped as shown on the drawings, which includes, but is not limited to:
 - 1. The tank shall have an interstitial monitor tied into the fuel system environmental monitoring system, as shown on the drawings.
 - 2. The tank shall be equipped with working and emergency vents on both the primary and interstitial compartments. All vent pipes shall terminate outside of the building in accordance with the California Fire Code.
 - 3. Provide signage on windshield washer fluid tank including NFPA hazard Symbol, "Flammable" signage, "Safe Fill Height ___ Inches" signage, "Windshield Washer Fluid/Methanol Mixture" signage and all other signage required by code and regulation.
 - 4. The tank shall be seismically anchored to resist seismic forces prescribed in the CBC.
 - 5. The tank shall have a mechanical overfill device
 - 6. Tank shall be equipped with a clock level gauge.

2.3 WINDSHIELD WASHER FLUID DISPENSING PUMP

- A. Manufacturers: Graco, Alemite, Balcrank, or equal.
- B. Description: Double-acting, air operated stainless steel diaphragm pump with self-lubricating non-stalling air valve. Pumps shall be compatible with 100 percent methanol or any mixture of water and methanol. All pumps in similar service shall be identical. Pump shall have a capacity to pump 20 gallons per minute with an input of 20 standard cubic feet per minute of air at 40 psi. Pump shall have a 1/2 inch air inlet and 1 inch fluid inlet and outlet.
- C. Accessories:
 - 1. Each pump shall have the following:
 - a. Air filter
 - b. Air regulator with pressure gauge (0-150 psi)
 - c. Oil lubricator
 - d. Pressure relief valve located between pump air regulator and pump set to 10 psi less than pressure rating of pump.
 - 2. Input air supply shall be equipped with a solenoid valve for remote shutdown of pumps. Valve shall have 200 psi rating and be designed for 120 volts-ac power.
 - 3. Input air supply shall have a runaway valve which restricts flow in the event of a pipe failure.
 - 4. Provide pressure relief kit on optional ports to the pump.
 - 5. Provide fire rated, flexible braided stainless sheathed hose between pump discharge and stainless steel piping to minimize vibration transfer from pump.
 - 6. Provide manufacturers standard bracket assembly suitable for wall mounting the pump. Assembly shall include vibration isolators at each attachment point beneath the pump to dampen vibrations. Bracket shall be anchored to resist seismic forces prescribed in the CBC.

2.4 WINDSHIELD WASHER FLUID TRANSFER PUMP

- A. Manufacturers: R. S. Corcoran Company, or Approved Equal.
- B. General
 - 1. Provide a submersible pump to transfer WWF from the underground storage tank to the aboveground storage day tanks.
 - 2. Provide a motor controller and disconnect to activate the pump motor, in addition to the gauging and control system listed below.
 - 3. Provide mounting infrastructure to mount the submersible pump in the underground storage tank. Mount sump on pre-manufactured stand.
- C. Performance and Characteristics: The pump shall have the following capabilities and characteristics:
 - 1. The entire pump and motor assembly shall be explosion-proof, industrial duty, and rated to be submerged in and pump flammable liquid.
 - 2. The pump shall be capable of pumping 100% water, 100% methanol, and all mixtures of methanol and water.

3. The pump shall be capable of pumping water at 15 GPM with 100 ft. of head.
4. The pump motor shall be 3 HP, 208/120 volts, 3 Phase.
5. Automatic Line Leak Detector: Supply an electronic line leak detector for the underground WWF piping. Coordinate with other sections.

2.5 WINDSHIELD WASHER FLUID TRANSFER PUMP CONTROLLER AND LEVEL SWITCHES

- A. Manufacturers: Pneumeracator, Samson, Omntec, or Aapproved Equal.
- B. General
 1. The windshield washer fluid transfer/submersible pump controller shall be the Pneumercator Model LC 2000 or approved equal.
- C. Performance Characteristics
 1. The controller shall have the 16 relay output card option installed.
 2. The controller will interface with three (3) multi-point float level switches, the fuel system environmental monitoring panel, the leak detection solenoid valve and a corresponding control solenoid valve in each WWF AST. One AST is located on each of levels 1, 2 and 3.
 3. The controller will interface with a submersible pump relay and appropriate annunciator panels.
 4. The controller will perform the following functions:
 - a. When any float level switch triggers a “pump on” signal, the controller will activate the submersible pump relay, signal the fuel system environmental monitoring console (indicating a pump on status), energize the leak detection solenoid valve and energize the associated control solenoid valve at the AST.
 - b. When a float switch triggers a “pump off” signal, the controller will de-energize the two solenoid valves and signal the environmental monitoring console (indicating pump off status).
 - c. The submersible pump relay shall be de-energized only when all three multi-point float level switches have triggered a “pump off” signal.
 - d. If a float level switch triggers “high level” or “low level”, the controller shall activate the appropriate relays to signal the fuel status panels and fuel annunciator panels.
- D. Construction
 1. The controller shall be housed in a NEMA 3, 3R, 4, or 4X enclosure.
- E. Appurtenances
 1. Provide level probe with four point-level float switches, Pneumercator LS600, or approved equal.

2. The float switches shall have the following individual set points (in percentage of AST tank capacity):
 - a. Low level: 40%.
 - b. Pump on: 50%.
 - c. Pump off: 90%.
 - d. High level: 95%.

2.6 VALVES

A. Ball Valves

1. Full port ball valves with 316 or ASTM A351 CF8M stainless steel bodies. Valves shall have a 316 stainless steel ball and stem with reinforced PTFE or RFTE seats and stem packing. Socket welding connections. Valves shall be rated for 2000 psig service and shall conform to ASME B16.34, MSS SP-110, Class 150.

B. Solenoid Valves

1. Manufacturers: ASCO, Morrison Brothers, or equal
2. Solenoid valves shall be normally closed, pilot operated piston type with body constructed of 304 or 316 stainless steel. Valve shall have PTFE or RFTE seals and discs and stainless steel internals. End connections shall be threaded. Solenoid shall be housed in an explosion proof case suitable for Class I, Division 2, Group D environments with maximum temperature rating of T2D (419 degrees F), as defined in the California Electrical Code. Solenoids shall operate on 120 volts, 60 cycle, single phase, alternating current. A manual type operator or needle valve to bypass the solenoid valve shall be provided for emergency manual operation. Valve movable parts including valve seat, stem bearings, and control system shall be replaceable without removing the main valve from the line. All nonmetallic parts shall be replaceable.

C. Silent (Non-slam) Check Valves

1. Provide Class 150 soft-seated, spring-assisted, silent check valves in the pump discharge piping in the UST sump for use as a block valve to maintain static pressure in the underground piping during automatic line leak detection. Silent check valves shall be center guided valve with ASTM A276 or ASTM A351 CF8M TP316 stainless steel body, stainless steel trim, EPDM seat, and stainless steel springs. Valves shall be rated for 200 psig service at 140 degrees F.

D. Swing Check Valves

1. Provide Class 150 swing type check valves to prevent reversed flow in operating tank overflow piping and at the base of the fill riser. Swing check valves shall have ASTM A276 or ASTM A351 CF8M TP316 stainless steel body, in accordance with ASME B16.11 threaded or ASME B16.5 flanged ends. Check valves shall be the bolted cover type with PTFE gasket to enable inline servicing. Valves shall have a swing type, replaceable PTFE seated stainless steel disc and stainless steel internals. Valves shall be rated for 200 psig service.

2.7 MECHANICAL TOTALIZERS

- A. Provide positive displacement type mechanical or electronic totalizer on the fill line branch to each AST. Totalizer shall be rated for viscosity up to 100 cP and flow rates up to 25 gpm. Body shall be constructed of 316SS with FNPT or ANSI Class 150 flange connections of size equal to connecting piping.
- B. Totalizer shall have a non-resettable data log with 6-digit gallon display.
- C. Totalizer shall be rated for windshield washer fluid (Class I liquid) up to 500 psig and temperatures up to 150 degrees F.
- D. The totalizer shall have a maximum pressure loss of 30 ft of water.

2.8 WINDSHIELD WASHER FLUID ABOVEGROUND PIPING

- A. Aboveground piping between pump and hose reel: 304L/316L stainless steel, seamless, schedule 40S, conforming to ASTM A312 and ASME B36.19
- B. Fittings shall be schedule 40S, socket/butt welded connections, conforming to ASTM A403.
- C. In addition to pipe hangars, all windshield washer fluid pipe runs shall have cross bracing to prevent lateral movement from the pulsing of the pneumatic pump.
- D. The connection between the windshield washer fluid (WWF) dispensing pump fluid outlet and the stainless steel dispensing pipe shall have a fire rated flexible hose with a minimum pressure rating of 500 psi. Hoses shall be compatible with 100 percent methanol or any mixture of water and methanol.
- E. Label all pipe a minimum of every 20 feet, with labels that include "Windshield Washer Fluid," "Methanol," and "Flammable," in accordance with ASME A13.1. All labels/signage shall be yellow with black letters, and shall be a permanent type.
- F. All aboveground WWF piping shall be prepared to an SSPC SP1 standard and painted with 1 coat of an alkyd primer appropriate for coating stainless steel and 2 top coats of alkyd enamel compatible and appropriate for the primer and stainless steel. Color or top coats shall be yellow. Painting shall be in accordance with SSPC PA1.
- G. Provide a braided flexible expansion loop for piping that crosses building shear joints as indicated in the drawings. Braided flexible expansion loops shall consist of two parallel sections of braided metal hose, a 180 degree return bend, with inlet and outlet 90 degree elbow connections. The loops shall be engineered to move in three planes and shall impart no loads to the anchors. Materials of construction of the braided metal hoses are to be stainless steel with stainless steel braid, 304L/316L. End fittings shall have socket welds for connection to piping. Loop assembly shall be sized as indicated on the drawings. Expansion loops shall be rated for minimum of 450psi and accommodate a total movement of 1 inch between ends in any direction. Manufacturers: Flexicraft, Metraflex, or equal.

- H. All WWF piping shall be seismically braced with an appropriate system selected by a professional structural engineer licensed in the state of California.

2.9 WINDSHIELD WASHER FLUID UNDERGROUND PIPING

- A. Manufacturers: Ameron, Smith Fibercast/Red Thread, or Approved Equal.
- B. Underground piping shall be double-wall, meet the UL 971 Standard, and shall be compatible with any mixture of methanol and water, 100% methanol, and 100% water.

2.10 HOSE REELS

- A. Manufacturers: Graco, Alemite, Balcrank, or equal.
- B. Description: Provide heavy duty hose reels compatible with 100 percent methanol or mixtures of methanol and water in locations as shown on drawings. Hose reels shall be rated for 300 psi, 50 foot length, 1/2 inch inner diameter, with yellow colored hose. Hose reels shall come equipped with all equipment needed to install and mount the reel to include:
 - 1. Hose inlet kits.
 - 2. Mounting brackets/overhead mounting brackets. Bracket shall be anchored to resist seismic forces prescribed in the CBC.
 - 3. Ball stop kits.
 - 4. Fluid shutoff valve.
 - 5. Water/Anti-freeze/WWF dispensing valve. Graco #180685 or equal.
 - 6. Other fitting connections required for complete system.

2.11 WINDSHIELD WASHER FLUID SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Provide designation labels on all equipment in this specification outlined on the related equipment drawings.
- B. Tag all valves, mechanical devices and components identified on system Process and Instrumentation Diagrams with permanent tags, as indicated.
- C. Provide wall mounted, plain English, permanent signage at all fill ports, regulating valves, evacuation stations, manual emergency actuators, operating valves and any other mechanical/or electrical device that the rental car user would be expected to actuate or operate in the normal course of business or emergency situation.
- D. Identify piping, concealed or exposed, with plastic pipe markers. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction. Underground pipe marker shall be detectable magnetic warning tape.

- E. All wall mounted and equipment mounted designation tags shall be 2 or 3-ply phenolic, outdoor and long-life rated, non-flammable, non-conductive, 1/8-inch thick, engraved. All signage shall be 0.020 baked enamel aluminum sized appropriately for the lettering. Aluminum shall be mounted with stainless steel hardware. Designation labels and operating signage shall be white letters on black signage. All emergency, warning or other related signs shall be red signs with white letters. Designation label material shall be specifically designed to prevent static build-up, ES-1 Phenolic by NORPLEX, or equal. Lettering on designation labels shall be 1/2-inch in height. Lettering for operational signage shall be 3/4-inch in height unless otherwise designated in the drawings. Lettering for emergency signage shall be 1-inch in height unless otherwise designated in the drawings. Wall mounted signs shall be affixed with anchors and stainless steel screws. Equipment mounted signs shall be mounted with epoxy adhesive.
- F. Valve and component tags shall be hanging type, stainless steel, round with stamped lettering. Tag size shall be minimum 1-1/2 inches diameter with finished edges. Tags shall be affixed to valves with a clamped wire rope loop, such that it is not easily removable. Lettering shall be 1/4-inch in height unless otherwise designated in the drawings. Removable and adjustable ball-type chains or zip ties are not acceptable for mounting.
- G. Provide a typed list of all valve tags at completion of the project. This list shall include the valve tag number, type of valve, location of valve, and purpose of valve (i.e. isolation valve, bypass valve, etc.). This list shall be framed and provided to LAWA for installation. Provide copies of the valve list in the Operation and Maintenance Manuals as part of the project closeout.

PART 3 - EXECUTION

3.1 UNDERGROUND WINDSHIELD WASHER FLUID STORAGE TANK

- A. Install the WWF underground storage tank in accordance with the requirements for installation of the gasoline underground storage tanks in Section 13 61 00.
- B. Prior to commissioning, submit an RFI to LAWA requesting WWF vendor information. Once identified, communicate with the selected vendor and install an adaptor suitable for the delivery equipment, understanding that WWF connections fittings are often not standard across suppliers.
- C. Secure permits, complete tests, and supply closeout documents in accordance with that section.

3.2 ABOVEGROUND WINDSHIELD WASHER FLUID TANKS

- A. Prior to commissioning, submit an RFI to LAWA requesting windshield washer fluid vendor information. Once identified, communicate with the selected vendor and install an adaptor suitable for the delivery equipment, understanding that WWF connections fittings are often not standard across suppliers.

- B. Install tanks in accordance with the California Building and Fire Codes.
- C. Coordinate with other sections to meet the requirements for a flammable liquid storage room as defined in the California Building code.
- D. Anchor the ASTs in accordance with the manufacturer's instructions and to withstand seismic requirements in the Quality Control section.
- E. Bond the tank, WWF piping, and vent piping. Ground the tank with a #2AWG electrode. Bond to the QTA fuel system grounding and bonding system.

3.3 WINDSHIELD WASHER FLUID DISPENSING PUMP

- A. Install dispensing pump in accordance with the manufacturer's instructions.
- B. Install pump bracket to resist seismic forces prescribed in the Quality Control section and as required by the CBC.

3.4 WINDSHIELD WASHER FLUID TRANSFER PUMP

- A. Install, the transfer pump control in accordance with the manufacturer's instructions.

3.5 WINDSHIELD WASHER FLUID TRANSFER PUMP CONTROLLER AND LEVEL SWITCHES

- A. Install, connect, and program the transfer pump control and fluid level system, including the control console, level probes, power and control wiring, solenoid valves, and safety devices in accordance with the manufacturer's instructions.
- B. Install legends, signage, safety precautions, and operating instructions.

3.6 VALVES

- A. Ball valves: install valves accordance with the manufacturer's instructions.
- B. Solenoid valves: accordance with the manufacturer's instructions. Install isolation valves in locations as shown on the drawings at each hose reel and at the discharge of each dispensing pump.
- C. Check valves: install valves accordance with the manufacturer's instructions.

3.7 MECHANICAL TOTALIZERS

- A. Install mechanical totalizers in accordance with the manufacturer's instructions.

3.8 WINDSHIELD WASHER FLUID ABOVEGROUND PIPING

- A. Install piping in accordance with the California Fire Code.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space. Coordinate with other sections.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Brace all piping to resist seismic forces in accordance with the Quality Control section.
- G. Install flexible expansion loops in accordance with manufacturer's instructions.
- H. Sleeve pipe passing through partitions, walls and floors.
- I. Install firestopping and rated penetrations at fire rated construction perimeters and openings containing penetrating sleeves and piping in accordance with Section 078400, Firestopping.
- J. Provide clearance for access to valves and fittings.
- K. Provide access where valves and fittings are not exposed.
- L. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer. Coat all hangars in accordance with General Mechanical requirements.
- M. Prepare uncoated pipe, fittings, supports, and accessories to a hand tool clean finish, apply primer and 2 top coats to match surrounding walls and ceilings.
- N. Install identification on piping system.
- O. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.
- P. Prior to connecting hose reels and commissioning system, flush and clean entire aboveground piping to remove slag and construction debris. At least 30 days prior to cleaning and flushing, submit flushing plan to LAWA for approval, which includes at a minimum health and safety procedures, flushing procedures, and waste disposal procedures.

3.9 WINDSHIELD WASHER FLUID UNDERGROUND PIPING

- A. Install underground piping in accordance with the requirements herein and in accordance with related requirements of section 13 61 00.
- B. Secure permits, complete tests, and supply closeout documents in accordance with that section.
- C. Verify connection size, location, and inverts are as indicated on Drawings.
- D. Establish elevations of buried piping with minimum cover in accordance with manufacturer requirements. Cover all piping with a subsurface protective concrete slab in accordance with the construction drawings.
- E. Install pipe on prepared bedding in accordance with manufacturer requirements.
- F. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- G. Install pipe with 1% slope back to underground storage tank.
- H. Install pipe and complete all penetrations in accordance with manufacturer requirements.

3.10 HOSE REELS

- A. Install vehicle service equipment in accordance with manufacturer's instructions at locations shown on the construction drawings.

3.11 INSTALLATION - WINDSHIELD WASHER FLUID SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.
- C. All emergency signs shall be unobstructed and easily readable from as wide an area as possible.

3.12 WINDSHIELD WASHER FLUID SYSTEM TESTING AND COMMISSIONING

- A. The Contractor shall submit a system commissioning plan to LAWA for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The Contractor shall be responsible for supplying all fluids and commodities required to startup and calibrate systems.

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- B. The WWF aboveground distribution system shall have a maximum operating pressure of 125 psi. 150 percent hydrostatic test pressure shall be 190 psi.
- C. Hydrostatically and non-destructively test the aboveground piping in accordance with NFPA 30 and ASME B31.3. In addition, provide non-destructive testing on 100 percent of aboveground piping system field welds. Submit a non-destructive testing plan to LAWA for approval 30 days prior to executing tests.
- D. Test the aboveground windshield washer fluid tanks in accordance with manufacturer requirements.
- E. Test and verify the operation of all equipment, monitoring systems and control devices in the presence of LAWA or representative, including the proper adjustment of all pressure settings and control system programming. All systems shall be tested with 100 percent water and all systems certified as operating properly prior to the introduction of WWF into the system. Testing shall be completed mindful of the need to protect the system and piping from freezing during testing. At the completion of commissioning and testing activities, the Contractor shall fill the entire system with the final 50/50 water/methanol mix of antifreeze washer fluid.

END OF SECTION 111127

SECTION 111128 – VACUUM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes furnishing and installing the vacuum system as shown on the drawings and as specified herein, including but not limited to the following:
 - 1. Vacuum producers
 - 2. Vacuum separators
 - 3. Control Panel
 - 4. Tubing, Fittings, and Valves
 - 5. Hose Station Equipment
 - 6. Exterior Wall Cap
 - 7. Labeling and Operational Signage

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 136101, Gasoline Electrical System

1.3 REFERENCES

- A. CBC: 2013 California Building Code
- B. CEC: 2013 California Electrical Code
- C. FM: Factory Mutual Association
- D. NEMA: National Electrical Manufacturers Association
- E. NFPA: National Fire Protection Association
- F. OSHA: Occupational Safety and Health Association
- G. SMACNA: Sheet Metal and Air Conditioning Contractors National Association
 - 1. SMACNA 016: HVAC Air Duct Leakage Test Manual
- H. UL: Underwriter's Laboratories
 - 1. UL 508A: Standard for Industrial Control Panels

1.4 SUBMITTALS

- A. Shop Drawings: Submit original copies of product data submittals for materials and equipment in Part 2 of this section including but not limited to:
 - 1. Vacuum producer: include performance curves and designed capacities
 - 2. Separator
 - 3. Control Panel
 - 4. Tubing, Fittings and Valves
 - 5. Hose Station Equipment
 - 6. Exterior Wall Caps
 - 7. Submit sealed shop drawings with seismic anchoring details complying with the Quality Control section. Shop drawings shall be stamped and signed by a professional structural engineer licensed in the state of California.
- B. Calculations: Submit seismic calculations indicating restraint loadings from design seismic forces in the Quality Control section. Calculations shall include proper anchorage details and when applicable shall include consideration of types of concrete. Calculations shall be stamped and signed by a professional structural engineer licensed in the state of California.
- C. Test Data: Submit test data of all vacuum pressure tests performed. Include date, sections tested, test pressures, and leakage rates. Tests shall be conducted according to SMACNA 016.
- D. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by the Project.
- E. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the vacuum system installation. Verification of permits shall be submitted.
- F. Provide certification that inspections and tests, as described in Part 3 of this Section, have been performed and the system has passed specified testing requirements.

1.5 CLOSEOUT SUBMITTALS

- A. The following additional items shall be included in the closeout submittals for the vacuum system:
 - 1. Indicate layout of each piping system to scale of 3/8 inch. Indicate piping system routing showing pipe sizes, elevations, pipe lengths, fitting locations, valve locations, expansion joints, expansions loop locations, cleanout locations, anchor locations and joint locations.

1.6 QUALITY CONTROL

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project:
 - 1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.

2. National Fire Protection Association (NFPA).
 3. Occupational Safety and Health Association (OSHA).
 4. Factory Mutual Association (FM).
 5. Underwriter's Laboratories (UL).
- B. Contractor Qualifications: Company specializing in performing Work of this section with minimum three years documented experience.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of experience.
- D. Permanent equipment shall be seismically anchored to resist the total design seismic force prescribed in the CBC. Seismic restrains shall be designed by a registered professional structural engineer licensed in the state of California. Design shall include:
1. Number, size, capacity, and location of anchors for floor and wall mounted equipment. For units with a weight greater than 2,500 pounds, provide substantiating calculations the floor can accept the prescribed seismic forces
 2. Number, size, capacity, and location of braces and anchors for suspended tubing on as-built plan drawings. The Contractor shall select a seismic restraint system pre-designed to meet requirements of the CBC. Maximum seismic loads shall be indicated on the drawings at each brace location. Drawings shall bear the stamp and signature of the registered professional structural engineer licensed in the state of California who designed the layout of the braces.

1.7 EXTRA MATERIALS AND SPARE PARTS

- A. Contractor shall provide the following spare parts for the system:
1. 20 duck-foot cleaning tools
 2. 20 extra hoses

PART 2 - PRODUCTS

2.1 SYSTEM MANUFACTURERS

- A. All vacuum equipment outlined in this specification (producer, separator, control panel) shall be from a single vacuum system manufacturer. The manufacturer shall have demonstrated experience with the supply, installation, and commissioning of rental car QTA/CONRAC facility vacuum systems and have a minimum 10 years rental car QTA facility projects on their resume of experience.
- B. Manufacturers: Spencer Turbine Company, or pre-bid approved equal

2.2 VACUUM PRODUCER

- A. Manufacturers: Spencer Turbine Company, or pre-bid approved equal
- B. Vacuum producers shall be 30-HP, 480V/3 phase multi-stage centrifugal with overhung design. Producers shall have exhaust air noise silencers and have an average sound level of 89 dBA or lower at three feet in an open environment.
- C. Vacuum producers shall have a Totally Enclosed, Fan Cooled (TEFC) construction and be rated for use in a Class 1, D, Division II environment.
- D. Provide a motorized bleed-valve assembly mounted near inlet with an intake that is outside of the vacuum room.
- E. Contractor shall provide vacuum producer with appropriate seismic anchoring system to comply with requirements in the Quality Control section.

2.3 VACUUM SEPARATOR

- A. Manufacturers: Spencer Turbine Company, or pre-bid approved equal
- B. The basis of design is a Spencer SEP 90327.
- C. Removable dirt can type designed to withstand maximum vacuum of system without deflection. Separator filter bags shall have grounding wires. Filtration efficiency at least 99.9 percent at 3.0 microns. Separator shall have easy access to filter via hinged door and separator shall have internal torn bag arrestor. Shaker plates shall be attached to top of bags and externally mounted palm-operated shakers to release debris.
- D. Separator shall be provided with grounding lug.
- E. Separator configured with 180 degrees of separation between inlets and outlets so tubing does not extend into travel way.
- F. Contractor shall provide vacuum separator with appropriate seismic anchoring system to comply with requirements in the Quality Control section.

2.4 CONTROL PANEL

- A. Provide wall-mounted NEMA 12 enclosure for motor starter control panel. UL 508A Listed motor starter providing complete motor control and protection against short-circuit. Provide HMCP circuit breaker complete with flange mounted operator and lockout device. The panel shall include, but not be limited to the following:
 - 1. NEMA rated motor starter for Vacuum Producer motor horsepower and voltage.
 - 2. Control power transformer with fused primary and secondary circuits.

3. Provisions to accept a relay contact input from a remote E-STOP button to shut down the vacuum system whenever the e-stop system is activated (or alternatively provide a contactor for the vacuum system e-stop input.)
4. The controller shall be supplied with an Ethernet connection and shall be capable of being monitored for performance by the building management system or remote facility management personnel.
5. The control panel shall include a controller to modulate a bleed valve located at the inlet of the vacuum producer. The bleed valve controller shall monitor the current to the vacuum producer motor. Two amperage setpoints shall be field adjustable at the panel, with the low setpoint closing the valve and the high setpoint opening the valve. Valve position shall remain in place when current is between the two setpoints. Manufacturer shall determine recommended current setpoints to protect vacuum producer and meet vacuum performance requirements.
6. Remote start pushbuttons/switches for each individual vacuum producer shall be provided for mounting in the fuel manager's office.
7. Panel Accessories
 - a. Start/stop pushbuttons
 - b. Motor on pilot light
 - c. Hand-off-auto selector switch
 - d. 24 hour 7 day time clock for preset run time hours
 - e. Ethernet connection

2.5 TUBING, FITTINGS, AND VALVES

- A. Tubing shall be galvanized steel of 16-gauge thickness up to 4-inch diameter, and 14-gauge thickness for larger sizes.
- B. All fittings shall be of long radius type, specifically designed for use in central vacuum cleaning systems. Vacuum manufacturers may use the term standard radius with tubing that is designed for vacuum applications. In this case, a standard radius bend is acceptable if recommended by the manufacturer for use in vacuum systems. Fittings shall be straight end and have all burrs removed and shall butt in order to leave a clean smooth bore. All metal tubing joints to be connected and sealed with a compression coupling joint.
- C. Tubing connections to vacuum producers and separators shall include flexible fittings. A conductor shall be bonded on either side of flexible sections to ensure electrical continuity.
- D. Factory fabricated double threaded "Y" fittings shall be used at each double-hose station.
- E. Hose inlet valves shall be 2-inch diameter and constructed of a forged brass body with a spring closing nickel plated cover plate and threaded ends.
- F. Provide manufacturer-recommended adapter fittings required for reducing and connecting to vacuum hoses.
- G. All tubing shall be grounded and bonded to the Vacuum Producer, Separator, and grounding conductors.

- H. Tubing across shear joints will be provided with a rubber boot to allow for flexibility during seismic events. A conductor shall be bonded on either side of flexible sections to ensure electrical continuity.

2.6 HOSE STATION EQUIPMENT

- A. Provide manufacturer supplied tool posts for each double drop at the island hose stations. Posts shall support the vacuum drop tube and shall have two hinged and cantilevered booms for supporting hoses. Booms shall extend from the post a minimum of 2-feet and at an elevation of no less than 8 feet above finish floor.
- B. Tool post vertical member shall be constructed of 4-inch x 4-inch tube steel with either galvanized finish or powder coat. Posts shall be surface mounted with anchorage according to manufacturer recommendations.
- C. Tool posts shall have integral tool holders designed for the hose-end cleaning tool attachment specified herein.
- D. Hose shall be 1-1/2-inch diameter, of anti-static construction, and at least 25 feet long.
- E. Each hose station shall include hose with coupling, swivel type hose cuff and duck-foot style cleaning tool attachment.

2.7 EXTERIOR WALL CAP

- A. Provide galvanized carbon steel wall cap with integral wall penetration sleeve at each vacuum system discharge to prevent water from entering the installed tube. Wall cap shall be provided with integral bird screen constructed of woven or welded wire and secured permanently.
- B. Provide segmented elastomeric modular seal for installation between the vacuum system discharge tube and the wall cap penetration sleeve. Modular seal shall be selected to fit in the annular space and to provide a hydraulic seal by tightening bolts along the circumference of the assembly.
- C. Wall cap shall be sized two pipe diameters larger than the exhaust pipe, or as required for modular seal installation between wall cap sleeve and vacuum system exhaust tube.
- D. Wall cap sleeve length shall extend through the entire wall to enable full contact with modular seal.

2.8 VACUUM SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Provide designation labels on all equipment in this specification outlined on the related drawings. All labels shall bear the abbreviations as described on those drawings.

- B. Tag all valves, mechanical devices and components indicated on system Process and Instrumentation Diagrams with permanent tags including function and designation number.
- C. Provide wall mounted, plain English, permanent signage at all locations with push buttons or other manual controls and any other mechanical/or electrical device that the rental car user would be expected to actuate or operate in the normal course of business or emergency situation.
- D. Identify piping, concealed or exposed, with plastic pipe markers. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.
- E. All wall mounted and equipment mounted designation tags shall be 2 or 3-ply phenolic, outdoor and long-life rated, non-flammable, non-conductive, 1/8-inch thick, engraved. All signage shall be 0.020 baked enamel aluminum sized appropriately for the lettering. Aluminum shall be mounted with stainless steel hardware. Designation labels and operating signage shall be white letters on black signage. All emergency, warning or other related signs shall be red signs with white letters. Designation label material shall be specifically designed to prevent static build-up, ES-1 Phenolic by NORPLEX, or equal. Lettering on designation labels shall be 1/2-inch in height. Lettering for operational signage shall be 3/4-inch in height unless otherwise designated in the drawings. Lettering for emergency signage shall be 1-inch in height unless otherwise designated in the drawings. Wall mounted signs shall be affixed with anchors and stainless steel screws. Equipment mounted signs shall be mounted with epoxy adhesive.
- F. Component tags shall be hanging type, stainless steel, round with stamped lettering. Tag size shall be minimum 1-1/2 inches diameter with finished edges. Tags shall be affixed to valves with a clamped wire rope loop, such that it is not easily removable. Lettering shall be 1/4-inch in height unless otherwise designated in the drawings. Removable and adjustable ball-type chains or zip ties are not acceptable for mounting.
- G. Provide a typed list of all tags at completion of the project. This list shall include the tag number, purpose of tag (i.e. isolation valve, bypass valve, etc.). This list shall be framed and provided to LAWA for installation. Provide copies of the valve list in the Operation and Maintenance Manuals as part of the project closeout.

PART 3 - EXECUTION

3.1 VACUUM PRODUCERS

- A. Install the vacuum producers in strict compliance with manufacturer instructions and guidelines.
- B. Anchor all vacuum producers and separators with concrete anchors in accordance with manufacturer specifications. Producers shall be seismically anchored to the requirements in the Quality Control section and as required by the CBC. All vacuum producer outlets shall be exhausted to the outside of the building as indicated on the drawings.

3.2 VACUUM SEPARATORS

- A. Install the vacuum separators in strict compliance with manufacturer instructions and guidelines.
- B. Vacuum separators shall be seismically anchored to the requirements in the Quality Control section and as required by the CBC.

3.3 CONTROL PANEL

- A. Install the control panel in strict compliance with manufacturer instructions and guidelines.
- B. Contractor shall provide initial start-up of system by manufacturer's authorized Representative. Start-up service shall include operational and maintenance instruction of end user's designated personnel and vacuum test. Contractor shall furnish manufacturer's operating and maintenance manual to end-user.

3.4 TUBING, FITTINGS, AND VALVES

- A. All connections to the vacuum system shall be in accordance with manufacturer's recommendations. As a minimum all threaded joints shall be sealed using Teflon tape.
- B. All vacuum tubing shall be seismically braced with an appropriate system selected by a professional structural engineer licensed in the state of California.
- C. Provide cleanouts to provide ease of system maintenance and cleaning, at a minimum as shown on the drawings.
- D. Route piping as straight as possible, so as to avoid all unnecessary elbows, sweeps, and tees.
- E. The vacuum system and piping shall be grounded and bonded to eliminate static electricity. The Contractor shall perform a conductivity test at completion of construction to confirm full electrical continuity across the system.

3.5 HOSE STATION EQUIPMENT

- A. Install the hose station equipment panel in strict compliance with manufacturer instructions and guidelines.
- B. Provide sliding attachment point at any areas where vertical posts are attached to ceiling-mounted members.

3.6 EXTERIOR WALL CAP

- A. Provide core-drilled wall penetrations, cast-in-place SS pipe sleeves or removable cast-in-place sleeves at each vacuum system exhaust tube discharge location for installation of a wall cap. Penetrations shall be sized to allow a close fit for the wall cap sleeve; otherwise the excess area shall be filled with non-shrink grout while maintaining a circular sleeve shape.
- B. Wall cap shall be sealed to the exterior wall surface by the use of caulking and secured using drilled concrete anchors with coatings to resist corrosion.
- C. Wall cap sleeve shall extend through the entire wall and be flush with interior wall surface. If trimming is necessary, burrs shall be removed.
- D. Comply with modular seal manufacturer instructions for proper torque procedure.

3.7 INSTALLATION - VACUUM SYSTEM LABELING AND OPERATIONAL SIGNAGE

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.

3.8 VACUUM SYSTEM INTERFACE WITH EMERGENCY SYSTEMS

- A. All vacuum producers shall be electrically supplied via a normally open (electrically) contactor, that opens when power is lost as a result of an emergency stop actuation. Control power shall be supplied by the fuel system electrical supply and power to the producer shall be supplied by the building electrical supply. Coordinate with Section 136101.

3.9 TRAINING

- A. Provide a factory representative shall be required for instruction on the maintenance and operation of the systems, when the system commences operation. Schedule training with Facility Manager at least 14 days in advance of training date.

3.10 COMMISSIONING

- A. The Contractor shall commission the vacuum system. Commissioning shall include all testing, start-up, calibration, programming, and documentation. At the conclusion of the commissioning, the facility shall be ready for LAWA and tenants to conduct unrestricted operations and use all systems to their full intended and designed capacity.

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- B. A certified manufacturer representative shall be present for the commissioning of the vacuum system.
- C. The Contractor shall submit a system commissioning plan to LAWA for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The plan may be combined with commission plans for other vehicle service equipment systems.
- D. Commissioning of the system shall commence no less than 21 days prior to date of beneficial occupancy, and be completed prior to beneficial occupancy.
- E. Notify LAWA no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the Contractor shall facilitate a final inspection by LAWA. The Contractor shall have all necessary trade personnel on-site to operate equipment and open electrical enclosures and equipment during LAWA's final inspection. That final inspection shall include, but not be limited to:
 - 1. Operational test of all systems.
 - 2. Operational test of all safety devices;
 - 3. General review of the installation against plans, specs, and manufacturer requirements;
 - 4. Review of all test reports and manufacturer start-up reports;
 - 5. Closeout document requirements review; and
 - 6. Confirmation that system training has been completed.

END OF SECTION 111128

SECTION 11 13 19 - STATIONARY LOADING DOCK EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Recessed dock levelers.
2. Edge-of-dock levelers.
3. Top-of-dock levelers.
4. Vertical-storing dock levelers.
5. Truck levelers.
6. Truck restraints.
7. Light-communication systems.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for **[curb angles at edges of recessed pits] [and] [loading dock platform edge channels]**.
2. Section 083323 "Overhead Coiling Doors" for coiling overhead doors electrically interlocked to dock levelers.
3. Section 083613 "Sectional Doors" for sectional overhead doors electrically interlocked to dock levelers.
4. Section 111313 "Loading Dock Bumpers" for loading dock bumpers.
5. Section 111316 "Loading Dock Seals and Shelters" for loading dock seals and shelters.
6. Section 111323 "Portable Dock Equipment" for portable loading dock lifts.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.

1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
2. Review sequence of operation for each type of loading dock equipment.
3. Review coordination of interlocked equipment specified in this Section and elsewhere.
4. Review required testing, inspecting, and certifying procedures.

1.3 DEFINITIONS

A. Operating Range: Maximum amount of travel above and below the loading dock level.

B. Working Range: Recommended amount of travel above and below the loading dock level for which loading and unloading operations can take place.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for stationary loading dock equipment.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For stationary loading dock equipment.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of anchors and field connection.
 - 3. Include diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Welding certificates.
- C. Product Test Reports: For each dock leveler, for tests performed by manufacturer and witnessed by a qualified testing agency.
 - 1. Indicate compliance of dock levelers with requirements in MH 30.1 for determining rated capacity, which is based on comprehensive testing within last two years of current products.
 - 2. Submittal Form: According to MH 30.1.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For stationary loading dock equipment to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Maintenance Proximity: Not more than [two] <Insert number> hours' normal travel time from Installer's place of business to Project site.

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

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

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of construction contiguous with stationary loading dock equipment, including **[recessed pit dimensions]** **[slopes of driveways]** **[and]** **[heights of loading docks]**, by field measurements before fabrication.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace dock levelers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracked or broken structural support members, load-bearing welds, and front and rear hinges.
 - b. Faulty operation of operators, control system, or hardware.
 - c. Deck plate failures including cracked plate or permanent deformation in excess of **1/4 inch (6 mm)** between deck supports.
 - d. Hydraulic system failures including failure of hydraulic seals and cylinders.
2. Warranty Period for Structural Assembly: **[10]** **<Insert number>** years from date of Substantial Completion.
3. Warranty Period for Hydraulic System: **[Five]** **<Insert number>** years from date of Substantial Completion.
4. Warranty shall be for unlimited usage of leveler for the specified rated capacity over the term of the warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 RECESSED DOCK LEVELERS **<Insert drawing designation>**

- A. General: Recessed, hinged-lip-type dock levelers designed for permanent installation in concrete pits preformed in the edge of loading platform; of type, function, operation, capacity,

size, and construction indicated; and complete with controls, safety devices, and accessories required.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Standard: Comply with MH 30.1[, **except for structural testing to establish rated capacity**].
- C. Rated Capacity: Capable of supporting total gross load of **<Insert load>** without permanent deflection or distortion.
- D. Platform: Not less than **[3/16-inch- (5-mm-)] [1/4-inch- (6-mm-)] [3/8-inch- (9.5-mm-)]** **<Insert dimension>** thick, nonskid steel plate.
 1. Platform Size: **[As indicated on Drawings] <Insert size>**.
 2. Frame: **[Manufacturer's standard] [Clean-pit type, designed to support leveler at sides of pit, with no supports at front of pit floor]**.
 3. Toe Guards: Equip open sides of dock leveler over range indicated with metal toe guards.
 - a. Toe-Guard Range: Entire upper **[operating] [working]** range.
- E. Hinged Lip: Not less than **[1/2-inch- (13-mm-)] [5/8-inch- (16-mm-)] [3/4-inch- (19-mm-)] [1-inch- (25-mm-)]** **<Insert dimension>** thick, nonskid steel plate.
 1. Hinge: Full-width, piano-type hinge with heavy-wall hinge tube[**and grease fittings**], with gussets on lip and ramp for support.
 2. Safety Barrier Lip: Designed to protect material-handling equipment from an accidental fall from loading platform edge of the dock leveler when the leveler is not in use.
- F. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
 1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
 - a. Above Adjoining Platform: **[12 inches (305 mm)] [18 inches (457 mm)] [As indicated on Drawings] <Insert dimension>**.
 - b. Below Adjoining Platform: **[12 inches (305 mm)] [14 inches (356 mm)] [As indicated on Drawings] <Insert dimension>**.
 2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to **4 inches (102 mm)** over width of ramp.
 4. Lip Operation: Manufacturer's standard mechanism, which automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck and automatically retracts lip when truck departs.

- a. Length of Lip Extension: [16 inches (406 mm)] [18 inches (457 mm)] [20 inches (508 mm)] [As indicated on Drawings] <Insert dimension>.
 5. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs.
 6. Interlock: Leveler does not operate while [overhead door is in closed position] [leveler night lock is engaged] [truck restraint is not engaged] [inflatable dock seal is not inflated] [and] [inflatable dock shelter is not inflated] <Insert equipment and condition>.
- G. Mechanical Operating System: Manual control; counterbalance and spring operation. Spring-operated raising and walk-down lowering of unloaded ramp. Equip leveler with an upward-biased-spring counterbalancing mechanism controlled by a hold-down device. Ramp raises to top limit of operating range by operating recessed control handle in ramp to disengage hold-down device. Ramp lowers below platform level with lip retracted by operating auxiliary, recessed control handle to release support legs.
1. Free-Fall Protection: Manufacturer's standard protection system to limit free fall of loaded ramps with front edge supported by truck bed.
- H. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Include means for lowering ramp below platform level with lip retracted behind dock bumpers. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than 3 inches (76 mm).
1. Remote-Control Station: [Weatherproof single] [Single]-button station of the constant-pressure type, enclosed in NEMA ICS 6, [Type 4] [Type 12] <Insert type> box. Ramp raises by depressing and holding button; ramp lowers at a controlled rate by releasing button.
 2. Remote-Control Station with Emergency Stop: [Weatherproof multibutton] [Multibutton] control station with an UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type, enclosed in NEMA ICS 6, [Type 4] [Type 12] <Insert type> box. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button.
 - a. Dual-Panel Control Station: Remote-control station for operating side-by-side dock levelers.
 - b. Master Panel: Control panel with integral fused disconnecting means for operating dock leveler, dock door, and truck restraints.
 3. Independent Lip Operation: Electric-powered hydraulic raising and hydraulic lowering of lip, controlled independent of raising and lowering of ramp.

- I. Electric Operating System: Electric control from a remote-control station; motorized operation. Electric activation for raising of ramp and automatic extending of lip. Equip leveler with a packaged unit including a unitized electric motor and shaft assembly of proper size, type, and operation for capacity of leveler indicated. Include means for lowering ramp below platform level with lip retracted behind dock bumpers.
 - 1. Remote-Control Station: [**Weatherproof single**] [**Single**]-button station of the constant-pressure type, enclosed in NEMA ICS 6, [**Type 4**] [**Type 12**] **<Insert type>** box. Ramp raises by depressing and holding button; ramp lowers at a controlled rate by releasing button.
 - 2. Remote-Control Station with Emergency Stop: [**Weatherproof multibutton**] [**Multibutton**] control station with an UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type, enclosed in NEMA ICS 6, [**Type 4**] [**Type 12**] **<Insert type>** box. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button.
- J. Air-Bag Operating System: Electric control from a remote-control station; pneumatic operation. High-volume, low-pressure lifting of ramp. Equip leveler with a packaged unit including a PVC-coated, reinforced polyester lifting bag and two-stage, single-speed electric fan of proper size, type, and operation for capacity of leveler indicated. Include dock-leveler supports controlled by release chain for lowering ramp below platform level without extending lip.
 - 1. Remote-Control Station: [**Weatherproof single**] [**Single**]-button station of the constant-pressure type, enclosed in NEMA ICS 6, [**Type 4**] **<Insert type>** box. Ramp raises by depressing and holding button; ramp lowers at a controlled rate by releasing button.
- K. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
 - 1. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
 - 2. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.
- L. Integral Molded-Rubber Dock Bumpers: Fabricated from [**4-inch- (102-mm-)**] [**6-inch- (152-mm-)**] **<Insert dimension>** thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
- M. Integral Laminated-Tread Dock Bumpers: Fabricated from [**4-1/2-inch- (114-mm-)**] [**6-inch- (152-mm-)**] **<Insert dimension>** thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-

steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.

N. Materials:

1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**.
3. Steel Tubing: ASTM A 500/A 500M, cold formed.
4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

O. Dock-Leveler Finish: Manufacturer's standard finish.

1. Toe Guards: Paint toe guards to comply with ANSI Z535.1.

P. Accessories:

1. Curb Angles: **3-by-3-by-1/4-inch (76-by-76-by-6-mm)** galvanized-steel curb angles for edge of recessed leveler pit, with **1/2-inch- (13-mm-)** diameter by **6-inch- (152-mm-)** long concrete anchors welded to angle at **6 inches (152 mm)** o.c.
2. Self-Forming Pan: Manufacturer's standard prefabricated, self-forming steel form system for poured-in-place construction of concrete pit.
3. Night Locks: Manufacturer's standard means to prevent extending lip and lowering ramp when overhead doors are locked.
4. Side and rear weatherseals.
5. Foam insulation under dock-leveler platform.
6. **[Abrasive skid-resistant] [Smooth]** surface.

2.3 EDGE-OF-DOCK LEVELERS **<Insert drawing designation>**

A. General: Surface-mounted, hinged-lip-type, edge-of-dock levelers designed for permanent installation on face of loading dock platform; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.

1. **<Double click here to find, evaluate, and insert list of manufacturers and products.>**

B. Standard: Comply with MH 30.1[, **except for structural testing to establish rated capacity**].

C. Rated Capacity: Capable of supporting total gross load of **<Insert load>** without permanent deflection or distortion.

D. Platform Ramp Width: **[66 inches (1676 mm)] [72 inches (1829 mm)] [78 inches (1981 mm)] [84 inches (2134 mm)] [As indicated on Drawings] <Insert dimension>**.

E. Hinged Lip: Not less than **[3/8-inch- (9.5-mm-)] [7/16-inch- (11-mm-)] [1/2-inch- (13-mm-)] <Insert dimension>** thick, nonskid steel tread plate.

1. Hinge: Full-width, piano-type hinge with heavy-wall hinge tube[**and grease fittings**], with gussets on lip and ramp for support.
- F. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
 - a. Above Adjoining Platform: **[5 inches (127 mm)] [6 inches (152 mm)] [As indicated on Drawings] <Insert dimension>.**
 - b. Below Adjoining Platform: **[5 inches (127 mm)] [As indicated on Drawings] <Insert dimension>.**
 2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to **3 inches (76 mm)** over width of ramp.
 4. Lip Operation: Manufacturer's standard mechanism, which automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck and automatically retracts lip when truck departs.
 - a. Length of Lip Extension: **[15 inches (381 mm)] [17 inches (432 mm)] [As indicated on Drawings] <Insert dimension>.**
 5. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs. Leveler shall be capable of retracting to stored position while truck is at loading dock.
- G. Mechanical Operating System: Manual control; counterbalance and spring operation. Spring-operated raising and walk-down lowering of unloaded ramp. Equip leveler with a torsion-spring counterbalancing mechanism controlled by a hold-down device.
1. Lever Handle: Self-storing lever handle for raising unloaded ramp with minimal lifting force by pulling lever back to extend lip and pushing lever forward to lower ramp and lip.
 2. Removable Lifting Handle: For raising unloaded ramp by lifting action.
- H. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than **3 inches (76 mm)**.

1. Remote-Control Station: [**Weatherproof single**] [**Single**]-button station of the constant-pressure type, enclosed in NEMA ICS 6, [**Type 12**] **<Insert type>** box. Ramp and lip raise to vertical position and extend to truck bed by depressing and holding button.
- I. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- and formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
 1. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
 2. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.
- J. Integral Molded-Rubber Dock Bumpers: Fabricated from [**4-inch- (102-mm-)**] [**6-inch- (152-mm-)**] **<Insert dimension>** thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
- K. Integral Laminated-Tread Dock Bumper: Fabricated from [**4-1/2-inch- (114-mm-)**] [**6-inch- (152-mm-)**] **<Insert dimension>** thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
- L. Materials:
 1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
 2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**.
 3. Steel Tubing: ASTM A 500/A 500M, cold formed.
 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- M. Dock-Leveler Finish: Manufacturer's standard finish.
- N. Accessories:
 1. Self-forming pan.
 2. Cast-in-place design.
 3. Run-off guards.
 4. Ramp approach plate.

2.4 TOP-OF-DOCK LEVELERS <Insert drawing designation>

- A. General: Surface-mounted, hinged-lip-type, top-of-dock levelers designed for permanent installation on top edge of loading dock platform without concrete pit; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Standard: Comply with MH 30.1[, **except for structural testing to establish rated capacity**].
- C. Rated Capacity: Capable of supporting total gross load of <Insert load> without permanent deflection or distortion.
- D. Platform Width: [**72 inches (1829 mm)**] [As indicated on Drawings] <Insert dimension>.
- E. Hinged Lip: Not less than [**3/8-inch- (9.5-mm-)**] [**7/16-inch- (11-mm-)**] <Insert dimension> thick, nonskid steel plate.
 - 1. Hinge: Full-width, piano-type hinge with heavy-wall hinge tube[**and grease fittings**], with gussets on lip and ramp for support.
- F. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
 - 1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with a minimum working range of [**10 inches (254 mm)**] <Insert dimension> above and [**4 inches (102 mm)**] <Insert dimension> below adjoining platform level.
 - 2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 - 3. Lip Operation: Manufacturer's standard mechanism, which automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck and automatically retracts lip when truck departs.
 - a. Length of Lip Extension: [**15 inches (381 mm)**] [As indicated on Drawings] <Insert dimension>.
 - 4. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs. Leveler shall be capable of retracting to stored position while truck is at loading dock.
- G. Mechanical Operating System: Manual control; counterbalance and spring operation. Spring-operated raising and walk-down lowering of unloaded ramp. Equip leveler with a torsion-spring counterbalancing mechanism controlled by a hold-down device.

1. Removable Lifting Hook: For raising unloaded ramp by lifting action and pushing forward to lower ramp and lip.
 - H. Hydraulic Operating System: Electric control from a remote-control station, fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated.
 1. Remote-Control Station: **[Weatherproof single]** **[Single]**-button station of the constant-pressure type, enclosed in NEMA ICS 6, **[Type 12]** **<Insert type>** box. Ramp and lip raise to vertical position and extend to truck bed by depressing and holding button.
 - I. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- and formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
 - J. Integral Molded-Rubber Dock Bumpers: Fabricated from **[4-inch- (102-mm-)]** **[6-inch- (152-mm-)]** **<Insert dimension>** thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
 - K. Integral Laminated-Tread Dock Bumpers: Fabricated from **[4-1/2-inch- (114-mm-)]** **[6-inch- (152-mm-)]** **<Insert dimension>** thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
 - L. Materials:
 1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
 2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**.
 3. Steel Tubing: ASTM A 500/A 500M, cold formed.
 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - M. Dock-Leveler Finish: Manufacturer's standard finish.
- 2.5 VERTICAL-STORING DOCK LEVELERS **<Insert drawing designation>**
- A. General: Recessed, hinged-lip-type, vertical-storing dock levelers designed for permanent installation in shallow concrete pits preformed in the edge of loading platform; of type,

function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Standard: Comply with MH 30.1[, **except for structural testing to establish rated capacity**].
- C. Rated Capacity: Capable of supporting total gross load of **<Insert load>** without permanent deflection or distortion.
- D. Platform: Not less than [**3/16-inch- (5-mm-)**] [**1/4-inch- (6-mm-)**] **<Insert dimension>** thick, nonskid steel plate.
 1. Platform Size: [**As indicated on Drawings**] **<Insert size>**.
- E. Hinged Lip: Not less than [**1/2-inch- (13-mm-)**] [**5/8-inch- (16-mm-)**] **<Insert dimension>** thick, nonskid steel plate.
 1. Hinge: Full-width, piano-type hinge with heavy-wall hinge tube[**and grease fittings**], with gussets on lip and ramp for support.
- F. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
 1. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
 - a. Above Adjoining Platform: [**6 inches (152 mm)**] [**10 inches (254 mm)**] [**12 inches (305 mm)**] [**As indicated on Drawings**] **<Insert dimension>**.
 - b. Below Adjoining Platform: [**6 inches (152 mm)**] [**As indicated on Drawings**] **<Insert dimension>**.
 2. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 3. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to **4 inches (102 mm)** over width of ramp.
 4. Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.
 - a. Length of Lip Extension: [**16 inches (406 mm)**] [**18 inches (457 mm)**] [**20 inches (508 mm)**] [**As indicated on Drawings**] **<Insert dimension>**.
- G. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump,

manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than **3 inches (76 mm)**. Provide mechanical lock that prevents leveler from lowering without hydraulic pressure.

1. Remote-Control Station: [**Weatherproof single**] [**Single**]-button station of the constant-pressure type, enclosed in NEMA ICS 6, [**Type 12**] **<Insert type>** box. Ramp lowers at a controlled rate.
 2. Remote-Control Station with Emergency Stop: [**Weatherproof multibutton**] [**Multibutton**] control station with an UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type, enclosed in NEMA ICS 6, [**Type 12**] **<Insert type>** box. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button.
 - a. Master Panel: Control panel with integral fused disconnecting means for operating dock leveler, dock door, and truck restraints.
 3. Independent Lip Operation: Electric-powered hydraulic raising and lowering of lip, controlled independent of raising and lowering of ramp.
- H. Construction: Fabricate dock-leveler frame, platform supports,[**run-off guards**,] and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
- I. Integral Molded-Rubber Dock Bumpers: Fabricated from [**4-inch- (102-mm-)**] [**6-inch- (152-mm-)**] **<Insert dimension>** thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
- J. Integral Laminated-Tread Dock Bumpers: Fabricated from [**4-1/2-inch- (114-mm-)**] [**6-inch- (152-mm-)**] **<Insert dimension>** thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
- K. Materials:
1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
 2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**.
 3. Steel Tubing: ASTM A 500/A 500M, cold formed.
 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

- L. Dock-Leveler Finish: Manufacturer's standard finish.
- M. Accessories:
 - 1. Interlock: Leveler does not operate while [**overhead door is in closed position**] [**and**] [**truck restraint is not engaged**].
 - 2. Curb Angles: **3-by-3-by-1/4-inch** (**76-by-76-by-6-mm**) galvanized-steel curb angles for edge of recessed leveler pit, with **1/2-inch-** (**13-mm-**) diameter by **6-inch-** (**152-mm-**) long concrete anchors welded to angle at **6 inches** (**152 mm**) o.c.

2.6 TRUCK LEVELERS <Insert drawing designation>

- A. General: Two-cylinder, hydraulic ramp designed to raise and lower end of truck at loading dock. Equip leveler with a packaged unit including a unitized electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity indicated. Provide manufacturer's standard means for limiting loaded ramp's free fall.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Rated Capacity: Capable of supporting total gross load of <Insert load> without permanent deflection or distortion.
- C. Travel Speed: Leveler raises and lowers at **3 fpm** (**0.015 m/s**), measured at traveling end.
- D. Surface-Mounted Units: Designed for mounting on surface of concrete driveway.
- E. Shallow-Pit-Mounted Units: Designed for mounting in sloping shallow pit; capable of **18 inches** (**457 mm**) of vertical travel above and below level of driveway.
- F. Full-Pit-Mounted Units: Designed for installation in a fully recessed pit, with top of platform in stored position flush with driveway.
 - 1. Provide removable plate for access to pit for service.
- G. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Self-contained, electric-powered hydraulic raising and hydraulic lowering of lift.
 - 1. Remote-Control Station: Weatherproof, multibutton control station of the constant-pressure type with UP and DOWN push buttons. Controller shall consist of magnetic motor starter with three-pole adjustable overloads and 24-V control transformer with 4-A, fused secondary prewired to terminal strips and enclosed in NEMA ICS 6, [**Type 12**] <Insert type> box.
 - a. Upper-Travel-Limit Switch: Equip unit with manufacturer's standard, adjustable, upper-travel-limit switch.

- H. Construction: Fabricate truck leveler from structural- and formed-steel shapes; fabricate platform from nonskid steel plate. Construct platform with notch at loading dock end to provide clearance for truck restraint.
 - 1. Cylinders: Equip truck leveler with not less than two heavy-duty, high-pressure, hydraulic, ram-type cylinders. Rams shall be manufacturer's standard, either direct-displacement plunger or rod-and-piston type with positive internal stops. Cylinder rods shall be chrome plated and polished.
- I. Materials:
 - 1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
 - 2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**.
 - 3. Steel Tubing: ASTM A 500/A 500M, cold formed.
 - 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- J. Truck-Leveler Finish: Manufacturer's standard finish.

2.7 TRUCK RESTRAINTS <Insert drawing designation>

- A. General: Manufacturer's standard device designed to engage truck's rear-impact guard and hold truck at loading dock. Restraint shall consist of an iron or steel restraining arm that raises until contacting rear-impact guard. Arm shall move vertically, automatically adjusting to varying height of truck due to loading and unloading operations.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Standard: Comply with MH 30.3.
- C. Rated Capacity: Capable of supporting total gross load of <Insert load> without permanent deflection or distortion.
- D. Operating Range: Capable of restraining rear-impact guards within a range from:
 - 1. Vertical: [**12 inches (305 mm)**] [**30 inches (762 mm)**] [As indicated on Drawings] <Insert dimension> above driveway.
 - 2. Horizontal: [**12 inches (305 mm)**] [As indicated on Drawings] <Insert dimension> in front of dock bumpers.
- E. Power Operating System: Manufacturer's standard electromechanical or hydraulic unit.
 - 1. Remote-Control Station: Single-button station of the constant-pressure type, enclosed in NEMA ICS 6, [Type 12] <Insert type> box. Restraint is engaged by depressing and holding button; restraint is released by releasing button.
 - 2. Interlock: Leveler does not operate while truck restraint is not engaged.

- F. Mechanical Operating System: Restraint operates by use of a lifting rod or hook to raise engagement device.
- G. Rear-Impact-Guard Sensor: Detects presence of rear-impact guard[**and automatically returns to stored position if rear-impact guard is not engaged**].
- H. Caution Signs: Exterior, surface mounted; designed to inform both dock attendant and truck driver; with sign copy as follows. Provide one sign at each truck-restraint location.
 - 1. Sign Copy in Forward and Reverse Text: [**Manufacturer's standard text permitting truck movement with green light**] <Insert text>.
 - 2. Interior Sign Copy: [**Manufacturer's standard text permitting truck movement with green light**] <Insert text>.
- I. Light-Communication System: Red and green illuminated signal-light sets, with lens approximately 4 inches (102 mm) in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with steel control panel located at interior of dock that [**includes illuminated lights indicating**] [**indicates**] status of exterior signal lights. Provide signal-light set and control panel at each location indicated for light-communication system. Enclose exterior signal-light sets in steel or plastic housing with sunshade.
 - 1. Manual Operation: System is activated by push button or switch located on [**interior**] [**truck-restraint**] control panel.
 - 2. Automatic Operation: System is activated automatically by [**limit switch**] [**photoelectric sensor**] [**magnetic switch**] mounted on overhead door track. Provide on-off switch located on [**light-communication system**] [**truck-restraint**] control panel.
 - 3. Automatic Operation: System is activated automatically when device engages rear-impact guard. Provide on-off switch located on truck-restraint control panel.
 - 4. Mounting: [**Wall**] [**Driveway**] [**Pit**].
- J. Alarm: [**Audible**] [**and**] [**visual**] system indicating that rear-impact guard is not engaged, with manual reset.
- K. Materials:
 - 1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
 - 2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade 55 (380).
 - 3. Steel Tubing: ASTM A 500/A 500M, cold formed.
 - 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- L. Truck-Restraint Finish: Manufacturer's standard finish.
- M. Accessories: [**Interlock to dock leveler**] [**Key switch**].

2.8 LIGHT-COMMUNICATION SYSTEMS

- A. General: Communication system consisting of signal-light sets, caution signs, alarms, and controls for each location indicated.
 - 1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Caution Signs: Surface mounted; designed to inform both dock attendant and truck driver; with sign copy as follows:
 - 1. Exterior Sign Copy in Forward and Reverse Text: [**Manufacturer's standard text permitting truck movement with green light**] **<Insert text>**.
 - 2. Interior Sign Copy: [**Manufacturer's standard text permitting truck movement with green light**] **<Insert text>**.
- C. Signal-Light Sets: Red and green illuminated signal-light sets, with lens approximately **4 inches (102 mm)** in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with steel control panel that [**includes illuminated lights indicating**] [**indicates**] status of exterior signal lights; locate control panel at interior of dock. Provide signal-light set and control panel at each location indicated for light-communication system. Enclose signal lights in steel or plastic housing, with exterior signal-light sets equipped with sunshade.
 - 1. Manual Operation: Lights are activated by push button or switch located on [**interior signal-light enclosure**] [**control panel**].
 - 2. Automatic Operation: Lights are activated automatically by [**limit switch**] [**photoelectric sensor**] [**magnetic switch**] mounted on overhead door track. Provide on-off switch located on control panel.
- D. Materials:
 - 1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
 - 2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**.
 - 3. Steel Tubing: ASTM A 500/A 500M, cold formed.
 - 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.9 FINISH REQUIREMENTS

- A. Finish loading dock equipment after assembly and testing.
- B. Galvanizing: Hot-dip galvanize components to comply with the following:
 - 1. ASTM A 123/A 123M for iron and steel loading dock equipment.
 - 2. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware for loading dock equipment.

- C. Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat in manufacturer's standard color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical systems for loading dock equipment to verify actual locations of connections before equipment installation.
- C. Examine walls and floors of pits for suitable conditions where recessed loading dock equipment is to be installed. Pits shall be plumb and square and properly sloped for drainage from back to front of loading dock.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate size and location of loading dock equipment indicated to be attached to or recessed into concrete or masonry, and furnish anchoring devices with templates, diagrams, and instructions for their installation.
- B. Set curb angles in concrete edges of dock-leveler recessed pits with tops flush with loading platform. Fit exposed connections together to form hairline joints.
- C. Set curb angles in concrete edges of truck-leveler recessed pits with tops flush with driveway. Fit exposed connections together to form hairline joints.
- D. Place self-forming pan system for **[recessed dock]** **[edge-of-dock]** levelers in proper relation to loading platform before pouring concrete.
- E. Clean recessed pits of debris.

3.3 INSTALLATION

- A. General: Install loading dock equipment as required for a complete installation.
 - 1. Rough-in electrical connections.
- B. Recessed Dock Levelers: Attach dock levelers securely to loading dock platform, flush with adjacent loading dock surfaces and square to recessed pit.

- C. **[Edge] [Top]-of-Dock Levelers:** Attach dock levelers to loading dock platform in a manner that complies with requirements indicated for arrangement and position relative to top of platform.
 - 1. Weld anchor holes in contact with continuous embedded loading dock edge channel. Weld or bolt bumper blocks to face of loading dock.
- D. **Truck Levelers:** Attach truck levelers securely to driveway construction with expansion anchors and bolts.
- E. **Truck Restraints:** Attach truck restraints in a manner that complies with requirements for arrangement and height required for device to engage vehicle rear-impact guard. **[Interconnect control panel and signals with dock leveler.]**
 - 1. **Wall-Mounted Units:** Weld truck restraints to steel **[curb angle] [edge channel] [mounting plate]** embedded in loading dock edge.
 - 2. **Wall-Mounted Units:** Anchor truck restraints to face of loading dock with expansion anchors and bolts.
 - 3. **Driveway-Mounted Units:** Anchor truck restraints to driveway with expansion anchors and bolts.
 - 4. **Pit-Mounted Units:** Anchor truck restraints to concrete pit with expansion anchors and bolts.

3.4 ADJUSTING

- A. Adjust loading dock equipment to function smoothly and safely, and lubricate as recommended by manufacturer.
- B. Test dock levelers for vertical travel within operating range indicated.
- C. After completing installation of exposed, factory-finished loading dock equipment, inspect exposed finishes and repair damaged finishes.

3.5 MAINTENANCE SERVICE

- A. **Maintenance Service:** Beginning at Substantial Completion, maintenance service shall include **[12] <Insert number>** months' full maintenance by skilled employees of loading dock equipment Installer. Include **[monthly] [quarterly]** preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper loading dock equipment operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.6 DEMONSTRATION

- A. **[Engage a factory-authorized service representative to train] [Train]** Owner's maintenance personnel to adjust, operate, and maintain loading dock equipment.

END OF SECTION 11 13 19

SECTION 11 14 80 - WASH BAY CURTAINS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes walk-draw curtains dividing wash bays, consisting of overhead suspension track, outdoor waterproof fabric curtains, and floor-mounted anchorages.
- B. Related Sections include the following:
 - 1. Division 5 Section "Metal Fabrications" for secondary framing.

1.2 SUBMITTALS

- A. Product Data: For the following:
 - 1. Tracks: Include maximum weights of curtains that can be supported.
 - 2. Fabrics, and textile treatments.
 - 3. Attachment hardware
- B. Shop Drawings:
 - 1. Tracks: Show installation and anchorage details.
 - 2. Curtains: Show sizes, locations, and details of installation.
 - 3. Mounting details to adjacent structure.
- C. Coordination Drawings: For track installation; reflected ceiling plans drawn to scale and coordinating track installation with openings and ceiling-mounted items. Show the following:
 - 1. Suspended ceiling components, including fire sprinkler piping.
 - 2. Structural members to which secondary framing will be attached.
- D. Samples for Verification: As follows:
 - 1. Tracks: 18 inches (450 mm) long, with carriers and accessories.
 - 2. Fabrics: For each color and pattern indicated, provide Sample, full length (height) by 16 inches (400 mm) wide, with specified textile treatments applied. Show complete pattern repeat if any. Mark top and face of fabric.
 - 3. Textile Trims: For each color and pattern indicated, 18 inches (450 mm) long.
 - 4. Curtain Fabrication Samples: For each heading, fabric, color, and pattern indicated, a complete full-size panel to verify details of fabrication and thread colors.
- E. Product Certificates: For each fabric treated with flame retardant, signed by fabric supplier and indicating treatment durability and cleaning procedures required to maintain treatment effectiveness.
- F. Maintenance Data: For products to include in maintenance manuals.

1.3 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide products that pass NFPA 701 as determined by testing of fabrics that were treated using treatment-application method intended for use for this Project by a testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Mockup: Install mockup to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Install mockup for each type of product and combination of products indicated.
 - 2. Approved mockup may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements before curtain fabrication and indicate measurements on Shop Drawings.
- B. Scheduling: Do not deliver or install curtains until after other finish work, including painting, is complete and spaces are otherwise ready for occupancy.

1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Track Carriers: For each size indicated, equal to 5 percent of amount installed, but no fewer than 10 of each size.
 - 2. Fabrics: For each fabric and color, full-width /full-length panels equal to 5 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. This specification is based upon products manufactured by Goff's Enterprises, Inc. of Pewaukee WI. Subject to compliance with substitution requirements, products from other manufacturers may be incorporated into the Work.

2.2 TRACKS

- A. Tracks:
 - 1. Basis-of-Design Product: "Goff's Curtain Walls" Track HW150.
 - 2. Formed 16 gage galvanized steel into inverted U-shaped channel and compatible with carriers.
 - 3. Mounting Brackets: Galvanized steel, of type suitable for fastening track to surface indicated and designed to support weight of track assembly and curtain plus force applied to operate track.

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- a. Mounting Surface: As indicated on Drawings.
4. Installation Fasteners: Sized to support track assembly and curtain, and fabricated from metal compatible with track, brackets, and supporting construction. Provide two fasteners to fasten each bracket to supporting construction.
5. Operation: Draw track.
6. Carriers: Nylon, rollers with hooks, Model HW156.
7. Accessories:
 - a. Manufacturer's Standard Mounting Devices: Track Bracket, Track Splice, Ceiling Support Hardware, Wall and End Mount Hardware as appropriate for the installation.
 - b. Universal Track Connector HW100.
 - c. Attachment Hardware: Galvanized steel bolts, nuts, and washers.

B. Motorized Track: None.

2.3 CURTAINS

A. Curtain:

1. Basis-of-Design: "Outdoor Curtain Wall" as manufactured by Goff's.
2. Heading/Top Hem: Manufacturer's standard heavy-duty hem as appropriate for the installation.
3. Curtain:
 - a. Upper Section: Fabric, 18 ounce reinforced vinyl, coated; 'white' color.
 - b. Mid-Section: 40 mil double-polished clear window.
 - c. Lower Section: Fabric, 18 ounce reinforced colored vinyl.
 - d. Color: As selected.
 - e. Textile Treatments: Flame retardant in accordance with NFPA-701 and requirements of the California State Fire Marshal Standard..
 - f. Grommets: No. 2 brass tooth grommets at 12 inches o.c.
4. Bottom Treatment: Type 'C' Spring Clip Attachment system installed at 3'-0" oc..
5. Hem Weights: Manufacturer's standard continuous galvanized steel chain sewn into bottom hem.

2.4 ACCESSORIES:

- A. Floor-Mounted Wind Ties: Style 'C' metal spring clip on curtain, attaching to corrosion-resistant metal plate and ring surface-mounted to floor.

2.5 CURTAIN FABRICATION

A. Fabricate curtains in heading style and bottom style indicated.

1. One-Way-Stacking Curtains: Add 5 inches (127 mm) to overall width for returns.

- B. Seams: Double lock stitched using mildew/rot resistant thread. Horizontal seams are not acceptable.
- C. Side Hems: Manufacturers' standard.
- D. Bottom Hems: Double-turned, 4-inch- (102-mm-) wide hems consisting of three layers of fabric, weighted.
- E. Wind Relief: If recommended by manufacturer due to semi-exposed nature of the Wash Bays, provide reinforced 1-inch nylon webbing every 3-feet vertical and horizontal.
- F. Provide vertical seam between curtain pairs, consisting of 2-inch heavy-duty Velcro overlap.

PART 3 - EXECUTION

3.1 CURTAIN TRACK INSTALLATION

- A. Install track systems according to manufacturer's written instructions, level and plumb, and at height and location as indicated on Drawings.
- B. Isolate metal parts of tracks and brackets from concrete, masonry, and mortar to prevent galvanic action. Use tape or another method recommended in writing by track manufacturer.

3.2 CURTAIN INSTALLATION

- A. Install so that bottom hems clear finished floor by approximately 1 inch (25 mm).
- B. Install with 5 inches of return onto adjacent sidewall at each end. Provide Velcro ties to secure edge to wall. Provide Velcro tie-backs to secure curtain in opened position.

3.3 WIND TIE INSTALLATION

- A. Coordinate location of ties with curtain fabrication. Drill holes in concrete topping slab to receive post-installed anchorages. Exercise extreme caution to avoid penetrating sub-slab waterproofing membrane.
- B. Install anchors according to manufacturer's direction, and install wind ties.

3.4 ADJUSTING

- A. After hanging curtains, test and adjust each track to produce unencumbered, smooth operation.
- B. Dress down curtains as required to produce crease- and wrinkle-free installation.
- C. Remove and replace curtains that are damaged, stained or soiled.

END OF SECTION 11 14 80

Section 11 24 24 - FALL RESTRAINT EQUIPMENT

PART 1: GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Suspended access support equipment including:
 - a. System design
 - c. Suspension line anchors
 - d. Fall arrest anchors
 - e. Davits – base, mast and boom

- B. Related Sections

- 1. Division 5 Section “Structural Steel Framing” for new steel framing for anchors and davit bases.
- 2. Division 7 Section “Joint Sealants” for related sealants.
- 3. Division 8 Section “Curtainwall” for window washer swing stage studs.”

1.3 REFERENCES

- A. Publications listed herein are part of this specification to extent referenced.

- 1. American Institute of Steel Construction (AISC)
 - a. AISC Publication Load and Resistance Factor Design for Structural Steel Buildings
 - b. AISC Specifications for the Design of Cold-Formed Steel Structural Members
- 2. American Society for Testing and Materials (ASTM)
 - a. ASTM A36 Specification for Structural Steel
 - b. ASTM A123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Hardware
 - c. ASTM A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - d. ASTM A780 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

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- e. ASTM B209-04 Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - f. ASTM B221-02 Specification for Aluminum and Aluminum-Alloy Extruded Bars, Wire, Shapes, and Tubes
 - g. ASTM B308/B308M-02 Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
- 3. American Welding Society (AWS)
 - a. AWS D1.1 Structural Welding Code
 - 4. Occupational Safety and Health Standards
 - a. ANSI/IWCA I-14.1-2001 Window Cleaning Safety
 - b. 1910 Subpart D (Walking and Working Surfaces)
 - c. 1910.66 Appendix C (Personal Fall Arrest)
 - d. 1910.66 Subpart F (Powered Platforms)
 - e. OSHA procedures and precautions for employees using descent control equipment.

1.4 SYSTEM DESCRIPTION

A. Anchorage Design Requirements

- 1. Safety anchor system design shall comply with current OSHA, ANSI, and local regulations pertaining to window cleaning and fall protection in accordance with sections 1.1, 1.2, and 1.3.
- 2. Anchor system shall provide independent fall arrest anchorages in addition to suspension line anchorages for each descent location as required by OSHA and ANSI requirements.
- 3. System shall be designed to be compatible with current window cleaning industry standard equipment (examples: rope descent systems, boatswain chairs, swing stages, transportable suspension devices).
- 4. Structural design requirements of anchorages and tie-back.
 - a. Anchorage shall be capable of sustaining a minimum ultimate load of 5,000 lbs., in any direction the load may be applied, without fracture or failure.
 - b. Anchorage shall be capable of sustaining a minimum proof load of 2,500 lbs., in any direction the load may be applied, without permanent deformation or damage to anchorage.
 - c. Anchorages shall be designed with a minimum 1,250 lb. working load, in any direction the load may be applied.
 - e. Parapet or guardrails subject to direct loading by workers' ropes, cables, or other equipment shall be designed to withstand 1,800 lbs without damage to either the structure or the rigging component in contact with it.

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5. Locate primary support and fall arrest anchors in conjunction with areas on façade of building needing to be serviced. Consideration shall be given to the type of suspension equipment that will be used at the building and conditions such as workers' reach, rigging methods, and roof edge conditions. Anchorages shall be unobstructed and located behind and in line with equipment or portion of building they are intended to service.

B. Davit Design Requirements

1. Verify that davit locations indicated on drawings will accommodate suspended maintenance during swing stage operations. Typically, spacing of davits is on column lines. Placement of supports should allow cables suspending powered equipment to hang either parallel and in plane or slightly angulated with the building façade as required by users. Consideration should be given to operating other equipment that may be required for access.
2. Verify that locations indicated on drawings for independent anchorages for personal fall protection are adequate when using davits in accordance with section 1.4(A) Anchorage Design Requirements.
3. Davits shall be capable of supporting an ultimate load of not less than 4 times the rated load. The rated load of the davit shall be based on the swing stage hoist and powered platform load capacity.
4. Manufacture shall provide engineer's calculations and test report to verify that davit will support load requirements.
5. Outreach of portable davit boom shall not exceed 8 foot 6 six inches.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product proposed

1. Test report certified by a professional engineer
2. General product data
3. Detailed drawings of equipment proposed
4. Installation instructions

B. Shop Drawings

1. Submit scaled shop drawings showing location plan of all support equipment and sections detailing all parts and accessories.
2. Clearly specify equipment dimensions, materials, fabrication details, hardware, and installation instructions.
3. Include notes with guidelines of proper use of system.
4. Equipment location plan to include identification number next to each piece of equipment, i.e. (anchors and davits) that are permanently affixed to a structure.
5. Field welds shall be indicated on equipment details using AWS symbols and showing length and size. Auxiliary views shall be shown to clarify welding as required.
6. Shop drawings shall be prepared under supervision of a registered professional engineer and shall bear the engineer's seal and signature. Professional engineer

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shall be licensed in jurisdiction where project is located. Include P.E. certified report of tested equipment.

C. Quality Assurance Submittal Certificates

1. Provide documentation verifying company's amount of experience and successful performance in design, fabrication, and installation of permanent window washing equipment.
2. Submit listing of company's installations representing similar scope and complexity to project requirements for previous 10 years. List shall include information as follows:
 - a. Project name and address
 - b. Name of owner
 - c. Name of contractor
 - d. Name of architect (if applicable)
 - e. Date of completion
3. Provide documentation verifying that installers have been trained by the manufacturer and are competent.

D. Contract Close-out Submittals

1. Operation and Maintenance
 - a. Provide a safety inspection logbook for yearly inspections. Log book shall include a certification of compliance letter. The certification of compliance shall state that access system is in compliance with current OSHA regulations and ANSI/IWCA I-14.1-2001 Window Cleaning Safety Standard.
2. Project Record Document Data
 - a. Record anchor locations and details.
 - b. Submit 2 copies of a reduced, plastic laminated Project Record Drawing showing as-installed anchor locations, details, and instructional text in English (and Spanish upon request). Post one copy on interior of each roof door or adjacent to exit on roof; owner shall establish exact location.
 - c. Submit a letter of certification by a registered professional engineer licensed in jurisdiction where project is located verifying that installed anchors and system are in compliance with OSHA and ANSI requirements as specified. Each piece of access equipment dedicated to the building shall be tested on site under the supervision of a P.E. in accordance with ANSI/IWCA I-14.1-2001 Window Cleaning Safety and Summit Anchor Co. test procedures.

1.6 QUALITY ASSURANCE

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A. Qualifications

1. Provide products from a company specializing in design, fabrication, and installation of permanent window washing equipment with a minimum of 5 years documented experience. Companies like miscellaneous metal fabricators not normally engaged in design and fabrications of suspended access equipment are not acceptable.
2. Manufacturer and installer shall have specific liability insurance (products and completed operations) in an amount not less than \$5,000,000.
3. Installer(s) shall be trained or qualified by manufacturer in installation techniques and procedures of permanent window washing equipment and shall demonstrate a minimum of 5 years successful experience in such installation.

B. Regulatory Requirements

1. Comply with Occupational Health and Safety Standards:
 - a. ANSI/IWCA I-14.1-2001 Window Cleaning Safety Standard
 - b. 1910 Subpart D (Walking and Working Surfaces)
 - c. 1910.66 Appendix C (Personal Fall Arrest)
 - d. 1910.66 Subpart F (Powered Platforms)
 - e. OSHA Procedures and precautions for employees using descent control equipment.
2. Welding shall comply with AWS D1.1 and shall be performed by welders qualified to work in jurisdiction where project is located.
3. Comply with AISC publications:
 - a. Load and Resistance Factor Design for Structural Steel Buildings
 - b. Specifications for the Design of Cold-Formed Steel Structural Members

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original unopened packaging.

B. Storage and Protection

1. Store materials in a protected area away from construction activities.
2. Clean bolts that have become dirty before installing.
3. Special care must be taken with stainless steel since not compatible with many chemicals and materials.
4. Do not install damaged materials. Remove damaged materials from site.

1.8 SEQUENCING AND COORDINATION

- A. General contractor is responsible for coordinating the schedule for producing shop drawings, fabricating suspended access equipment, and installation. General contractor

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shall allow three weeks for delivery of shop drawings and three weeks to deliver equipment upon approval of shop drawing by general contractor.

- D. Manufacturer to provide detailed installation instructions and directions for installation of embedded items, welded items, and through-bolted items, etc.
- C. Manufacturer to provide installation assistance during installation of the equipment. However, the responsibility of the installation rest with the general contractor unless equipment is installed and certified by the manufacturer.

PART 2: PRODUCTS

2.1 MANUFACTURERS & INSTALLERS

- A. Basis of Design Product: Subject to compliance with requirements, provide suspended access and fall restraint systems as manufactured by Summit Anchor Company or comparable product by one of the following:

- 1. American Davit and Anchor
- 2. Pro-Bel Enterprises, Ltd.

2.2 STRUCTURAL COMPONENTS' MATERIALS

- A. Exposed Structural Components Finish: Galvanized Mild Steel or Stainless Steel

- 1. Steel: ASTM A572 GR 50
- 2. Steel: ASTM A A36
- 3. Galvanizing: ASTM A123
- 4. Stainless Steel; 304 ASTM A 193 Grade B8, Class 2
- 5. Aluminum; 6061-T6 Alloy

- B. Yield Strength

- 1. Base Plates and Bottom Plates, High Strength Steel: 50 ksi minimum
- 2. Other Sections: 36 ksi minimum

- C. Non-Structural Components

- 1. Aluminum; 6061-T6 Alloy
- 2. Alloys shall conform to requirements published in AA Aluminum Standards.
- 3. Sheet and Plate: ASTM B209
- 4. Extruded Bars, Rods, Shapes, and Tubes: ASTM B221

- D. Cold-Rolled Sections

- 1. ASTM A500
- 2. Yield Strength: 55 ksi minimum
- 3. Tensile Strength: 62 ksi minimum

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E. Nuts, Bolts, Davit Pins, and Washers

1. Stainless Steel; 304 ASTM A 193 Grade B8 or F593C
2. Galvanized Flat Washers ASTM F-436 or 18 -8 Stainless Steel

E. Anchor Bolts (for securing base plate)

1. Metal: Stainless Steel, 304 Stainless Steel; ASTM A 193 Grade 8, B8
2. Size: 5/8 in. diameter minimum

2.3 MANUFACTURED UNITS

A. Anchor

1. Capable of withstanding 5000 lbs. (2268kg) in any direction without permanent deflection.
2. Anchor eye size: Not less than ¾ inch (20 mm) diameter material with 2 ¼ in (60 mm) eye opening.
3. Anchor eye metals:
 - a. Forged, 1030 quenched and tempered per ASTM 576-90-b, 72ksi minimum
 - b. Stainless steel, type 304, solution annealed, 35 ksi minimum
4. Anchor tube height: not less than 4 in. above the finished roof.

B. Davit Base

1. Stanchion type complete with davit adapter and lock pin with stainless steel safety snap pin.
2. Davit socket; with two stainless steel hinge pins and stainless steel safety snap pins.
3. Pier Height: not less than 10 in. above finished roof surface to allow proper fit up with adaptor.

C. Flashing – verify compatibility with roofing system

1. Seamless Spun Aluminum Flashing: ASTM B221; Type 6061-T6 alloy
2. Stainless Steel: 304

2.4 FABRICATION

- A. Fabricate work true to dimension, square, plumb, level, and free from distortion or defects detrimental to appearance and performance.

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- E. Grind off surplus welding material to ensure exposed surfaces are smooth so as not to abrade workers' ropes.
- C. Welding shall be in accordance with the AWS Structural Welding Code D1.1/D1.

PART 3: EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions

- 1. Examine areas and conditions under which permanent window washing equipment shall be installed.
- 2. Report to general contractor any conditions that deviate from shop drawings or any defects in workmanship that would cause an unsafe installation. This report shall be verified in writing to the general contractor and any other responsible party.
- 3. Correct conditions detrimental to timely and proper execution of work.
- 4. Do not proceed until unsatisfactory conditions have been corrected.
- 5. Commencement of installation constitutes acceptance of conditions and responsibility for satisfactory performance by installer.
- 6. Faults occurring in work of this section due to acceptance of unsatisfactory conditions shall be corrected at no additional cost to owner.

3.2 INSTALLATION

A. General Requirements

- 1. Install window washing system in compliance with manufacturer's instructions. Install equipment level, tightly fitted, and flush to adjacent surfaces as needed for proper installation.
- 2. Coordinate anchor installation with roofing installation to ensure a watertight and warrantable condition of the roofing. Anchors shall be directly flashed into roofing in a manner compatible with roofing system and anchors.
- 3. When components come into contact with dissimilar metals, surfaces shall be kept from direct contact to prevent corrosion.
- 4. No wall anchors shall be installed through membrane roofing system without specification detailing such from the architect or water proofing company warranting the roof.
- 5. Deform a minimum of two threads of tail end of anchor studs after nuts have been tightened to prevent accidental removal or vandalism. Deform threads with 2/32" stainless steel punch

B. Instructions for welding access equipment to structure

- 1. All welders must be certified to American Welding Society (AWS) in accordance with AWS standards.

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2. Welding rods used to weld the anchor system to be E70 xx electrodes.
3. Prior to welding anchors to structure, abrasively remove within one inch of all welded surfaces galvanizing, mill, scale, and rust.
4. Immediately after welding, chip away slag to prepare for welding inspector to inspect welds.
5. An AWS certified welding inspector must inspect and confirm size of all field welds. Following the inspection a written report must be supplied to the building owner and/or general contractor. Welded joints shall not be painted until after welding has been completed and the weld accepted.
6. Immediately after an acceptable inspection, paint welded areas with cold-galvanizing compound to protect from corrosion.
7. Structural steel to receive roof or wall anchors shall have a surface wide enough so that base plate can be welded all the way around. For example, anchors equipped with 4½ in. (112.5 mm) base plates would require a minimum 5 in. (137.5 mm) surface to weld to.

D. Aluminum Flashing

1. Deck flange shall be flashed in compliance with National Roofing Contractor Association recommendations.

3.3 REPAIR/RESTORATION

A. Galvanizing Touch-Up

1. Immediately after erection clean field welds and abraded areas. Repair damaged areas in compliance with ASTM A780.

3.4 FIELD QUALITY CONTROL

A. Inspection and site visits

1. Inspections and site visits shall be performed while installation of equipment is in progress under the supervision qualified professional engineer registered in the jurisdiction where the project is located.
2. On site inspection of equipment welded to structure shall be performed by an AWS Certified Welding Inspector verifying, in writing, size and quality of welds. Such an inspection shall be performed on each piece of equipment before roofing material is installed.
3. On site inspection shall be performed on all cast in place items while being tied in with the rebar with sufficient time before concrete is poured to allow to adjustments to embedded items as recommended by inspector.
4. G.C. shall be responsible to schedule above site visits and inspections with sufficient advanced notice given to the inspection company.

B. Site Tests

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1. All equipment shall be tested on site in accordance with manufacturer's recommendations, under the supervision of a professional engineer, and ANSI/IWCA I-14.1-2001 Window Cleaning Safety Standards, before being placed in service.
 2. Equipment shall be tested under the supervision of a professional engineer with experience with suspended maintenance equipment and manufacturers guidelines.
- C. Manufacturer shall assist and/or supervise installation of window washing equipment installed by others when such is included in contracted.

3.5 ADJUSTING

- A. Verify that completed work has been installed correctly and products function properly. Make adjustments where needed to ensure satisfactory operation.
- B. Complete inspection logbook to certify system for use noting any deviations, changes, or corrections from original shop drawings. Provide as-built anchor layout plan on 11 in. x 17 in. paper or larger together with annual inspection log book.

END OF SECTION 11 24 24

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cooking appliances.
2. Kitchen exhaust ventilation.
3. Refrigeration appliances.
4. Cleaning appliances.
5. Trash compactors.

B. Related Sections:

1. Section 112600 "Unit Kitchens" for small, compact kitchen units that include residential appliances.

1.2 ALLOWANCES

A. Furnish residential appliances as part of residential appliance allowance.

B. Furnish **[clothes washer/dryer combination, CWD #]** **<Insert item and drawing designation>** as part of **[residential appliance]** **<Insert allowance designation>** allowance.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.

B. LEED Submittals:

1. Product Data for **[Credit EA 1.4]** **[Credit EA 9.1]**: For appliances indicated, documentation that products are ENERGY STAR rated.
2. Product Data for Credit EA 9.2: For water-efficient clothes washer, documentation indicating modified energy factor and water factor.

C. Samples: For each exposed product and for each color and texture specified, in **[manufacturer's standard]** **<Insert dimensions>** size.

D. Product Schedule: For appliances. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified **[Installer]** **[manufacturer]**.
- B. Product Certificates: For each type of appliance, from manufacturer.
- C. Field quality-control reports.
- D. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Maintains, within **<Insert number> miles (<Insert number> km)** of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.
- B. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.
- C. Source Limitations: Obtain **[residential appliances from single source]** **[and]** **[each type of residential appliance from single manufacturer]**.
- D. **[High-Altitude]** **[and]** **[Propane]** Conversion: Provide gas-operated appliances with manufacturer's conversion kit installed by a qualified service agency according to manufacturer's written instructions for Project location and type of fuel.
- E. Regulatory Requirements: Comply with the following:
 - 1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.
- F. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with **[the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines]** **[and]** **[ICC/ANSI A117.1]** **<Insert requirement>**.
- G. Preinstallation Conference: Conduct conference at **[Project site]** **<Insert location>**.

1.7 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period[.][**except as qualified below:**]
1. Warranty Period: [Two] [Five] <Insert number> years from date of Substantial Completion.
- B. Electric [Cooktop] [Range]: [Full warranty including parts and labor] [Limited warranty including parts and labor for first year and parts thereafter] <Insert description> for on-site service on surface-burner elements.
1. Warranty Period: [Two] [Five] <Insert number> years from date of Substantial Completion.
- C. Microwave Oven: [Full warranty including parts and labor] [Limited warranty including parts and labor for first year and parts thereafter] for on-site service [on the magnetron tube] <Insert requirement>.
1. Warranty Period: [Two] [Five] <Insert number> years from date of Substantial Completion.
- D. [Refrigerator/Freezer] [Freezer] [Icemaker], Sealed System: [Full warranty including parts and labor] [Limited warranty including parts and labor for first year and parts thereafter] for on-site service on the product.
1. Warranty Period for [Sealed Refrigeration System] <Insert item>: [Two] [Five] <Insert number> years from date of Substantial Completion.
 2. Warranty Period [for Other Components] <Insert requirement>: [Two] <Insert number> years from date of Substantial Completion.
- E. Dishwasher: [Full warranty including parts and labor] [Limited warranty including parts and labor for first year and parts thereafter] for on-site service on the product.
1. Warranty Period for [Deterioration of Tub and Metal Door Liner] <Insert requirement>: [Three] [Five] [10] <Insert number> years from date of Substantial Completion.
 2. Warranty Period [for Other Components] <Insert requirement>: [Two] <Insert number> years from date of Substantial Completion.
- F. Clothes Washer: [Full warranty including parts and labor] [Limited warranty including parts and labor for first year and parts thereafter] <Insert description> for on-site service on the product.
1. Warranty Period: [Two] [Three] <Insert number> years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 COOKTOPS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Electric Cooktop [CT #] <Insert drawing designation>:
1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
 2. Width: [12 inches (305 mm)] [30 inches (762 mm)] [36 inches (914 mm)] <Insert dimension>.
 3. Electric Burner Elements: [Two] [Four] [Six] <Insert number>.
 - a. Coil Type: [Manufacturer's standard] [Two 1200 W and two 2200 W] [One 1200 W, one 2200-W dual element, and two 2200 W] <Insert burner combination and power ratings>.
 - b. Radiant Type: [Two 1500 W and two 2000 W] [One 1200-W element, dual 1500-W/1500-W bridge element, and one 1200-W/2500-W expandable element] <Insert burner combination and power ratings>.
 - c. Induction Type: [Manufacturer's standard] [Two 1200 W and two 1800 W] [One 1200 W, one 1800 W, one 2700 W, and one 3300 W] <Insert burner combination and power ratings>.
 4. Controls: Digital panel controls, located [on front] [on left side] [on right side] [remotely, where indicated].
 5. Downdraft Ventilation: [Manufacturer's standard] [550 cfm (260 L/s)] <Insert capacity> built-in downdraft ventilation, with [remote] blower and exterior weatherproof wall cap.
 6. Other Features: [Grill] [deep fryer] [wok burner] [and] [wok ring] <Insert feature>.
 7. Electric Power Supply: [240 V, 60 Hz, 1 phase, 30 A] [As indicated on Drawings] <Insert requirement>.
 8. Top Material: [Manufacturer's standard] [Ceramic glass] [Porcelain-enameled steel] [Stainless steel] <Insert material>.
 - a. Color/Finish: [White] [Black] <Insert color or finish>.
- C. Gas Cooktop [CT #] <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer's name; product name or designation>.
 2. Width: [12 inches (305 mm)] [30 inches (762 mm)] [36 inches (914 mm)] <Insert dimension>.
 3. Gas Burners: [Two] [Four] [Six] <Insert number>.
 - a. Power Ratings: [Manufacturer's standard] [One 5000 Btu/h (1500 W), two 9100 Btu/h (2700 W), and one 12,000 Btu/h (3500 W)] <Insert burner combination and power ratings>.

- b. Grates: **[Individual]** **[Continuous]** **<Insert description>**.
- 4. Controls: **[Digital panel]** **[Manual-dial]** controls, located on **[front]** **[left side]** **[right side]**.
- 5. Downdraft Ventilation: **[Manufacturer's standard]** **[550 cfm (260 L/s)]** **<Insert capacity>** built-in downdraft ventilation, with **[remote]** blower and exterior weatherproof wall cap.
- 6. Other Features: **[Sealed burners]** **[auto-reigniting burners]** **[grill]** **[deep fryer]** **[wok burner]** **[and]** **[wok ring]** **<Insert feature>**.
- 7. Electric Power Supply: **[120 V, 60 Hz, 1 phase, 30 A]** **[As indicated on Drawings]** **<Insert requirement>**.
- 8. Top Material: **[Manufacturer's standard]** **[Ceramic glass]** **[Porcelain-enameled steel]** **[Stainless steel]** **<Insert material>**.
- a. Color/Finish: **[White]** **[Black]** **<Insert color or finish>**.

2.2 RANGES

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Electric Range **[RG #]** **<Insert drawing designation>**: **[Freestanding]** **[Slide-in]** **[Drop-in]** range with **[one]** **[two]** oven(s) and complying with AHAM ER-1.
 - 1. Basis-of-Design Product: **[Indicated on Drawings]** **<Insert manufacturer's name; product name or designation>**.
 - 2. Width: **[30 inches (762 mm)]** **[36 inches (914 mm)]** **<Insert dimension>**.
 - 3. Electric Burner Elements: **[Four]** **[Six]** **<Insert number>**.
 - a. Coil Type: **[Manufacturer's standard]** **[Two 1200 W and two 2200 W]** **[One 1200 W, one 2200-W dual element, and two 2200 W]** **<Insert burner combination and power ratings>**.
 - b. Radiant Type: **[Two 1500 W and two 2000 W]** **[One 1200-W element, dual 1500-W/1500-W bridge element, and one 1200-W/2500-W expandable element]** **<Insert burner combination and power ratings>**.
 - c. Induction Type: **[Manufacturer's standard]** **[Two 1200 W and two 1800 W]** **[One 1200 W, one 1800 W, one 2700 W, and one 3300 W]** **<Insert burner combination and power ratings>**.
 - d. Controls: Digital panel controls, located on **[front]** **[left side]** **[right side]** **[splash panel at rear of rangetop]**.
 - e. **<Insert feature>**.
 - 4. Oven Features:
 - a. Capacity: **[3.3 cu. ft. (0.09 cu. m)]** **[and]** **<Insert capacity for each oven>**.
 - b. Operation: **[Baking]** **[convection]** **[and]** **[self-cleaning]** **<Insert requirement>**.
 - c. Broiler: Located in **[top of oven]** **[separate roll-out drawer on bottom]**.
 - d. Oven Door(s): Counterbalanced, removable, with **[observation window]** **[and]** **[full-width]** **<Insert type of handle>** handle.

- e. Electric Power Rating:
 - 1) Oven(s): [Manufacturer's standard] [2400 W] [and] <Insert power rating for each oven>.
 - 2) Broiler: [Manufacturer's standard] [3500 W] <Insert power rating>.
 - f. Controls: Digital panel controls and timer display, located on [front] [left side] [right side] [splash panel at rear of rangetop].
 - g. <Insert feature>.
5. Anti-Tip Device: Manufacturer's standard.
6. Electric Power Supply: [240 V, 60 Hz, 1 phase, 30 A] [As indicated on Drawings] <Insert requirement>.
7. Material: [Porcelain-enameled] [Stainless] steel with [manufacturer's standard] [ceramic-glass] <Insert material> cooktop.
- a. Color/Finish: [White] [Black] <Insert color or finish>.
- C. Gas Range [RG #] <Insert drawing designation>: [Freestanding] [Slide-in] range with [one] [two] oven(s).
- 1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
 - 2. Width: [30 inches (762 mm)] [36 inches (914 mm)] <Insert dimension>.
 - 3. Gas Burners: [Four] [Six] <Insert number>.
 - a. Power Ratings: [Manufacturer's standard] [One 5000 Btu/h (1500 W), two 9100 Btu/h (2700 W), and one 12,000 Btu/h (3500 W)] <Insert burner combination and power ratings>.
 - b. Controls: [Digital panel] [Manual-dial] controls, located on [front] [left side] [right side] [splash panel at rear of rangetop].
 - c. Grates: [Individual] [Continuous] <Insert description>.
 - d. Other Feature(s): [Sealed burners] [auto-re-igniting burners] [and] [grill] <Insert feature>.
 - 4. Oven Features:
 - a. Capacity: [3.3 cu. ft. (0.09 cu. m)] [and] <Insert capacity for each oven>.
 - b. Operation: [Baking] [convection] [and] [self-cleaning] <Insert requirement>.
 - c. Broiler: Located in [top of oven] [separate roll-out drawer on bottom].
 - d. Oven Door(s): Counterbalanced, removable, with [observation window] [and] [full-width] <Insert type of handle> handle.
 - e. Gas Power Ratings:
 - 1) Oven(s): [Manufacturer's standard] [9100 Btu/h (2700 W)] [and] <Insert power rating for each oven>.
 - 2) Broiler: [Manufacturer's standard] [14,500 Btu/h (4200 W)] <Insert power rating>.

- f. Controls: [Digital panel] [Manual-dial] controls and timer display, located on [front] [left side] [right side] [splash panel at rear of rangetop].
 - g. <Insert feature>.
 - 5. Anti-Tip Device: Manufacturer's standard.
 - 6. Electric Power Supply: [120 V, 60 Hz, 1 phase, 15 A] [As indicated on Drawings] <Insert requirement>.
 - 7. Material: [Porcelain-enameled] [Stainless] steel with [manufacturer's standard] [ceramic-glass] <Insert material> cooktop.
 - a. Color/Finish: [White] [Black] <Insert color or finish>.
- D. Dual Fuel Range [RG #] <Insert drawing designation>: [Freestanding] [Slide-in] range with gas burners and [one] [two] electric oven(s).
- 1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
 - 2. Width: [30 inches (762 mm)] [36 inches (914 mm)] <Insert dimension>.
 - 3. Gas Burners: [Four] [Six] <Insert number>.
 - a. Power Ratings: [Manufacturer's standard] [One 5000 Btu/h (1500 W), two 9100 Btu/h (2700 W), and one 12,000 Btu/h (3500 W)] <Insert burner combination and power ratings>.
 - b. Controls: [Digital panel] [Manual-dial] controls, located on [front] [left side] [right side] [splash panel at rear of rangetop].
 - c. Grates: [Individual] [Continuous] <Insert description>.
 - d. <Insert feature>.
 - 4. Oven Features:
 - a. Capacity: [3.3 cu. ft. (0.09 cu. m)] [and] <Insert capacity for each oven>.
 - b. Operation: [Baking] [convection] [and] [self-cleaning] <Insert requirement>.
 - c. Broiler: Located in [top of oven] [separate roll-out drawer on bottom].
 - d. Oven Door(s): Counterbalanced, removable, with [observation window] [and] [full-width] <Insert type of handle> handle.
 - e. Electric Power Rating:
 - 1) Oven(s): [Manufacturer's standard] [2400 W] [and] <Insert power rating for each oven>.
 - 2) Broiler: [Manufacturer's standard] [3500 W] <Insert power rating>.
 - f. Controls: [Digital panel] [Manual-dial] controls and timer display, located on [front] [left side] [right side] [splash panel at rear of rangetop].
 - g. <Insert feature>.
 - 5. Anti-Tip Device: Manufacturer's standard.
 - 6. Electric Power Supply: [240 V, 60 Hz, 1 phase, 30 A] [As indicated on Drawings] <Insert requirement>.

7. Material: **[Porcelain-enameled]** **[Stainless]** steel with **[manufacturer's standard]** **[ceramic-glass]** **<Insert material>** cooktop.
 - a. Color/Finish: **[White]** **[Black]** **<Insert color or finish>**.

2.3 WALL OVENS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Electric Wall Oven **[WO #]** **<Insert drawing designation>**: **[One]** **[Two]**-oven unit.
 1. Basis-of-Design Product: **[Indicated on Drawings]** **<Insert manufacturer's name; product name or designation>**.
 2. Mounting: Built-in **[wall]** **[undercounter]** **<Insert requirement>**.
 3. Capacity: **[3.3 cu. ft. (0.09 cu. m)]** **[and]** **<Insert capacity for each oven>**.
 4. Operation: **[Baking]** **[convection]** **[and]** **[self-cleaning]** **<Insert requirement>**.
 5. Broiler: Located in **[top of oven]** **[separate roll-out drawer on bottom]** **<Insert requirement>**.
 6. Oven Door(s): Counterbalanced, removable, with **[observation window]** **[and]** **[full-width]** **<Insert type of handle>** handle.
 7. Electric Power Rating:
 - a. Oven(s): **[Manufacturer's standard]** **[2400 W]** **[and]** **<Insert power rating for each oven>**.
 - b. Broiler: **[Manufacturer's standard]** **[3500 W]** **<Insert power rating>**.
 8. Electric Power Supply: **[240 V, 60 Hz, 1 phase, 30 A]** **[As indicated on Drawings]** **<Insert requirement>**.
 9. Controls: **[Digital panel]** **[Manual-dial]** controls and timer display.
 10. **<Insert feature>**.
 11. Material: **[Porcelain-enameled steel]** **[Stainless steel]** **[Manufacturer's standard]** **<Insert material>**.
 - a. Color/Finish: **[White]** **[Black]** **<Insert color or finish>**.
- C. Gas Wall Oven **[WO #]** **<Insert drawing designation>**: **[One]** **[Two]**-oven unit.
 1. Basis-of-Design Product: **[Indicated on Drawings]** **<Insert manufacturer's name; product name or designation>**.
 2. Mounting: Built-in **[wall]** **[undercounter]** **<Insert requirement>**.
 3. Capacity: **[3.3 cu. ft. (0.09 cu. m)]** **[and]** **<Insert capacity for each oven>**.
 4. Operation: **[Baking]** **[convection]** **[and]** **[self-cleaning]** **<Insert requirement>**.
 5. Broiler: Located in **[top of oven]** **[separate roll-out drawer on bottom]** **<Insert requirement>**.
 6. Oven Door(s): Counterbalanced, removable, with **[observation window]** **[and]** **[full-width]** **<Insert type of handle>** handle.
 7. Gas Power Ratings:

- a. Oven(s): [Manufacturer's standard] [9100 Btu/h (2700 W)] [and] <Insert power rating for each oven>.
- b. Broiler: [Manufacturer's standard] [14,500 Btu/h (4200 W)] <Insert power rating>.
8. Electric Power Supply: [120 V, 60 Hz, 1 phase, 30 A] [As indicated on Drawings] <Insert requirement>.
9. Controls: [Digital panel] [Manual-dial] controls and timer display
10. <Insert feature>.
11. Material: [Porcelain-enameled steel] [Stainless steel] [Manufacturer's standard] <Insert material>.
- a. Color/Finish: [White] [Black] <Insert color or finish>.

2.4 MICROWAVE OVENS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Microwave Oven [MO #] <Insert drawing designation>:
 1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
 2. Mounting: [Undercabinet] [Wall cabinet] <Insert requirement>.
 3. Type: [Conventional] [Convection] <Insert type>.
 4. Dimensions:
 - a. Width: [24 inches (610 mm)] [30 inches (762 mm)] [As indicated on Drawings] <Insert dimension>.
 - b. Depth: [19-1/2 inches (495 mm)] [As indicated on Drawings] <Insert dimension>.
 - c. Height: [14 inches (356 mm)] [18 inches (457 mm)] [As indicated on Drawings] <Insert dimension>.
 5. Capacity: [1.5 cu. ft. (0.04 cu. m)] [2.0 cu. ft. (0.06 cu. m)] <Insert capacity>.
 6. Oven Door: Door with observation window [and pull handle] [and push-button latch release] <Insert requirement>.
 7. Exhaust Fan: [Variable] [Two] [Four]-speed fan, [vented to outside] [nonvented, recirculating type with charcoal filter] and with [manufacturer's standard] [300-cfm (140-L/s)] <Insert value> capacity.
 8. Microwave Power Rating: [Manufacturer's standard] [1000 W] <Insert power rating>.
 - a. Convection Element Power Rating: [Manufacturer's standard] [1450 W] <Insert power rating>.
 9. Electric Power Supply: [120 V, 60 Hz, 1 phase, 15 A] [As indicated on Drawings] <Insert requirement>.
 10. Controls: Digital panel controls and timer display.

11. Other Features: [Turntable] [temperature probe] [and] [lock-out feature] <Insert feature>.
12. Material: [Porcelain-enameled steel] [Stainless steel] [Manufacturer's standard] <Insert material>.
 - a. Color/Finish: [White] [Black] <Insert color or finish>.

2.5 KITCHEN EXHAUST VENTILATION

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Overhead Exhaust Hood [EX #] <Insert drawing designation>:
 1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
 2. Type: [Wall-mounted,] [Suspended-island-canopy,] <Insert requirement> exhaust-hood system.
 3. Dimensions:
 - a. Width: [30 inches (762 mm)] [36 inches (914 mm)] [48 inches (1219 mm)] [As indicated on Drawings] <Insert dimension>.
 - b. Depth: [30 inches (762 mm)] [36 inches (914 mm)] [48 inches (1219 mm)] [As indicated on Drawings] <Insert dimension>.
 4. Exhaust Fan: [Variable] [Two] [Three]-speed fan [built into hood] [remotely located, with separate housing] and with [manufacturer's standard] [500-cfm (236-L/s)] [900-cfm (425-L/s)] <Insert value> capacity.
 - a. Venting: [Vented to outside through roof with weatherproof roof cap, backdraft damper, and rodent-proof screening] [Vented to outside through wall with weatherproof wall cap, backdraft damper, and rodent-proof screening] [Nonvented, recirculating type with charcoal filter] [As indicated on Drawings] <Insert requirement>.
 - b. Fan Control: [Hood] [Wall]-mounted[touch-pad to control] fan switch, with separate hood-light control switch.
 5. Duct Type: [Manufacturer's standard] [7-inch- (175-mm-) diameter round] [3-1/4 by 10 inches (82 by 250 mm) rectangular] [As indicated on Drawings] <Insert requirement>.
 6. Finish: [Baked enamel] [Stainless steel] <Insert finish>.
 - a. Color: [White] <Insert color>.
 7. Features:
 - a. Permanent, washable [aluminum mesh] [stainless-steel mesh] [baffle-type] filter(s).
 - b. Built-in [halogen] [incandescent] [fluorescent] lighting.

- c. Warming lamp socket(s).
- d. **<Insert feature>**.

C. Downdraft Exhaust [DX #] **<Insert drawing designation>**:

1. Basis-of-Design Product: [Indicated on Drawings] **<Insert manufacturer's name; product name or designation>**.
2. Type: [Retractable-downdraft] **<Insert requirement>** exhaust system.
3. Width: [30 inches (762 mm)] [36 inches (914 mm)] [As indicated on Drawings] **<Insert dimension>**.
4. Exhaust Fan: [Variable] [Two] [Three]-speed fan [built into cabinet below countertop] [remotely located, with separate housing] and with [manufacturer's standard] [500-cfm (236-L/s)] [900-cfm (425-L/s)] **<Insert value>** capacity.
 - a. Venting: [Vented to outside through roof with weatherproof roof cap, backdraft damper, and rodent-proof screening] [Vented to outside through wall with weatherproof wall cap, backdraft damper, and rodent-proof screening] [Nonvented, recirculating type with charcoal filter] [As indicated on Drawings] **<Insert requirement>**.
 - b. Fan Control: [Countertop] **<Insert location>**-mounted [touch-pad to control] fan switch.
5. Duct Type: [Manufacturer's standard] [7-inch- (175-mm-) diameter round] [3-1/4 by 10 inches (82 by 250 mm) rectangular] **<Insert requirement>**.
6. Finish: [Baked enamel] [Stainless steel] **<Insert finish>**.
 - a. Color: [White] **<Insert color>**.
7. Features:
 - a. Permanent, washable [aluminum mesh] [stainless-steel mesh] [baffle-type] filter(s).
 - b. **<Insert feature>**.

2.6 REFRIGERATOR/FREEZERS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Refrigerator/Freezer [RF #] **<Insert drawing designation>**: [One-door refrigerator with inside freezer compartment] [Two-door, side-by-side refrigerator/freezer] [Two-door refrigerator/freezer with freezer on top] [Two-door refrigerator/freezer with freezer on bottom] **<Insert description>** and complying with AHAM HRF-1.
1. Basis-of-Design Product: [Indicated on Drawings] **<Insert manufacturer's name; product name or designation>**.
 2. Type: [Freestanding] [Built in] [Undercounter].
 3. Dimensions:

- a. Width: [16 inches (406 mm)] [24 inches (610 mm)] [27 inches (686 mm)] [30 inches (762 mm)] [36 inches (914 mm)] [42 inches (1067 mm)] [48 inches (1220 mm)] [As indicated on Drawings] <Insert dimension>.
 - b. Depth: [24 inches (610 mm)] [27 inches (686 mm)] [33-1/4 inches (845 mm)] [As indicated on Drawings] <Insert dimension>.
 - c. Height: [34-1/2 inches (876 mm)] [70 inches (1778 mm)] [73 inches (1854 mm)] [84 inches (2134 mm)] [As indicated on Drawings] <Insert dimension>.
4. Storage Capacity:
- a. Refrigeration Compartment Volume: [15.6 cu. ft. (0.44 cu. m)] <Insert volume>.
 - b. Freezer Volume: [5.13 cu. ft. (0.15 cu. m)] <Insert volume>.
 - c. Shelf Area: [Three] <Insert number> adjustable [wire] [glass] shelves, [26 sq. ft. (2.42 sq. m)] <Insert area>.
 - d. <Insert storage requirement>.
5. General Features:
- a. Door Configuration: [Framed] [Overlay].
 - b. Dispenser in door for [ice] [and] [cold water] [with dispenser lock].
 - c. Built-in water filtration system.
 - d. Dual refrigeration systems.
 - e. Separate [touch-pad] temperature controls for each compartment.
 - f. <Insert feature>.
6. Refrigerator Features:
- a. Interior light in refrigeration compartment.
 - b. Compartment Storage: [Wine racks] [vegetable crisper] [and] [meat compartment] <Insert requirement>.
 - c. Door Storage: [Glazed door without storage] [Modular compartments] [Gallon (3.8 L-)milk-container storage] <Insert requirement>.
 - d. Temperature-controlled meat/deli bin.
 - e. <Insert feature>.
7. Freezer Features: [One] [Two] <Insert number> freezer compartment(s) [with door(s)] [configured as pull-out drawer(s)].
- a. [Automatic] [Manual] defrost.
 - b. Interior light in freezer compartment.
 - c. Automatic icemaker and storage bin.
 - d. <Insert feature>.
8. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
9. Front Panel(s): [Manufacturer's standard] [Wood panel(s) to match kitchen cabinets] [Porcelain enamel] [Stainless steel] [Wood-panel insert(s) specified in Section 064113 "Wood-Veneer-Faced Architectural Cabinets" to match kitchen cabinets] [Wood-panel insert(s) specified in Section 123530 "Residential Casework"]

to match kitchen cabinets] [Reversible panel(s) with choice of colors] <Insert description>.

a. Panel Color: [White] [Black] <Insert color(s)>.

10. Appliance Color/Finish: [White] [Black] [Stainless steel] <Insert color or finish>.

2.7 FREEZERS

A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

B. Freezer [FR #] <Insert drawing designation>: [One] [Two] <Insert number> freezer compartment(s) [with door(s)] [configured as pull-out drawer(s)] <Insert description> and complying with AHAM HRF-1.

1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.

2. Type: [Freestanding] [Built in] [Undercounter].

3. Dimensions:

a. Width: [27 inches (686 mm)] [30 inches (762 mm)] [36 inches (914 mm)] [As indicated on Drawings] <Insert dimension>.

b. Depth: [24 inches (610 mm)] [27 inches (686 mm)] [As indicated on Drawings] <Insert dimension>.

c. Height: [34-1/2 inches (876 mm)] [70 inches (1778 mm)] [73 inches (1854 mm)] [84 inches (2134 mm)] [As indicated on Drawings] <Insert dimension>.

4. Storage Capacity:

a. Volume: [5.13 cu. ft. (0.15 cu. m)] [15.0 cu. ft. (0.42 cu. m)] <Insert volume>.

b. Shelf Area: [Three] <Insert number> adjustable [wire] [glass] shelves, [26 sq. ft. (2.42 sq. m)] <Insert area>.

5. Features:

a. Door Configuration: [Framed] [Overlay].

b. [Automatic] [Manual] defrost.

c. Interior light in compartment.

d. Automatic icemaker and storage bin.

e. Temperature [touch-pad] controls for [each] compartment.

f. Defrost drain.

g. Lock with key.

h. <Insert feature>.

6. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

7. Front Panel(s): [Manufacturer's standard] [Wood panel(s) to match kitchen cabinets] [Porcelain enamel] [Stainless steel] [Wood-panel insert(s) specified in

Section 064113 "Wood-Veneer-Faced Architectural Cabinets" to match kitchen cabinets] [Wood-panel insert(s) specified in Section 123530 "Residential Casework" to match kitchen cabinets] <Insert description>.

- a. Panel Color: [White] [Black] <Insert color(s)>.
- 8. Appliance Color/Finish: [White] [Black] [Stainless steel] <Insert color or finish>.

2.8 ICEMAKERS

A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

B. Icemaker [IC #] <Insert drawing designation>:

- 1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
- 2. Type: [Undercounter] <Insert requirement>.
- 3. Dimensions:
 - a. Width: [14-3/4 inches (375 mm)] [15-1/4 inches (387 mm)] [As indicated on Drawings] <Insert dimension>.
 - b. Depth: [24 inches (610 mm)] [25-1/4 inches (641 mm)] [As indicated on Drawings] <Insert dimension>.
 - c. Height: [33-5/8 inches (876 mm)] [34-1/2 inches (876 mm)] [As indicated on Drawings] <Insert dimension>.
- 4. Ice Capacity:
 - a. Production: [30 lb (13.6 kg)] [50 lb (22.7 kg)] <Insert value> per day.
 - b. Storage: [25 lb (11.3 kg)] [35 lb (15.9 kg)] <Insert value>.
- 5. Features:
 - a. Door Configuration: [Framed] [Overlay].
 - b. [Automatic defrost] <Insert requirement>.
 - c. Automatic shutoff.
 - d. Defrost drain[with pump].
 - e. <Insert feature>.
- 6. Front Panel: [Manufacturer's standard] [Wood panel to match kitchen cabinets] [Porcelain enamel] [Stainless steel] [Wood-panel insert specified in Section 064113 "Wood-Veneer-Faced Architectural Cabinets" to match kitchen cabinets] [Wood-panel insert specified in Section 123530 "Residential Casework" to match kitchen cabinets] <Insert description>.
 - a. Panel Color: [White] [Black] <Insert color(s)>.
- 7. Appliance Color/Finish: [White] [Black] [Stainless steel] <Insert color or finish>.

2.9 DISHWASHERS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Dishwasher [DW #] **<Insert drawing designation>**: Complying with AHAM DW-1 and ASSE 1006.
1. Basis-of-Design Product: **[Indicated on Drawings] <Insert manufacturer's name; product name or designation>**.
 2. Type: **[Built-in undercounter] [Built-in under sink] [Portable] <Insert type>**.
 3. Dimensions:
 - a. Width: **[18 inches (457 mm)] [24 inches (610 mm)] [As indicated on Drawings] <Insert dimension>**.
 - b. Depth: **[23 inches (584 mm)] [25-3/4 inches (654 mm)] [As indicated on Drawings] <Insert dimension>**.
 - c. Height: **[34-1/2 inches (876 mm)] [As indicated on Drawings] <Insert dimension>**.
 4. Capacity:
 - a. International Place Settings of China: **[Eight] [12] [14] <Insert number>**.
 - b. Water Consumption for Full Load: **[3.2 gal. (12 L)] <Insert value>** per cycle.
 5. Sound Level: Maximum **[42] [48] <Insert value>** dB.
 6. Tub and Door Liner: **[Manufacturer's standard] [Porcelain-enameled steel] [Stainless steel] [Porcelain-enameled steel tub and molded-plastic door liner] <Insert requirement>** with sealed detergent and automatic rinsing-aid dispensers.
 7. Rack System: **[Nylon] [PVC]-coated sliding dish racks, with [removable cutlery basket] [top cutlery tray] <Insert feature>**.
 8. Controls: **[Touch-pad] [Rotary-dial] <Insert description>** controls with **[four] <Insert number>** wash cycles and hot-air and heat-off drying cycle options.
 9. Features:
 - a. Waste food disposer.
 - b. Self-cleaning food-filter system.
 - c. Hot-water booster heater for **[140 deg F (60 deg C)] [160 deg F (71 deg C)]** wash water with incoming water at **100 deg F (38 deg C)**.
 - d. Lock-out feature.
 - e. Half-load option.
 - f. Delay-wash option.
 - g. Digital display panel.
 - h. Water softener.
 - i. Soil-sensing water use control system.
 - j. **<Insert feature>**.
 10. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

11. Front Panel: **[Manufacturer's standard]** **[Wood panel to match kitchen cabinets]** **[Porcelain enamel]** **[Stainless steel]** **[Wood-panel insert specified in Section 064113 "Wood-Veneer-Faced Architectural Cabinets" to match kitchen cabinets]** **[Wood-panel insert specified in Section 123530 "Residential Casework" to match kitchen cabinets]** **[Reversible panel with choice of colors]** **<Insert description>**.
 - a. Panel Color: **[White]** **[Black]** **<Insert color(s)>**.
12. Appliance Color/Finish: **[White]** **[Black]** **[Stainless steel]** **<Insert color or finish>**.

2.10 CLOTHES WASHERS AND DRYERS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Clothes Washer **[CW #]** **<Insert drawing designation>**: Complying with ASSE 1007.
 1. Basis-of-Design Product: **[Indicated on Drawings]** **<Insert manufacturer's name; product name or designation>**.
 2. Type: **[Freestanding]** **[Stacking]** **[Undercounter]**, **[top]** **[front]**-loading unit.
 3. Dimensions:
 - a. Width: **[23-1/2 inches (597 mm)]** **[27 inches (686 mm)]** **[30 inches (762 mm)]** **[As indicated on Drawings]** **<Insert dimension>**.
 - b. Depth: **[24 inches (610 mm)]** **[29 inches (737 mm)]** **[31 inches (787 mm)]** **[As indicated on Drawings]** **<Insert dimension>**.
 - c. Height: **[34-1/2 inches (876 mm)]** **[38 inches (965 mm)]** **[45 inches (1143 mm)]** **[As indicated on Drawings]** **<Insert dimension>**.
 4. Drum: **[Manufacturer's standard]** **[Perforated porcelain-enameled steel]** **[Perforated stainless steel]** **<Insert material>**.
 - a. Capacity: **[2.7 cu. ft. (0.08 cu. m)]** **[3.2 cu. ft. (0.09 cu. m)]** **[3.8 cu. ft. (0.11 cu. m)]** **<Insert volume>**.
 5. Controls: **[Touch-pad]** **[Rotary-dial]** controls for water-fill levels, wash/rinse water temperatures, **<Insert function,>** and variable-speed and fabric selectors.
 - a. Wash Cycles: **[Four]** **[Six]** **[10]** **<Insert number>** wash cycles including regular, delicate, and permanent press.
 - b. Wash Temperatures: **[Three]** **<Insert number>** settings.
 - c. Speed Combinations: **[Two]** **[Four]** **[Five]**.
 6. Electrical Power: **[120 V, 60 Hz, 1 phase, 15 A]** **[As indicated on Drawings]** **<Insert requirement>**.
 7. Motor: Manufacturer's standard with built-in overload protector.
 8. Features:
 - a. Agitator: **[Center spindle]** **[Impeller (without spindle)]**.

- b. Self-cleaning lint filter.
 - c. Unbalanced-load compensator.
 - d. Inlet Hoses: Minimum length **60 inches (1525 mm)**.
 - e. Drain Hoses: Minimum length **48 inches (1220 mm)**.
 - f. Self-leveling legs.
 - g. Automatic dispenser for **[bleach] [fabric softener] [and] [detergent]**.
 - h. Spin-cycle safety switch.
 - i. End-of-cycle signal.
 - j. Extra-rinse option.
 - k. Delay-wash option.
 - l. Electronic temperature control.
 - m. Water levels automatically set.
 - n. Pedestal: **[8-inch- (203-mm-) high] [15-inch- (381-mm-) high] [Manufacturer's standard height] <Insert dimension>** laundry pedestal with storage drawer, matching appliance finish.
 - o. **<Insert feature>**.
9. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
10. Water-Efficient Clothes Washer: Provide clothes washer with modified energy factor greater than or equal to 2.0 and water factor less than 5.5.
11. Appliance Finish: **[Porcelain enamel on top and lid; baked enamel on front and sides] [Stainless steel] <Insert finish>**.
- a. Color: **[White] [Almond] <Insert color>**.
12. Front-Panel Finish: **[Manufacturer's standard] [Wood panel to match kitchen cabinets] [Porcelain enamel] [Stainless steel] [Wood-panel insert specified in Section 064113 "Wood-Veneer-Faced Architectural Cabinets" to match kitchen cabinets] [Wood-panel insert specified in Section 123530 "Residential Casework" to match kitchen cabinets] <Insert description>**.
- a. Panel Color: **[White] [Black] <Insert color(s)>**.
- C. Clothes Dryer **[CD #] <Insert drawing designation>**: Complying with AHAM HLD-1.
- 1. Basis-of-Design Product: **[Indicated on Drawings] <Insert manufacturer's name; product name or designation>**.
 - 2. Type: **[Freestanding] [Stacking] [Undercounter]**, frontloading, **[gas] [electric] [electric, ventless]** unit.
 - 3. Dimensions:
 - a. Width: **[23-1/2 inches (597 mm)] [27 inches (686 mm)] [As indicated on Drawings] <Insert dimension>**.
 - b. Depth: **[24 inches (610 mm)] [31 inches (787 mm)] [As indicated on Drawings] <Insert dimension>**.
 - c. Height: **[34-1/2 inches (876 mm)] [36 inches (914 mm)] [As indicated on Drawings] <Insert dimension>**.

4. Drum: [Manufacturer's standard] [Perforated porcelain-enameled steel] [Perforated stainless steel] <Insert material>.
 - a. Capacity: [5.7 cu. ft. (0.16 cu. m)] [7.0 cu. ft. (0.20 cu. m)] <Insert volume>.
5. Controls: [Touch-pad] [Rotary-dial] controls for drying cycle, temperatures, <Insert function,> and fabric selectors.
6. Electric-Dryer Power: [240 V, 60 Hz, 1 phase, 30 A] [As indicated on Drawings] <Insert requirement>.
7. Gas-Dryer Power: [120 V, 60 Hz, 1 phase, 15 A electric; 22,000-Btu/h (6400-W) gas] [As indicated on Drawings] <Insert requirement>.
8. Features:
 - a. Removable lint filter.
 - b. Electronic temperature and moisture level sensor control.
 - c. End-of-cycle signal.
 - d. Interior drum light.
 - e. Self-leveling legs.
 - f. Antibacterial cycle.
 - g. Auxiliary drying rack.
 - h. Built-in electrical power fuse.
 - i. Stacking kit to stack dryer over washer.
 - j. Pedestal: [8-inch- (203-mm-) high] [15-inch- (381-mm-) high] [Manufacturer's standard height] <Insert dimension> laundry pedestal with storage drawer, matching appliance finish.
 - k. <Insert feature>.
9. Appliance Finish: [Porcelain enamel on top and lid; baked enamel on front and sides] [Stainless steel] <Insert finish>.
 - a. Color: [White] [Almond] <Insert color>.
10. Front-Panel Finish: [Manufacturer's standard] [Wood panel to match kitchen cabinets] [Porcelain enamel] [Stainless steel] [Wood-panel insert specified in Section 064113 "Wood-Veneer-Faced Architectural Cabinets" to match kitchen cabinets] [Wood-panel insert specified in Section 123530 "Residential Casework" to match kitchen cabinets] <Insert description>.
 - a. Panel Color: [White] [Black] <Insert color(s)>.

2.11 CLOTHES WASHER/DRYER COMBINATIONS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Clothes Washer/Dryer Combination [CWD #] <Insert drawing designation>: Complying with ASSE 1007.

1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
2. Type: Freestanding washer/dryer unit with [dual-drum design and electric dryer] [dual-drum design and gas dryer] [all-in-one, single-drum design]; washer is [top] [front] loading.
3. Dimensions:
 - a. Width: [23-1/2 inches (597 mm)] [27 inches (686 mm)] [As indicated on Drawings] <Insert dimension>.
 - b. Depth: [25 inches (635 mm)] [32 inches (813 mm)] [As indicated on Drawings] <Insert dimension>.
 - c. Height: [34-1/2 inches (876 mm)] [71-1/2 inches (1816 mm)] [As indicated on Drawings] <Insert dimension>.
4. Washer and Dryer Drums: [Manufacturer's standard] [Perforated porcelain-enameled steel] [Perforated stainless steel] <Insert material>.
 - a. Washer-Drum Capacity: [1.5 cu. ft. (0.04 cu. m)] [2.0 cu. ft. (0.06 cu. m)] [2.6 cu. ft. (0.07 cu. m)] <Insert volume>.
 - b. Dryer-Drum Capacity: [2.0 cu. ft. (0.06 cu. m)] [3.4 cu. ft. (0.10 cu. m)] [5.9 cu. ft. (0.17 cu. m)] <Insert volume>.
5. Washer/Dryer Drum: [Manufacturer's standard] [Perforated stainless steel] <Insert material>.
 - a. Drum Capacity: [2.3 cu. ft. (0.07 cu. m)] <Insert volume>.
6. Washer Controls: [Touch-pad] [Rotary-dial] controls for water-fill levels, wash/rinse water temperatures, <Insert function,> and variable-speed and fabric selectors.
7. Dryer Controls: [Touch-pad] [Rotary-dial] controls for drying cycle, temperatures, <Insert function,> and fabric selectors.
 - a. Wash Cycles: [Three] <Insert number> wash cycles including regular, delicate, and permanent press.
 - b. Wash Temperatures: [Three] <Insert number> settings.
 - c. Speed Combinations: [Two] <Insert number>.
8. Electric Washer/Dryer Power: [240 V, 60 Hz, 1 phase, 30 A] [120 V, 60 Hz, 1 phase, 15 A] [As indicated on Drawings] <Insert requirement>.
9. Gas Washer/Dryer Power: [120 V, 60 Hz, 1 phase, 15 A electric; 22,000-Btu/h (6400-W) gas] [As indicated on Drawings] <Insert requirement>.
10. Motor: Manufacturer's standard with built-in overload protector.
11. Washing Features:
 - a. Self-cleaning lint filter.
 - b. Unbalanced-load compensator.
 - c. Inlet Hoses: Minimum length 60 inches (1525 mm).
 - d. Drain Hoses: Minimum length 48 inches (1220 mm).
 - e. Self-leveling legs.

- f. Automatic dispenser for [bleach] [fabric softener] [and] [detergent].
 - g. Spin-cycle safety switch.
 - h. <Insert feature>.
- 12. Drying Features:
 - a. Removable lint filter.
 - b. Electronic temperature and moisture level sensor control.
 - c. End-of-cycle signal.
 - d. Interior drum light.
 - e. <Insert feature>.
- 13. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
- 14. Water-Efficient Clothes Washer: Provide clothes washer with modified energy factor greater than or equal to 2.0 and water factor less than 5.5.
- 15. Appliance Finish: [Porcelain enamel on top and lid; baked enamel on front and sides] [Stainless steel] <Insert finish>.
 - a. Color: [White] [Almond] <Insert color>.

2.12 TRASH COMPACTORS

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Trash Compactor [TC #] <Insert drawing designation>: Complying with AHAM TC-1.
 - 1. Basis-of-Design Product: [Indicated on Drawings] <Insert manufacturer's name; product name or designation>.
 - 2. Type: [Built in] [Convertible].
 - 3. Width: [15 inches (381 mm)] [18 inches (457 mm)].
 - 4. Capacity: [1.4 cu. ft. (0.04 cu. m)] [1.7 cu. ft. (0.05 cu. m)] <Insert volume>.
 - 5. Features:
 - a. Key-operated starting switch.
 - b. Rear wheels.
 - c. Removable bag carrier.
 - d. Retainer for disposable bags.
 - e. Odor-control mechanism.
 - f. Foot-operated drawer operator.
 - g. <Insert feature>.
 - 6. Front Panel: [Manufacturer's standard] [Wood panel to match kitchen cabinets] [Enameled steel] [Stainless steel] [Wood-panel insert specified in Section 064113 "Wood-Veneer-Faced Architectural Cabinets" to match kitchen cabinets] [Wood-panel insert specified in Section 123530 "Residential Casework" to match kitchen cabinets] <Insert description>.

- a. Panel Color: [**White**] [**Black**] <Insert color(s)>.

2.13 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- C. Examine walls, ceilings, and roofs for suitable conditions where [**overhead exhaust hoods**] [**downdraft exhaust**] [**and**] [**microwave ovens with vented exhaust fans**] will be installed.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written instructions.
- B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- D. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.
- E. Utilities: Comply with plumbing and electrical requirements.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- C. An appliance will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION 11 31 00

SECTION 136100 – GASOLINE STORAGE AND DISPENSING SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes furnishing and installing the gasoline fuel system as shown on the contract drawings and as specified herein, including but not limited to the following:
1. Underground gasoline storage tanks
 2. Geotextile fabric
 3. Earthworks and excavation support
 4. Concrete
 5. Tank top equipment
 6. Spill and overfill protection
 7. Surface manways
 8. Automatic line leak detector
 9. Submersible turbine pumps
 10. Variable frequency drive motor controllers
 11. Underground fuel piping
 12. Aboveground fuel piping
 13. Pipe hangers and supports
 14. Flex connectors
 15. Flex protectors
 16. Tank vent
 17. Valves
 18. Strainers
 19. Surge tanks/accumulators
 20. Fire extinguishers
 21. Fuel dispensers
 22. Dispenser fuel filter assembly
 23. Dispenser containment
 24. Dispenser equipment
 25. Emergency shear valve
 26. Island forms
 27. Signage, labeling, and designation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 032000, Concrete Reinforcing
- B. Section 033000, Cast-In-Place Concrete
- C. Section 078400, Firestopping

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- D. Section 136101, Gasoline Electrical System
- E. Section 136102, Environmental Monitoring and Fuel Control System
- F. Section 136103, Fuel Management and Revenue Control System
- G. Section 312000, Site Clearing and Earthwork
- H. Section 312300, Trenching, Backfilling, and Compacting
- I. Section 312319, Dewatering

1.3 REFERENCES

- A. ACI: American Concrete Institute
- B. API: American Petroleum Institute
 - 1. API 2000: Venting Atmospheric and Low-Pressure Storage Tanks
 - 2. API 1637: Color Code
- C. ASME: American Society for Mechanical Engineers
 - 1. ASME B31.3: Process Piping
- D. ASTM: American Society for Testing and Materials
 - 1. ASTM A48: Standard Specification for Gray Iron Castings
 - 2. ASTM A615: Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 3. ASTM C136: Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - 4. ASTM D1557: Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m-m³))
- E. CARB: California Air Resources Board
 - 1. Phase I EVR: Vapor Recovery Certification Phase I EVR for Underground Storage Tanks
- F. CFC: 2013 California Fire Code
- G. CUPA: Certified Unified Program Agency
- H. EPA: Environmental Protection Agency
- I. FM: Factory Mutual Association
- J. MSS: Manufacturers Standardization Society
 - 1. MSS SP-110: Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends
- K. National Certified Pipe Welding Bureau

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- L. NFPA: National Fire Protection Association
 - 1. NFPA 30A: Code for Motor Fuel Dispensing Facilities and Repair Garages
- M. NTEP: National Type Evaluation Program
- N. OSHA: Occupational Safety and Health Act
- O. PEI: Petroleum Equipment Institute
 - 1. PEI RP100: Recommended Practices for Installation of Underground Liquid Storage Systems
- P. SWRCB: State Water Resources Control Board
- Q. UL: Underwriter's Laboratories
 - 1. UL 79: Standard for Power-Operated Pumps for Petroleum Dispensing Products
 - 2. UL 87: Standard for Power-Operated Dispensing Devices for Petroleum Products
 - 3. UL 842: Standard for Valves for Flammable Fluids
 - 4. UL 971: Standard for Nonmetallic Underground Piping for Flammable Liquids
 - 5. UL 1316: Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures

1.4 SUBMITTALS

- A. Shop drawings: Submit original copies of product data submittals for materials and equipment in Part 2 of this section including but not limited to:
 - 1. Pipe bedding and backfill material.
 - 2. Tank bedding and backfill material.
 - 3. Compaction methods and equipment.
 - 4. Dewatering Plan.
 - 5. Underground Storage Tanks.
 - 6. Anchors and Supports.
 - 7. Leak detection and monitoring.
 - 8. Engineered Shoring and Retaining Wall Design.
 - 9. Piping.
 - 10. Valves.
 - 11. Strainers.
 - 12. Surge tanks/Accumulators.
 - 13. Containment Sumps.
 - 14. Spill Containment Manholes.
 - 15. Dispensers.
 - 16. Hose Retractors.
 - 17. Nozzles.
 - 18. Hoses.
 - 19. Breakaways.
 - 20. Hose Swivels.
 - 21. Filters.
 - 22. Turbine Pumps.

23. Pump Controllers, including initial dip-switch and other startup settings
 24. Solenoid valves.
- B. Record and submit actual location of piping system, storage tank, and system components.
- C. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by the Project.
- D. No welder will be employed on the work who has not been fully qualified under the herein specified procedures and so certified by the local chapter of the National Certified Pipe Welding Bureau or similar testing authority.
1. Each operator's certificate shall be on file at the site and shall be made available upon request.
- E. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the gasoline storage and dispensing system installation. Verification of permits shall be submitted.
- F. Provide certification that a tank and piping tightness test has been performed according to State and Federal EPA standards, and system is free of leaks.
- G. Manufacturer's Field Reports: Submit report of each visit of manufacturer's representative to provide technical assistance during installation.
- H. State Installer Certification: Certify tank installers employed on the Work, verifying that all work meet State installer requirements.

1.5 CLOSEOUT SUBMITTALS

- A. The following additional items shall be included in the closeout submittals for the gasoline system:
1. A minimum of 400 high resolution (no less than 4 mega-pixel) digital (.jpeg format) photographs depicting the installation at each critical construction phase. Ensure to photograph underground, buried, and normally inaccessible components.
 2. UST installation/warranty checklist with proof of delivery to manufacturer.
 3. Underground piping manufacturers' installation checklists with proof of delivery to manufacturer.
 4. Indicate layout of each piping system to scale of 3/8 inch. Indicate piping system routing showing pipe sizes, elevations, pipe lengths, fitting locations, valve locations, expansion joints, expansions loop locations, anchor locations and joint locations. Indicate on Record Drawings leak detection and locating system routing and panel location.
 5. Environmental Monitoring/Leak Detection system checklist, warranty registration and checkout form/Intrinsic Safety Checklist with proof of delivery to manufacturer.
 6. Laminated large format diagram showing all sensor, probe locations throughout system with corresponding labels to match Environmental Monitoring and Fuel Control System device designations.

7. Large format key plan of all gasoline and related system components and designation abbreviations.
8. Monitoring systems final setup printout.
9. Underground sump test records (dispenser, tank top sumps).
10. Dispenser Registration documentation and proof of transmittal to manufacturer.
11. Dispenser calibration documentation.
12. Copies of any State/Local approvals, authorizations, permits, and registrations.
13. Tank and Piping Test Results, Vapor Recovery Test Results, and Test Results for all secondary containment structures or annuluses and all containment sumps.
14. Records of all other inspections and tests.
15. Automatic line leak detector test results and electronic release detection equipment (sensors and probes) test results on state regulatory agency forms.
16. Tank certificate, licenses, and/or registration.
17. Warranties for all equipment and apparatus. In general, any product / manufacturer documentation that was provided with the equipment shall be provided as part of the closeout documents. Any warranty requiring forms or checklists shall be completed and fully executed.
18. Training certification for instruction seminars signed by the individuals trained on these systems.
19. All instruction bulletins, preventive maintenance schedules, operational instructions, and parts lists provided with the tanks, dispensers, monitoring system, and all other systems.
20. Waste disposal documentation (if any).
21. Other environmental information or permits (if any).
22. Copies of receipts for any keys, locks, or other equipment turned over to LAWA.
23. Provide directions for and sequences of operation Gasoline and related systems. Sequence shall list valves, switches, and other devices used to start, stop and control systems.
24. Lubrication instructions detailing type of lubricant, amount, and intervals recommended by manufacturer for each item of equipment. Include additional instructions necessary for implementation of first-class lubrication program. Include approved summary of lubrication instructions in chart form, where appropriate.
25. Operating manuals and instructions for each major system. Manuals shall include the following materials and information for all specified materials and equipment:
 - a. Table of contents.
 - b. Emergency instructions with 24-hour phone number to contact a responsible individual for each Section of Work.
 - c. All Subcontractor warranties.
 - d. Name and telephone number of local representative and supplier.
 - e. Manufacturers' maintenance procedures: Systems which require preventive maintenance to maintain efficient operation shall be furnished with complete necessary maintenance information. Required routine maintenance actions, as specified by the manufacturer, shall be stated clearly and incorporated on a readily accessible label on the equipment. Such label may be limited to identifying, by title or publication number, the operation and maintenance manual for that particular model and type of product.
 - f. Exploded drawings and parts lists.
 - g. Troubleshooting checklists with potential problems and possible causes.

- h. Schematic wiring diagrams.
- i. As-built Record drawings.
- j. Valve tag charts.
- k. Equipment warranties and guaranties.
- l. Sequence of Operations and Systems Descriptions.
- m. Additional requirements specified in other sections.

1.6 QUALITY CONTROL

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project:
 - 1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.
 - 2. National Fire Protection Association (NFPA).
 - 3. Occupational Safety and Health Act (OSHA).
 - 4. Factory Mutual Association (FM).
 - 5. Underwriter's Laboratories (UL).
 - 6. American Petroleum Institute (API).
- B. Specific reference is made to the following Standard of the National Fire Protection Association (NFPA) which shall govern provision of work as specified and as required by codes and authorities:
 - 1. NFPA 30A – Code for Motor Fuel Dispensing Facilities.
- C. Qualifications: Use adequate numbers of skilled, licensed individuals who are thoroughly trained and experienced in the installation and testing of the specified systems and who are completely familiar with the requirements and the methods needed for proper performance of the work of this Section.
- D. Tests of all Contractor secured materials and products being submitted for approval to determine conformance with all requirements of the Contract Documents, including borrow materials proposed for use, shall be performed by an independent testing laboratory retained and compensated by the Contractor.
- E. As materials are incorporated into the project, on-site and off-site quality control tests shall be performed during construction to determine conformance with the Contract Documents by an independent testing laboratory retained and compensated by the Contractor.
- F. All fuel system equipment shall be compatible with oxygenated fuel blends including up to 15 percent Ethanol and up to 100% methanol.
- G. Comply with the testing and field quality control in Part 3.
- H. Qualifications:
 - 1. Manufacturer: Utilize companies specializing in manufacturing products specified in this section with minimum five years documented experience.

2. Leak Detection Systems: The installer of the environmental monitoring system shall be the highest grade technician as certified by the leak detection manufacturer.
3. Tank Installer: Company specializing in performing Work of this section with minimum ten years documented experience. The Contractor installing the gasoline system shall be licensed by the State of California and be in accordance with Local and State requirements.
4. Provide a manufacturer certified installer to supervise the installation of the underground UL 971 piping systems.

1.7 EXTRA MATERIALS AND SPARE PARTS

- A. Provide 10 spares of every type and model of relay used in the fuel system.
- B. Provide 20 spare dispenser hose breakaway fittings.
- C. Provide 10 spare gasoline dispensing nozzles.
- D. Provide 10 spare hose/swivel/breakaway assemblies.
- E. After the completion of a complete filter change out following commissioning, provide 96 additional E10 compatible filters.

1.8 PERMITS AND SUBMISSIONS

- A. The Contractor shall provide all permits and notifications required by state and local codes and regulations.
- B. Specifically at a minimum, the Contractor shall make the following submissions or provide LAW with the information required to make the following submissions to the local CUPA or regulatory agency:
 1. Unified Program Consolidated Form, Underground Storage Tank, Operating Permit Application – Tank Information
 2. Unified Program Consolidated Form, Underground Storage Tank, Certification of Installation/Modification
 3. Unified Program Consolidated Form, Underground Storage Tank, Monitoring Plan
 4. SWRCB Monitoring System Certification
 5. SWRCB Secondary Containment Testing Report Form
 6. SWRCB Spill Bucket Testing Report Form
 7. SWRCB Vacuum/Pressure Sensor Certification Form
 8. South Coast Air Quality Management District, Form 400-E-11, Fuel Dispensing and Storage Equipment
 9. The Contractor shall also be responsible for contacting the Los Angeles County Agricultural Commissioner, Weights and Measures Bureau for testing, registration, and inspection of the dispensers.

- C. Copies of all submissions and permits/registrations received shall be provided as part of the closeout documentation.

PART 2 - PRODUCTS

2.1 UNDERGROUND GASOLINE STORAGE TANKS

- A. Manufacturers: Containment Solutions Inc., Xerxes, or approved equal.
- B. Underground storage tanks shall be double-walled fiberglass reinforced plastic (FRP) and carry a UL 1316 listing. Provide tanks in with nominal capacity, dimensions, and fittings as shown on the contract drawings. Tanks are designed for operation at atmospheric pressure only and be capable of storing liquids with specific gravity up to 1.1. Tank manufacturer shall supply tank sumps as shown on tank drawings, and with sump collars bonded.
- C. Tanks shall have a space between the primary and secondary shell walls to allow the free flow of containment of all leaked product from the primary tank. Tanks shall have an integrally mounted FRP reservoir installed on the tank for hydrostatic monitoring. The tank monitoring equipment shall have the following requirements:
 - 1. Capable of detecting a breach when: the inner tank is empty, the inner tank is partially or completely full and groundwater is below the tank bottom, and the inner tank is partially or completely full and the tank is partially or completely submerged in ground water.
 - 2. Capable of detecting leaks as small as 0.10 gallons per hour in a one month period.
 - 3. All monitoring equipment shall be UL listed or accepted.
 - 4. The reservoir shall be filled with a UL approved solution of contrasting color to the tank surface.
- D. Accessories
 - 1. Anchor Straps: Provide glass fiber reinforced plastic anchor straps for each tank. Number and location of straps shall be as specified by manufacturer. Straps shall be standard as supplied by the tank manufacturer. Hardware shall be galvanized, mastic coated and wrapped in geotextile fabric.
 - 2. Certification Plate
 - a. Underwriters Laboratories label shall be permanently affixed to each tank.
 - 3. Flanged Manways
 - a. Flanged manways shall be provided with dimensions and locations as specified in the drawings.
 - b. All manways will be furnished complete with UL listed gaskets, bolts and covers, and shall be the bolt-down type.
 - 4. Fill Tubes
 - a. Fill tubes shall be provided by the Contractor as specified on the drawings. Fill and vapor recovery risers shall be located in a multi-port manway as described in 2.6 below.
 - 5. Hydrostatic Monitor Accessories
 - a. Brine antifreeze, solution designation: BAS-30, chemical composition: 30 percent+ calcium chloride, 1 percent to 3 percent potassium chloride, 1 percent to

- 2 percent sodium chloride, balance water, visual appearance: green in color, odorless fluid, specific gravity @ 60°F: 1.272-1.317, factory installed.
- b. Reservoir sensor – A reservoir sensor manufactured by the environmental monitoring system manufacturer shall be provided.
- 6. Tank Gauge Probe – A tank level probe as specified in section 136102 shall be provided.
- 7. Watertight Turbine Enclosures
 - a. Double-Wall, brine-monitored, watertight FRP turbine enclosures, manufactured by the tank manufacturer, shall be furnished by the Contractor, in accordance with the drawings. The turbine enclosure opening shall be the largest diameter available from the manufacturer. If ZCL tanks are provided, they shall be provided with the larger Xerxes sump lid openings. All gasoline turbine enclosures shall be 54 inches.

2.2 GEOTEXTILE FABRIC

- A. Supply geotextile fabric that meets the tank manufacturer specifications and requirements.

2.3 EARTHWORKS AND EXCAVATION SUPPORT

- A. Fill Materials
 - 1. Supply fill materials for the underground tank installation in accordance with tank manufacturer requirements.
 - 2. Supply fill materials for the underground gasoline piping installation in accordance with piping manufacturer requirements.
- B. Shoring/Sheeting/Excavation Support
 - 1. Supply engineered shoring/excavation support/permanent retaining wall for the tank installation. Supply engineered shoring design and retaining wall design drawings and calculations sealed by a Professional Engineer licensed in the State of California. Coordinate with Structural and Civil sections.

2.4 CONCRETE

- A. Concrete for tank cover pad shall have a minimum 28-day compressive strength of 4000 psi, with a maximum slump of 4 inches. Concrete shall be broom finished.
- B. Reinforcing bar shall comply with ASTM A615 and Section 032000.

2.5 TANK TOP EQUIPMENT

- A. All tank top equipment, including vent caps, shall meet the Phase I EVR standard as defined by the California Air Resources Board, and be certified as a complete system by CARB Executive Order.

2.6 SPILL AND OVERFILL PROTECTION

- A. Multi-port Dual Point Fill and Vapor Containment Assembly
 - 1. Manufacturers: OPW, Emco-Wheaton, Phil Tite, or equal
 - 2. Double-Wall, brine-monitored, FRP, multi-port sumps with dimensions as shown on the drawings, and be Phase I EVR listed by CARB.
- B. Spill Containment Manhole
 - 1. Manufacturers: OPW, Emco-Wheaton, Fairfield, or equal
 - 2. Spill containment manhole shall be UL listed, double walled, testable without manhole excavation or concrete disturbance, have a primary container that is easily replaceable without excavation or concrete disturbance, and be Phase I EVR listed by CARB.
 - 3. The secondary containment chamber shall be equipped with a mechanical leak detection device which can be easily inspected from within the primary chamber.
- C. Mechanical Overfill Protection Device
 - 1. Manufacturers: OPW (71-SO) EVR, Morrison Brothers, or equal.
 - 2. The overfill protection device shall be Phase I EVR listed by CARB.
- D. Audible/Visual Overfill Alarm
 - 1. Manufacturers: Manufactured by selected Environmental Monitoring and Fuel Control System manufacturer in Section 136102.
 - 2. Provide 1 strobe/horn combination for each UST.
 - 3. Provide 1 strobe/horn combination outside of each riser room, and outside of WWF storage rooms, as indicated on the drawings.

2.7 SURFACE MANWAYS

- A. Manufacturers: Franklin Fueling Systems, Fiberlite, Emco Weaton, or equal.
- B. Manways for UST turbine enclosures shall be composite and shall be minimum 44-inch diameter, nominal 42-inch. Covers shall be bolt-down cam lock, and shall be supplied with a removal tool/lifting handle. Covers shall be watertight. Manways shall be equipped with inspection ports. Manholes shall be rated for HS-20 loading, rain tight with recessed handles.
- C. Manways for ATG and interstitial risers shall be bolt down, 24-inch diameter, with composite covers.

2.8 AUTOMATIC LINE LEAK DETECTOR

- A. Manufacturers: INCON, Vaporless, or pre-bid approved equal
- B. The Contractor shall supply an electronic automatic line leak detector (ALLD/ELLD) for each underground piping run capable of learning the characteristics of the line being monitored. The leak detector shall be capable of detecting a leak in the underground piping at a leak rate compliant with State and local regulations and shall be capable of accommodating the long

piping runs and multi-level arrangement associated with this project. Refer to Section 136102 Environmental Monitoring and Fuel Control System for requirements.

2.9 SUBMERSIBLE TURBINE PUMPS

- A. Manufacturers: FE Petro, or pre-bid approved equal
- B. Important Manufacturer note: The hydraulic calculations for this project have been performed using pump curves for FE Petro 4 HP, Variable Frequency, Intelligent Submersible Pumps (Model ISTVS4), and the associated Variable Frequency Controllers. Should the Contractor wish to perform a substitution, it will be the responsibility of the Contractor to perform customized hydraulic calculations and manufacturer pump curves shall be submitted for review, in order to validate the performance of the system. Individual pump selections shall be based on 50 gallons per minute at 88.4 feet total head, pumping gasoline with specific gravity of 0.76.
- C. General
 1. The performance requirements for this facility are that the pumps shall be capable of pumping to the full range of conditions from one fueling position at 8-10 gallons per minute to 50 percent of all fueling positions simultaneously at 8-10 gallons per minute each. There are a total of 192 nozzles, so one nozzle from each dispenser, or 96 nozzles shall be assumed to be flowing at 8-10 gallons per minute each. Due to the physical layout of the pumping systems and segregated piping arrangement, each piping system shall be capable of providing 8-10 gallons per minute to 50% of the nozzles that are connected to it.
 2. To meet federally mandated "Spitback" control requirements the predetermined flow rate through each nozzle shall be controlled to limit this to 10 gallons per minute maximum. This shall be limited based on variable frequency drive control, and without the addition of flow limiting devices.
 3. The pumps shall be capable of adjustable pressure output settings, such that pumps serving each level of fuel dispensers will have equivalent delivery flows (i.e. that the pump pressure output settings can be varied to account for differences in elevation, allowing for system pressure reaching the dispensers on multiple floors to be equivalent.).
 4. The entire pumping assembly shall be UL 79 listed.
 5. The pump discharge head and manifold assembly shall be manufactured from ASTM A48 class 25 gray iron.
 6. The pump shall use a 3-phase variable frequency motor designed for installation through a standard 4 inch tank opening.
 7. The pump shall be equipped with a variable telescoping length feature such that the pump length is field adjustable in length without disrupting the UL label.
 8. The pump motor shall have a thermal over-current overload protector with automatic reset.
 9. The pump motor assembly shall be clearly marked with pertinent information including Model, Horsepower, Voltage, Phase and Manufacturer etched into the pump shell for permanent identification.
 10. The pumps shall be designed for motor fuels and be UL listed for blend concentrations of:
 - a. 0 percent - 15 percent ethanol and gasoline.
 - b. 20 percent MTBE with 80 percent gasoline.

- c. 20 percent ETBE with 80 percent gasoline.
 - d. 17 percent TAME with 83 percent gasoline.
 - e. 100 percent methanol.
- 11. The pumping unit shall not incorporate any flexible diaphragms. All sealing shall be accomplished with O-rings or UL recognized fiber gaskets.
 - 12. The pump shall be rated to operate between -40 degrees F and 104 degrees F with non-gelled product.
 - 13. The pump shall have a three-wire field connection and an easy access ground wire terminal, and shall incorporate a wire seal plug which will incorporate all four wires.
 - 14. The pump shall incorporate a port for line pressure testing that shall be sealed with a 1/4 inch NPT pipe plug.
 - 15. The head of the pump shall contain a manual pressure relief screw to bleed static line pressure to zero through a flow path into the tank. This feature is required to avoid product escaping into the environment when opening the piping system for service when the piping is pressurized.
 - 16. The pump unit shall have a fully extractable head in order to permit removal of the pump motor assembly without disturbing the discharge piping, product in the pipelines downstream of the check valve, siphoning system with siphon check valve installed, or the electric wiring.
 - 17. During the removal of the extractable portion of the pump, product contained in the discharge manifold of the pump shall drain automatically into the storage tank.
 - 18. The product in the pipelines shall be held in place by a line check valve that shall have a minimum sealing force of 170 pounds. when the pump is not running and a minimum 30 psi of pressure in the pipeline.
 - 19. The line check valve shall be independent of the removable head and shall be easily accessible.
 - 20. Input and Output wiring of the controller shall be "home-run" rigid metal conduits, no shielded power cables required.
 - 21. The pump shall have an air/vapor elimination system that returns air or vapors to the underground storage tank through a tune discharging near the top of the pump motor assembly.
 - 22. The unit shall contain a built-in expansion relief valve that relieves pressure at or above pumping pressure but below 50 psi as standard. Other pressure relief settings shall be available.
 - 23. The pump motor shall utilize the product being pumped for lubrication of the motor bearings and for cooling the stator, and this fluid shall discharge into the underground storage tank at the top of the motor.
 - 24. The pump shall have siphon capability built into the pump.
 - 25. The pump shall have a 2 inch NPT threaded opening for the installation of mechanical line leak detectors or pressure transducers used in certain electrical line leak detectors.

2.10 VARIABLE FREQUENCY DRIVE MOTOR CONTROLLER

- A. Manufacturer: The gasoline submersible pump motor controllers shall be supplied by the manufacturer of the submersible pumps

- B. The controller shall be designed to vary the speed of the motor to provide a constant flow to the required number of dispensers. The controller shall have the following additional functions:
1. Report Abnormal Operating Conditions: The controller shall report the following abnormal operating conditions by means of dual seven segment displays on the face of the controller, or by connection to a computer through an RS 485 communications port.
 - a. Abnormal Conditions:
 - 1) Tank Empty, Under Load
 - 2) Low Incoming Voltage
 - 3) Locked Rotor
 - 4) Open Circuit
 - 5) Capacitor Bank Failing
 - 6) Extended Run
 - 7) Short Circuit
 - 8) High Temperature
 2. The pump shall be capable of monitoring and reporting by the Environmental Monitoring and Fuel Control Consoles.
 3. Manual Reset Button: The controller shall be equipped with a manual reset button, which is pressed upon correction of any of the above faults.
 4. Silence Button: The controller shall be equipped with a silence button, which is pressed upon acknowledging audible alarm on abnormal conditions. Pushing and holding the silence button will display the last faults encountered by the controller.
 5. Seven Segment Displays: The front cover of the controller shall have seven segment display to indicate power on, pump running, and abnormal conditions. The controllers shall be configured as stand-alone units allowing each to operate independently of each other.
 6. Stand Alone: This configuration will allow the controller to operate independently as a Stand Alone unit.
 7. Alternating (AC): This configuration will allow the controller to continually alternate up to 16 lead pumps upon each start cycle in manifolded pumping systems.
 8. Master/Slave: This configuration will allow the controller to start up to 16 manifolded pumps on demand. Master/Slave systems shall have one controller designated as the "Master" and all others as "Slaves". The Master shall automatically start the Slave pumps in the event that it can no longer support the predetermined flow rate or an abnormal condition has occurred. Each pump controller shall be fed with a dedicated hook signal.
 9. Master/Slave and AC: This configuration allows the controller to simultaneously operate as a Master/Slave and AC.
 10. One controller is required for each pump.
 11. The controller shall operate on 200-250 volt, 60 Hz, 3-phase.
 12. The controller shall have an RS 485 communications port for connection compatibility to electronic line leak detection/point of sale units manufactured by others, or other PC monitoring means.
 13. The pump and controller shall be manufactured by the same company.
 14. The pump controller shall have 10 pressure output settings from 24 to 40 psi, adjustable by the user.
 15. The pump controller shall have alternate settings for long pipe runs.

2.11 UNDERGROUND FUEL PIPING

- A. Manufacturers: Ameron, Smith, Approved Equal.
- B. All underground gasoline piping shall be UL-971 listed Fiberglass Reinforced Plastic (FRP), conforming to ASTM D2310 and ASTM D2996, UL-971 listed double walled, filament wound glass fiber reinforced epoxy pipe with integral epoxy liner and exterior coating. Piping materials shall be as follows:
 - 1. All primary filament wound pipe shall contain a resin-rich liner with a minimum thickness of 0.015 inches. The liner resin system shall be chemically resistant epoxy resin that has been demonstrated to be satisfactory for the intended service. Pipe shall be coaxial and a pre-manufactured double-walled system.
 - 2. Containment Pipe: Construction of the containment pipe and materials used shall be identical to the reinforced portion of the primary pipe, exhibiting similar physical properties.
 - 3. Fitting Dimensions: All fittings supplied under this Specification shall have face-to-face dimensions and laying lengths as specified in the manufacturer's literature.
 - 4. Joining Methods:
 - a. Primary Pipe: Primary pipe and fittings shall be joined by means of a matching taper adhesive joint. Adhesives used for joining components shall be compatible with all intended fluids. The adhesive systems shall be used in accordance with the manufacturer's recommendations.
 - b. Containment Pipe: Containment pipe joints shall be made with bolted clamshell halved bonded together with adhesive.
 - c. Flanges: Flanges shall be two-piece (van Stone) type with raised grooves on the sealing face. Fiberglass-reinforced stub ends are to be adhesive bonded to pipe or fitting.

2.12 ABOVEGROUND FUEL PIPING

- A. Manufacturers: Perma-Pipe, Inc., Enviro-tek., or Rovanco.
- B. General
 - 1. All aboveground gasoline service piping, except that which is located within the transition area of the building entrance and that which is housed within the dispenser sumps, shall be housed in an engineered secondary containment piping system. Field fabrication shall be limited to welding of the engineered and prefabricated spool sections.
 - 2. The system shall be "Ultra-FS" as manufactured by Perma-Pipe, Inc., or approved equal.
 - 3. The secondary containment pipe shall include a tape-type leak detection system, "PAL-AT", or approved equal.
 - 4. Containment design shall allow for the placement of a continuous pull cable, with pull ports throughout the containment piping system, as required for the designed pipe route. All sensor cable connectors shall be accessible at junction boxes, end seals or blind flange assemblies.
 - 5. All straight sections, fittings, and other accessories shall be factory prefabricated to job dimensions and designed to minimize the number of field connections.

6. Each system layout shall be computer analyzed by the piping system manufacturer to determine stress on the carrier pipe and thermal movement of the service pipe.
7. The secondary containment piping system manufacturer shall supply a complete design submittal including the following:
 - a. Layout drawings.
 - b. Leak detection routing.
 - c. Catalog sheets.
 - d. Material data.
 - e. Pipe stress and end load calculations.
8. The system design shall be in strict conformance with ANSI B31.3, latest edition. Given the unique nature of gasoline piping in an occupied building, the non-destructive testing requirements (listed below) for this project exceed the minimum required to meet ASME B.31.
9. Secondary containment joints completed at the factory shall be 100% air tested.
10. The system shall be designed and manufactured to allow placement and removal of the leak detection cable in the secondary containment after the piping has been installed.
11. The secondary containment shall be drainable, dryable and air pressure testable.
12. Contractor fabricated systems, whether built on or off site shall not be acceptable.
13. A factory employed and certified field technician shall be required on site to provide inspection during the critical periods of installation defined as:
 - a. Unloading the first load of material/Pre-construction meeting.
 - b. Field joint instruction.
 - c. Installation of first sensor cable runs and connectors.
 - d. Testing.
 - e. Leak detection system calibration and owner training.
14. A minimum of ten (10) days service shall be required to perform the above listed duties, field report shall be required from the factory technician detailing work observed while on-site. Field reports shall be submitted to the Contractor and Engineer, a notarized certificate from the manufacturer stating that the installation has been made in accordance with the manufacturer's recommendations.

C. Carrier Pipe

1. Gasoline piping shall be seamless ASTM A-53 Grade B carbon steel. Provide Schedule 40 for pipe sizes 1-1/2" and larger and Schedule 80 for pipe sizes smaller than 1-1/2", unless otherwise indicated.
2. All factory and field joint welds shall be socket welded for 2" diameter and smaller and butt-welded for pipe sizes 2-1/2" and larger.
3. Where possible, factory straight sections shall be supplied in minimum 20 foot random lengths with piping exposed at each end for field joint fabrication. Straight sections may vary based on Contractor field requirements.
4. The carrier pipe shall be supplied with a factory-applied fusion-bonded epoxy (FBE) on the exterior at a minimum of 20 mils thick.

D. Internal Supports

1. Internal supports shall be constructed of carbon steel and circumferentially welded to the carrier pipe. Internal supports shall be designed and factory installed by the secondary containment manufacturer with distances not to exceed 10-foot intervals, unless approved.

2. Supports shall be coated at the factory using a two-part liquid coating system manufactured and approved by the FBE coating manufacturer for the intended purpose.
 3. Supports shall be designed to allow for continuous airflow and drainage.
 4. Supports shall be designed to facilitate the installation of pull-type leak detection sensor cables. The supports shall have weld-attached and flared-end stainless steel guide tubes that prevent cable damage during pulling operations.
- E. Secondary Containment Piping
1. The secondary containment piping shall be ASTM A-53 Grade B Schedule 40 Seamless Carbon Steel (domestic only).
 2. Secondary containment piping shall be furnished with a factory applied resin saturated fiberglass cladding on the exterior (OD). The color of the resin saturated fiberglass cladding shall be yellow and shall contain U.V. inhibitors.
 3. Secondary containment piping shall be furnished with a factory installed primer on the interior (ID).
- F. Fittings
1. All fittings shall be factory prefabricated.
 2. All fittings shall have factory welded straight legs on each end of the fitting to ensure a "straight" field connection.
 3. All fittings shall be manufactured with internal supports to ensure proper spacing, airflow, drainage and the placement of pull-type leak detection sensor cables.
- G. Factory Applied Coatings
1. The carbon steel carrier pipe shall be supplied with a factory-applied fusion-bonded epoxy (FBE) coating on the exterior at a minimum 12 mils dry film thickness, and not exceeding 20 mils.
 2. The carbon steel containment pipe shall have a factory-applied fiberglass reinforced polyester (FRP) external cladding, at least .100 inch thick. The cladding shall be applied to a shot-blasted steel surface that meets SSPC SP-7 surface finish. The cladding on straight sections shall consist of multiple layers of helical windings of continuous glass reinforcements. The cladding on fittings shall consist of either a chopped spray-up polyester resin/fiberglass reinforcement composite, or wrapping of glass cloth fully saturated with a two part catalyst adhesive. The color of the resin saturated fiberglass cladding shall be yellow and shall contain U.V. inhibitors.
 3. Secondary containment piping shall be furnished with a factory-applied zinc-rich primer on the interior surface
- H. Accessories
1. Where indicated, end seals and pull ports shall be designed and factory fabricated to prevent the ingress of moisture into the system and to facilitate ease of cable pulling.
- I. Testing
1. Carrier Pipe
 - a. Carrier pipe shall be tested to 150 PSIG for a period of not less than 2 hours. No pressure drop shall be allowed.
 - b. Factory FBE coated spools shall be Holiday Tested at the plant with supporting documentation.

2. Secondary Containment Pipe
 - a. Containment pipe shall be tested at 15 PSIG with a corresponding sensitive leak test (soap test) for a period of not less than 1 hour. No pressure drop shall be allowed.
 - b. The manufacturer's field service technician shall witness all containment pipe testing.
- J. Field Joints
1. Carrier Pipe
 - a. Field joint shall remain exposed until they are fully examined by the specified non-destructive method(s) and pressure tested.
 - b. After successful weld examination and testing of the carrier pipe, the Contractor shall coat field welds using a two-part liquid coating system manufactured and approved by the carrier pipe FBE coating manufacturer. Submit manufacturer approval indicating the intended purpose, along with appropriate preparation and application procedures.
 - c. Upon sufficient curing time, carrier pipe coating thickness shall be measured for verification of required thickness, and then factory-supplied closure sleeves shall be welded in place.
 - d. After successful weld examination and testing of the containment pipe, the Contractor shall coat all field welds with factory-supplied FRP "rock shield" kit. Cured FRP thickness measurements shall be taken for verification of required thickness.
 2. Secondary Containment Pipe
 - a. All field joints shall be covered with a wrapping of glass cloth, fully saturated with a two part catalyst adhesive, identical in properties to the factory applied cladding system. The minimum thickness of the field hand lay-up shall be .100 inches.
 - b. The field wrapping shall be applied to a shot-blasted steel surface that meets SSPC SP-7 surface finish.
- K. Welding
1. The manufacturer and the installing Contractor shall submit welding procedure specifications (WPS), welding procedure qualification records (WPQ) and welder performance qualification records (PQR) for each welder performing factory and field welds on carrier and containment piping.
 2. Submit weld maps and weld map data sheets identifying all welds, welder ID# and the respective NDE report.
- L. Pipe Bending
1. Pipe bending shall not be permitted.
- M. Non-Destructive Examination (NDE)
1. NDE shall be performed on 100% of all shop and field carrier piping butt welds by a qualified third-party testing agency using radiographic or ultrasonic test methods. Credentials shall be submitted for approval prior to performing the examinations. Reports shall be submitted for all factory and field weld examinations identifying the examining technician and the associated weld identification number.

2. NDE shall be performed on 100% of all shop and field containment piping welds by a qualified third-party testing agency using either dye-penetrant or magnetic particle methods. Credentials shall be submitted for approval prior to performing the examinations. Reports shall be submitted for all factory and field weld examinations identifying the examining technician and the associated weld identification number.
- N. Material Traceability
1. The manufacturer shall provide Material Traceability Reports (MTR) to the Contractor as part of the Bill of Lading/Packing Slips for each shipment arriving onsite; the Contractor shall forward the information to the Engineer and the Owner for record purposes.
- O. Leak Detection
1. The double containment piping system manufacturer shall furnish the following leak detection system:
 - a. A cable type system: "PAL-AT" Leak Detection System.
 - b. Approved equal provided by the pre-fabricated pipe manufacturer supplying the pipe.
 2. The manufacturer of the leak detection system shall have a minimum of ten (10) years of experience in supplying leak detection systems.
 3. The piping shall be designed to allow for the pulling of leak detection cable into the containment pipe both during and after piping installation.
 4. Containment pull ports shall be located a maximum of 500 feet apart for straight runs and reduced by 150 feet for every 90 degree change in direction.
 5. The leak detection cable shall be located in horizontal pipe runs only.
 6. The leak detection/location system shall consist of a microprocessor based panel, type capable of continuous monitoring of all sensor strings for leaks/faults. The monitoring unit shall have a range of 5,000 feet and shall include sensing cable and jumper cable. The monitoring unit shall indicate when any liquid comes in contact with the sensor cable by actuating the output relays (2), sending signal to central environmental monitoring system displaying a message that a leak has been detected and the location of that leak on the sensing string.
 7. The system shall be capable of monitoring sensor cable (detecting and locating) for multiple leaks or additional liquid on the sensor cables.
 8. The alarm shall operate on the principle of pulsed energy reflection and be capable of mapping the entire length of the sensor cable and storing the digitized system map in nonvolatile memory. The alarm panel shall provide continuous indication that the sensor cable is being monitored.
 9. The alarm unit shall be enclosed in a modified NEMA 12 enclosure and have a two line by forty character display providing status and alarm data. The monitoring unit shall have a factory mounted alarm horn. The monitoring unit shall be UL listed and FM approved to provide connections for intrinsically safe sensor circuits for use in a Class 1, Division 1, Groups C and D Hazardous locations. Monitoring units power requirements shall be 120/240 VAC, 100 VA, 60 Hz single phase. The monitoring units shall be equipped with an ES-232 communication port and common alarm relay for the panel and one relay per cable.
 10. The contractor shall comply with the manufacturer's recommendations for installation. The system shall not be turned over to the owner's representative until all aspects of the pipe and leak detection system have been approved by the Engineer and leak detection

manufacturer. This includes drying to the containment pipe and installation of fault free cable, junction boxes, connectors and probes. Upon completion of the pipe installation the Contractor shall provide to the Owner and Engineer an "As-Built" calibration map that details pipe and leak detection cable routing, panel, junction box and connector calibration point locations. The Contractor shall coordinate with the Owner's representative and manufacturer a training session to instruct the Owner on the correct operation of the PAL-AT Leak Detection System.

11. The containment pipe and leak detection system shall be completely dry and moisture free before acceptance by the Owner. If for any reason moisture or fluid is present, the Contractor shall dry the containment piping and leak detection system in strict accordance with manufacturer recommendations. Do not seal the secondary piping area on days with high humidity.

P. Paint

1. Pipe Coatings

- a. Furnish a corrosion-preventative exterior alkyd primer intended for use on steel and ferrous metals and where a "hand-tool" or SSPC-SP 2 is acceptable surface preparation.
- b. Furnish glossy sheen, exterior, alkyd enamel compatible with the supplied primer and intended for use on ferrous metals.
- c. Furnish a primer compatible with the factory-applied primer on the pre-manufactured piping systems.

2.13 PIPE HANGERS AND SUPPORTS

A. Manufacturers: B-Line System, Unistrut Corp. Anvil, or equal

B. Gasoline Piping

1. Conform to ASME B31.3, MSS SP-58, MSS SP-69 and MSS SP-89.
2. All pipe supports, anchors and fasteners shall be hot-dipped galvanized or zinc plated carbon steel.
3. Hangers for Pipe Sizes 2 to 4 inches: Adjustable, clevis.
4. Multiple or Trapeze Hangers for Pipe Sizes 6 inches and Larger: Steel channels with welded spacers and hanger rods, cast iron roll.
5. Wall Support: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
6. Vertical Support: Strut with pipe strap support.
7. Floor Support for Pipe Sizes 4 Inches and Smaller: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and steel support.
8. Floor Support for Pipe Sizes 6 inches and Larger: Adjustable cast iron roll and stand, steel screws, and concrete pier or steel support.

C. Accessories

1. Hanger Rods: Mild steel threaded both ends, threaded on one end, or continuous threaded.

D. Formed Steel Channel

1. Manufacturers: B-line Systems, Carpenter & Paterson Inc., Anvil International.

- E. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.14 FLEX CONNECTORS

- A. Manufacturers: Franklin Fueling Systems FireFlex, or equal.
- B. Provide EZ FIT or similar union style connector where shown on drawings.

2.15 FLEX PROTECTORS

- A. Manufacturers: Franklin Fueling Systems, or equal.
- B. Provide a protective heat shrink wrap around buried flexible connectors. Fireflex Yellow Jacket heat shrink wrap or equal.

2.16 TANK VENT

- A. Tank Venting Requirements: All primary tanks shall be vented with a pressure-vacuum vent that remains closed unless venting under pressure or vacuum conditions. Tanks are designed for operation at atmospheric pressure only. Pressure vacuum vents shall be part of a complete Phase 1 EVR CARB executive order.

2.17 VALVES

- A. Ball Valves
 1. Acceptable Manufacturers: Jomar, Apollo, or equal.
 2. 2 inch and smaller: Full port, class 150, MSS SP-110, UL 842 listed, carbon steel body, stainless steel ball and stem, seat, body, and stem seals PTFE, steel handle, threaded ends.
 3. Larger than 2 inch: Full port, class 150, MSS SP-110, UL 842 listed, carbon steel body, stainless steel ball and stem, seat, body, and stem seals reinforced PTFE, steel handle, flanged ends.
 4. Three-way ball valves shall be 1/4-turn and T-port style, configured to allow flow to only one of the two paths while adjusting valve position. Valve shall have locking lever when positioned for straight-through flow.
- B. Check Valves
 1. Manufacturer: Morrison Brothers, Velan, or approved equal.
 2. Horizontal Swing Check Valves, 2 inch and larger: MSS Class 150, A216-WCB body, bolted cover, A216-WCB disk, flanged ends.
- C. Relief Valves
 1. Manufacturers: Taylor Valve Technology or approved equal.
 2. Automatic type, direct pressure actuated.
 - a. Maximum working temperature: 400 degrees F.

- b. Body Carbon Steel.
- c. Seat: Viton.
- d. Stem: Stainless Steel.
- e. Springs: Stainless Steel.
- f. Connections: Threaded.

D. Solenoid Valves

- 1. Manufacturers: Morrison Brothers (Figure 710F) or approved equal.
- 2. Solenoid valves shall be full port, normally closed, hung piston design with body constructed of carbon steel or stainless steel. End connections shall be ANSI Class 150 flanged. Valve shall be fitted with stainless steel internals. Seals shall be constructed of Viton or PTFE. Solenoid shall be housed in an explosion proof case suitable for Class I, Division 2, Group D environments with maximum temperature rating of T2D (419 degrees F), as defined in NFPA 70. Solenoids shall operate on 120 volts, 60 cycle, single phase, alternating current. Valve movable parts including valve seat, stem bearings, and control system shall be replaceable without removing the main valve from the line. All nonmetallic parts shall be replaceable.
- 3. Valve shall have performance characteristics such that pressure drop across valve in the full open position shall not exceed 1.0 psig at 100 gpm when tested with water.

E. Fusible Link/Emergency Valves

- 1. Manufacturers: Morrison Brothers (Figure 346F) or approved equal
- 2. Provide emergency valves at each building entrance immediately after transition from FRP to steel piping. Valves shall be the fusible link, reverse check valve type with hinged disc oriented out of the flow path, and designed for positive shutoff in the event of a fire. Valve actuation shall be by means of an external fusible link designed to melt at a temperature of 165 F.
- 3. Valve bodies shall be flanged ductile iron with ANSI Class 150 rating and flanges conforming to ANSI B16.4. Gaskets shall be PTFE and O-rings shall be PTFE encapsulated fluoroelastomer, or other approved material. All other valve internals shall be stainless steel, except that the hinge pins may be carbon steel.

2.18 STRAINERS

- A. Manufacturers: Morrison Brothers or approved equal.
- B. Y-pattern, ANSI Class 150 with cast iron body, flanged ends and bolted flange cover. Provide with 1/16" stainless steel perforated screen.

2.19 SURGE TANKS/ACCUMULATORS

- A. Manufacturers: Young Engineering Manufacturing, Inc. or approved equal.
- B. Specification:
 - 1. Young Engineering Manufacturing Model No. 10BSA-27, or approved equal.
 - 2. Epoxy coated carbon steel body.

3. 275 psi design pressure with a 4x safety factor.
4. Buna-N bladder.
5. 10 gallon capacity.

2.20 FIRE EXTINGUISHERS

- A. Manufacturers: Potter Rommer, Ansul, or equal.
- B. Provide fire extinguishers, metal cabinets (no glass/plastic windows), and signage at each fuel dispenser and other locations shown on the construction drawings, including at each fuel dispensing area at each aboveground storage tank, and in the underground storage tank area.
- C. Fire extinguishers shall be UL Listed with a 4-A:80-B:C UL rating.

2.21 FUEL DISPENSERS

- A. Manufacturers: Wayne/Wayne iX, or pre-bid approved equal
- B. Important Note: The hydraulic calculations for this project have been performed in conjunction with the selection of equipment meeting reduced pressure drop requirements. Should the Contractor wish to perform a dispenser substitution, it will be the responsibility of the Contractor to submit flow test data from the manufacturer, in order to validate the flow performance of the alternate dispenser.
- C. Requirements:
 1. Dispenser shall have a National Type Evaluation Program (NTEP) Certificate of Conformance, be UL 87 rated, and be compatible with ethanol blended fuel up to E15.
 2. Self-contained, two hose single product, enhanced capacity, electronic dispensers with lane oriented nozzle boots, stainless steel panels and doors, solenoid valves and 100:1 dual pulse output per nozzle.
 3. Fuel Management and Revenue Control System (Wayne iX): Each dispenser shall be equipped with a fuel management system card reader mounted in the dispenser cabinet on both sides of the dispenser. Fuel management card readers mounted on pedestals are not authorized. Each lane-oriented fuel dispenser nozzle position shall be associated with an HID card reader on the dispenser face, i.e. each dispenser cabinet shall be equipped with 2 card readers, one per position. Refer to Section 136103 Fuel Management and Revenue Control System.
 4. Label all dispensers by fueling position. Do not affix labels to removable dispenser doors.
 5. Provide 1 dispenser key per dispenser to LAWA at project conclusion.
 6. Provide primary and spare dispenser filters for dispenser startup described later in this section. All dispenser filters provided shall be designed for compatibility with ethanol blends.
 7. Provide all required stickers and labels, including 87 Octane, product labels, anti-static, and all required safety labels.

2.22 DISPENSER FUEL FILTER ASSEMBLY

- A. Manufacturers: Vaporless, or equal
- B. Provide a safety port fuel filter assembly on each gasoline dispenser fuel filter housing. The assembly shall allow for line testing and the installation of pressure test equipment, Vaporless Safety Port (SP-series) or equal.

2.23 DISPENSER CONTAINMENT

- A. Provide custom fabricated 316L stainless steel containment boxes for above grade dispensers. Stainless steel plate shall be minimum 3/16" thick. Provide flanges at the top of the box and provide a welded seal to the stainless steel penetration provided in the floor. Allow a 1" extrusion above the island. Field measure the stainless steel sleeves provided by the concrete fabricator and size containment boxes to properly fit within the floor penetration and within the footprint of the dispenser. Do not fabricate aboveground dispenser containment boxes prior to field measurement. All piping and conduit entering the containment shall be welded to the box. Paint all disturbed conduit coatings after welding in accordance with the coatings specifications.

2.24 DISPENSER EQUIPMENT

- A. Hose Retractors
 - 1. Manufacturers: Wayne, POMECO, Universal, or equal
- B. Hose Mast Base
 - 1. Manufacturers: Morrison Brothers, or equal.
 - 2. Provide hinged base for hose masts that allows hose retriever to be tilted 90 degrees to grade level for installation and service.
- C. Nozzles
 - 1. Manufacturers: Husky Safe-T-Squeeze, or pre-bid approved equal
 - 2. Important Note: The hydraulic calculations for this project have been performed in conjunction with the selection of equipment meeting reduced pressure drop requirements. Should the Contractor wish to perform a nozzle substitution, it will be the responsibility of the Contractor to submit flow test data from the manufacturer, in order to validate the flow performance of the alternate nozzle. At the time of this submission, the only nozzle available that met the low pressure requirements and could meet Air Quality requirements was the Husky Safe-T-Squeeze ECO nozzle. If South Coast Air Quality Management District rules change to allow other Nozzles, careful hydraulic calculations should be performed to ensure required flow rates can be provided.
- D. Hoses
 - 1. Manufacturers: Goodyear, Irpco, Dayco, or equal.
- E. Breakaways
 - 1. Manufacturers: OPW 66REC, or equal

2. Pressure drop less than 1.5 psig at 10 gallons per minute.

F. Hose Swivels (single plane only)

1. Manufacturers: Franklin Fueling Systems SWVL34-N or equal

G. Dispenser Sumps

1. Manufacturers: Franklin Fueling Systems, S. Bravo, or pre-bid approved equal
2. Fiberglass single wall sump with dimensions as shown on drawings.

2.25 EMERGENCY SHEAR VALVES

A. Acceptable Manufacturers: OPW, Morrison Brothers, Franklin Fueling Systems, or equal

B. Double poppet, normally closed valve, NPT threaded connections with a union top, fusible link closes at 165 degrees F., with shear point, test port, ductile iron valve, stainless steel spring. UL 842 listed. Provide stabilizer bar to rigidly mount in dispenser sump.

2.26 ISLAND FORMS

A. Provide an island form for each dispenser island. Island forms shall be stainless steel, and sized as shown on the construction drawings.

2.27 SIGNAGE, LABELING, AND DESIGNATION

- A. Provide designation labels on all equipment in this specification outlined on the related equipment drawings. All labels shall bear the abbreviations as described on those drawings and legends, and shall match exactly the designation abbreviations programmed into the Environmental Monitoring and Fuel Control System and the Fuel Management and Revenue Control System.
- B. Tag all valves, mechanical devices and components identified on system Process and Instrumentation Diagrams with permanent tags, as indicated.
- C. Provide wall mounted, plain English, permanent signage at all fill ports, regulating valves, evacuation stations, manual emergency actuators, operating valves and any other mechanical/or electrical device that the rental car user would be expected to actuate or operate in the normal course of business or emergency situation.
- D. Identify piping, concealed or exposed, with plastic pipe markers. Identify service and flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction. Underground pipe marker shall be detectable magnetic warning tape.

- E. All wall mounted and equipment mounted designation tags shall be 2 or 3-ply phenolic, outdoor and long-life rated, non-flammable, non-conductive, 1/8-inch thick, engraved. All signage shall be 0.020 baked enamel aluminum or FRP sized appropriately for the lettering. Aluminum shall be mounted with stainless steel hardware. Stock adhesive stickers are authorized only where specifically designated on the construction drawings. Designation labels and operating signage shall be white letters on black signage. All emergency, warning or other related signs shall be red signs with white letters, unless otherwise specified on the construction drawings. Designation label material shall be specifically designed to prevent static build-up, ES-1 Phenolic by NORPLEX, or equal. Lettering on designation labels shall be 1/2-inch in height. Lettering for operational signage shall be 3/4-inch in height unless otherwise designated in the construction drawings. Lettering for emergency signage shall be 1-inch in height unless otherwise designated in the construction drawings. Wall mounted signs shall be affixed with anchors and stainless steel screws. Equipment mounted signs shall be mounted with epoxy adhesive.
- F. Valve and component tags shall be hanging type, stainless steel, round with stamped lettering. Tag size shall be minimum 1-1/2 inches diameter with finished edges. Tags shall be affixed to valves with a clamped wire rope loop, such that it is not easily removable. Lettering shall be 1/4-inch in height unless otherwise designated in the construction drawings. Removable and adjustable ball-type chains or zip ties are not acceptable for mounting.
- G. Provide a typed list of all signs and valve tags at completion of the project. This list shall include the valve tag number, type of valve, location of valve, and purpose of valve (i.e. isolation valve, bypass valve, etc.). This list shall be framed and provided to LAWA for installation. Provide copies of the valve list in the Operation and Maintenance Manuals as part of the project closeout.

PART 3 - EXECUTION

3.1 GENERAL

- A. The installation of underground storage tanks and all fuel system equipment shall be conducted in strict accordance with the manufacturer's installation instructions. Nothing in this specification is intended to supersede or contradict those instructions.
- B. Install underground tanks and all fuel system equipment in accordance with the requirements of the City of Los Angeles, and State of California Building and Fire Codes. Additionally, install per NFPA 30, and NFPA 30A.
- C. Relief from the Los Angeles Fire Code/International Fire Code restrictions on fueling vehicles with Class I liquids in a building has been granted by the City of Los Angeles. The requirements outlined in the application and approval shall be considered an integral part of these specifications. As such, the system shall be installed in substantial compliance with those additional requirements, understanding that the construction documents reflect updated interpretations of those conceptual level requirements.

- D. Penetrations through the floor in the second, and third levels is strictly prohibited, with the exception of drainage structures and where seal welding at dispenser sumps is provided, and within raised islands. This is to prevent spilled fuel from migrating to the floor below through a loosened penetration.
- E. The Contractor shall install enabling infrastructure in the fuel dispensing area for tenant installed productivity systems.
- F. Prior to installing underground storage tanks, verify the presence of existing interferences and confirm that the installation procedures will not violate headroom restrictions.

3.2 UNDERGROUND GASOLINE STORAGE TANKS

- A. The installation of underground storage tanks shall be conducted in strict accordance with the tank manufacturer's installation instructions. Nothing in this specification is intended to supersede or contradict those instructions.
- B. Check factory installed equipment and accessories for loosening during transit.
- C. Install underground tanks with anchoring as specified in the drawings. Secure with hold-down straps and turnbuckles.
- D. Install piping connections to tanks with unions and swing joints. Provide venting in accordance with API 2000.
- E. Seal unused tank openings using threaded steel pipe plugs, flanges, or caps. Cover all unused bungs with FRP coating.
- F. Extend fill line and cover to grade and provide concrete pad as specified in the drawings and in accordance with Section 033000.
- G. Tank Accessories:
 - 1. Install tank accessories shipped loose with tank.
 - 2. Install tank accessories as indicated on drawings.
- H. Install underground tanks with cover as specified on the drawings. The Contractor shall not exceed the specified cover by more than 12 inches, the tank manufacturer's requirements notwithstanding. The elevation of the tank relative to the aboveground piping system is critical for successful operation of the fuel dispensers.
- I. Backfill tanks with backfill approved by the tank manufacturer.
- J. Ballast tanks with clean water upon tank installation at the time specified by the tank manufacturer.

- K. Only after completion of entire installation, including all concrete surface pads, remove all water ballast prior to the tanks being filled with gasoline. The Contractor shall be present during the first fuel or fluid delivery to each tank.

3.3 GEOTEXTILE FABRIC

- A. Install geotextile fabric in accordance with tank manufacturer requirements.

3.4 EARTHWORKS AND EXCAVATION SUPPORT

- A. Excavation
 - 1. Unless otherwise directed, all excavated native soil shall be replaced with manufacturer approved backfill material. Allowance shall be made for the required base and sand or gravel cushion-leveling course. The area of the foundations and footings shall be proof rolled to detect any soft zones. All soft zones shall be removed and replaced with select material compacted to 95 percent maximum dry density (ASTM D1557), as tested by the Contractor.
 - 2. Structures and utilities located within the excavated area shall not be disturbed without prior approval by LAWA. The Contractor shall protect all structures and utilities to remain to prevent disruption of facility operations.
 - 3. The Contractor shall provide the necessary shoring, sheeting or bracing as required by OSHA and other applicable regulatory agencies for any trenching or similar excavation. All shoring materials used shall be in good, serviceable condition, and carried down as the excavation progresses.
- B. Sheeting and Shoring
 - 1. Engineered excavation support shall be required for all underground storage tank excavations. Refer to and coordinate with Structural and Civil sections.
 - 2. The required construction shall meet all applicable federal, state, and local regulations. Shoring shall be removed after tank is backfilled.
 - 3. Pressures on sheeting and the stability of the sheeting and bottom of the excavation are dependent not only on soil conditions but on many procedures and options available to the Contractor, such as dewatering, staging of excavation, installation of bracing, flexibility of sheeting, construction equipment used, and time of completing the work. All such factors shall be considered in the design of the sheeting and bracing.
 - 4. The Contractor shall submit drawings, computations and substantiating data prepared, signed, and sealed by a professional engineer licensed in the State of California, and shall be submitted to LAWA a minimum of 21 days prior to work taking place. The plans shall show the proposed sheeting and retaining wall design and method of construction. Any review or comments by LAWA shall not relieve the Contractor of his responsibility for proper sheeting, bracing, and a retaining wall with sufficient structural integrity.
 - 5. The Contractor shall design the shoring system having consulted the project geotechnical report.
 - 6. During the installation of the shoring, bracing and retaining wall, and as long as the excavation is open, the Contractor shall monitor the work to ensure that it is carried out in accordance with the design and procedures.

7. Before commencing work the Contractor shall check and verify all dimensions and elevations. The Contractor shall be solely responsible for the proper alignment and fit of the proposed tank installation.
8. Dewatering and groundwater treatment may occur in conjunction with the sheeting and shoring operation. It is the Contractor's responsibility to ensure that such dewatering activities do not adversely impact upon the sheeting and shoring. Any movement in the sheeting and shoring shall be corrected immediately, and corrective measures enacted to ensure no further movement.
9. If the excavation is to be left unattended, the Contractor shall erect and maintain solidly constructed fencing to restrict unauthorized access. The use of orange construction fence, flashing barriers, or similar measures will not be allowed.

C. Dewatering

1. The Contractor shall not allow water to accumulate in excavations. Surface water must be prevented from flowing into excavations and from flooding the Project site. The Contractor shall be responsible for all equipment and labor necessary for the removal of all surface water that enters the excavation. Remove water from excavations to prevent softening of foundation bottoms, undercutting of footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain portable holding tanks, pumps, well points, sumps, suction and discharge water lines, and other dewatering system components to convey water away from excavations. Maintain erosion control measures to prevent sediment from leaving the work area.
2. Unless authorized by the Owner, bulk transportation and disposal of excavation water at an off-site facility will not be allowed.
3. The Contractor is responsible for preventing tank floatation during the installation or maintenance of the tank systems.
4. The Contractor shall be responsible for filing all permits to allow groundwater discharges to surface or groundwater.

D. Material Disposal

1. The Contractor shall dispose of all excess and/or unsuitable excavated material. IN THE EVENT THAT CONTAMINATED SOIL, WATER OR HAZARDOUS WASTE MATERIAL IS ENCOUNTERED IN ANY EXCAVATION, THE CONTRACTOR SHALL SECURE THE EXCAVATION AND NOTIFY OWNER IMMEDIATELY. UNDER NO CIRCUMSTANCES SHALL ANY CONTAMINATED SOIL, WATER OR HAZARDOUS MATERIALS BE REMOVED WITHOUT AUTHORIZATION BY OWNER.

E. Subgrade Preparation

1. The Contractor shall finely grade all improvement areas indicated on the contract documents to the finish elevation indicated less the depth of the slab, footing, paving, and/or walkways and their base. Any required fill shall conform to specifications set forth in Paragraph F.4. All subgrades shall be compacted to 95 percent Maximum Dry Density (ASTM D1557) as tested by the Contractor.

F. Fill, Backfill, and Base

1. The Contractor shall not commence placement of fill, backfill, or base materials until the subgrade has been inspected and approved by LAVA.

2. The Contractor shall provide a minimum of 8-inch compacted gravel cushion below all new concrete slabs, (including replacement). Backfill around concrete shall be of materials not subject to expansion or contraction (non-cohesive), and shall be sloped away from the concrete work. Sand shall not be placed above any gravel used as backfill in an area undergoing installation of concrete slabs, footings, paving, and walkways.
3. Trench or excavation backfill shall be compacted to 95 percent maximum dry density, as tested by the Contractor, with a mechanical tamper in lifts not to exceed 6 inches. Surface material and finish shall be replaced to match that of adjacent grade surface, including any base material required.
4. All new fill shall be compacted to at least 95 percent Maximum Dry Density at Optimum Moisture Content according to ASTM D1557, as tested by the Contractor.
5. Crushed stone and similar base materials shall be material that will compact and adequately bond under watering and rolling. Base course materials are to be placed in one or more layers, rolled thoroughly, and compacted until the material does not creep or wave ahead of the roller. All coarse aggregates shall be removed and the finish surface of the base shall be firm and free of loose material.
6. Crushed gravel or crushed rock shall be 1-1/2-inch minus, free from dirt, clay balls, and organic material, well graded from coarse to fine, containing sufficient finer material for proper compaction, and less than 8 percent by weight passing the No. 200 sieve.

G. Geotextile Filter Fabric.

1. A geotextile filter fabric shall be used for the installation of all underground storage tanks in accordance with tank manufacturer specifications, within the excavation.
2. Installation procedure: Line the excavation sides and bottom with filter fabric. Overlap horizontal panels at the bottom of the UST excavation with 3 feet of the vertical panels. Place some backfill on top of the filter fabric in and around the excavation perimeter to hold the fabric in place. In wet hole installations, backfill ballast is necessary to sink and hold the fabric to the bottom of the excavation.
3. Installation procedure (Dry Hole): Filter fabric will be used for the installation of tank beds. Place filter fabric on bottom of excavation and extend up the sides to a minimum of 1-foot above the top of the final tank bed. Provide a minimum of 12-inches level approved backfill bed over excavation bottom or concrete anchor pad. Set tanks on bed. Do not place tanks directly on concrete, timbers, beams, or cradles. Do not mix approved gravel with sand or native soil. Always use approved gravel. Do not backfill in layers using sand or native soil. Regardless of the hole size, all excavated (or loose) native soil shall be replaced with an approved backfill material.

H. Underground Storage Tank Backfill

1. The Contractor shall install only backfill that is approved by the tank manufacturer. A laboratory Certificate of Sieve Analysis (ASTM Method C136) and moisture-density relationships (Modified Proctor) analyses (ASTM Method D1557) shall be furnished to LAWA prior to installing backfill.

I. Backfilling

1. Ballasting the underground storage tanks with water shall be required immediately upon installation of the tanks at a point specified by the tank manufacturer.
2. Backfill using the same material as used for bedding. Place first 12-inch lift evenly around tanks. From the bank or adjacent tank top, backfill shall be pushed completely

beneath the tank bottom, between ribs and under end caps to provide necessary support. A long handled probe can be used to penetrate backfill and push it between all ribs and at 3 to 5 points under endcaps. The backfill may be shoveled beneath the tank. Place another 12-inch lift evenly around the tanks. Repeat the probing of backfill from the bank or adjacent tank top.

J. Installation Procedure - Wet Hole

1. Wet hole installations will not be permitted on this project.

K. Pipe Trenches

1. Excavate to the dimensions indicated in the drawings. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Wet and tamp as necessary to provide a firm and compacted pipe bed.
2. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length.
3. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe.
4. Backfill and fill material placement over pipes
5. Backfilling over tanks or underground fuel piping shall not begin until construction below finish grade has been inspected, tested and approved. This includes, but is not limited to underground utilities, fuel piping, UST vent piping and other related piping installations.

3.5 CONCRETE

- A. Install tank top concrete slab in accordance with the drawings, Section 033000, and ACI standards.
- B. The concrete tank top slab shall have an HS-20 loading.
- C. All tank top concrete manways shall be crowned to prevent storm water from entering manways.

3.6 TANK TOP EQUIPMENT

- A. Install tank top equipment in accordance with the installation instruction in the Phase 1 EVR CARB executive order, manufacturer requirements and the drawings.

3.7 SPILL AND OVERFILL PROTECTION

- A. Install sumps assemblies, and spill and overfill protection equipment in accordance with manufacturer requirements and the construction drawings.
- B. Color spill bucket covers in accordance with API 1637.
- C. Submit mechanical overfill prevention valve calculations to LAWA for approval.

- D. Demonstrate operability/measure all overfill prevention devices in the presence of a representative of LAWA.
- E. Submit written test results.

3.8 SURFACE MANWAYS

- A. Install surface manways in accordance with manufacturer instructions and PEI RP100.
- B. Extend skirt with galvanized sheet metal as necessary to prevent tank backfill from interfering with the sump cover watertight seal.
- C. All bolt threads shall be installed with an anti-seize compound before initial installation. Use “Never-Seez” or equal. All cover gaskets shall be kept clean. Sweep all stones, soil and debris from manway gasket prior to each cover installation.

3.9 AUTOMATIC LINE LEAK DETECTOR (ALLD)

- A. Install the Electronic ALLD in accordance with manufacturer requirements and Section 136101.
- B. The ALLD shall be installed such that a positive alarm results in securing of the associated submersible pump.

3.10 SUBMERSIBLE TURBINE PUMPS

- A. Install submersible pumps in accordance with manufacturer instructions, requirements, and regulations.

3.11 VARIABLE FREQUENCY DRIVE MOTOR CONTROLLERS

- A. Install variable frequency controllers (VFC) in accordance with manufacturer requirements.
- B. Provide a manufacturer rep for the submersible pump and VFC on for commissioning. Program/configure the submersible pumps to meet the performance requirements. Adjust so that flow rates are equivalent on all floors. Adjust pressure output settings and “DIP” switches accordingly and test until flow rates meet the equivalency requirements and the flow rate performance requirements. Submit startup settings to LAWA for approval prior to startup.
- C. Adjust configuration of pumps between single operation, master/slave, alternating, or master/slave alternating as required, coordinating with mechanical trades to adjust valve alignments, to achieve performance requirements. Provide dedicated hook signal to each pump controller.

3.12 UNDERGROUND FUEL PIPING

A. Examination

1. Verify excavations are to required grade, dry, and not over-excavated.
2. Over-excavated areas shall be provided with select fill at no more than 4-inch lifts, wetted and compacted to 95 percent density. This shall be repeated until the desired grade is achieved.

B. Installation

1. All piping shall be installed by manufacturer certified personnel in strict accordance with manufacturer installation instructions.
2. Verify connection size, location, and invert elevations are as indicated on drawings, or as required for indicated slope.
3. Establish elevations of buried piping with not less than 12 inches of cover unless otherwise specified.
4. Install piping with horizontal curves and loops as shown on the construction drawings to facilitate expansion, contraction and soil settlement.
5. Remove scale and dirt on inside of piping before assembly.
6. Excavate pipe trench.
7. Install pipe to elevation as indicated on drawings. All piping shall be installed with loops and curves as shown on the drawings to facilitate expansion, contraction, and motion.
8. Place bedding material at trench bottom to provide uniform bedding for piping, level bedding materials in one continuous layer not exceeding 4 inches compacted depth; compact to 95 percent maximum density.
9. Install pipe on prepared bedding.
10. Install pipe to allow for expansion and contraction without stressing pipe or joints.
11. Install shutoff and drain valves at locations indicated on drawings.
12. Install magnetic utility warning tape continuous over top of pipe buried 6 inches below finish grade and in accordance with Section 312300.
13. Pipe Testing Requirements:
 - a. Test piping per manufacturer's requirements and specifications.
 - b. Maintain the required pressure for a minimum of 2 hours after the backfill process has been completed. Maintain a vacuum on the interstitial space through all backfilling and concrete work. Remove vacuum from interstice only after all work is completed above the piping.
14. Pipe Cover and Backfilling:
 - a. Backfill trench in accordance per manufacturer's requirements and Section 312300.
 - b. Maintain optimum moisture content of fill material to attain required compaction density.
15. After pneumatic test, evenly backfill entire trench width by hand placing backfill material and hand tamping in 4 inches compacted layers to 6 inches minimum cover over top of jacket. Compact to 95 percent maximum density.
16. Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.
17. Do not use wheeled or tracked vehicles for tamping.

18. Test primary and secondary piping in accordance with manufacturer's requirements and this specification prior to backfill, prior to pouring concrete for building and tank slabs, and after all trenches have been backfilled and building and tank slabs have been installed.
19. In addition, conduct a precision test, capable of detecting a leak of 0.005 gallons per hour and after all backfill and concrete work, including tank slab, is complete.

3.13 ABOVEGROUND PIPING

A. Installation

1. Install piping in accordance with the CFC and NFPA 30A.
2. Route piping in orderly manner and maintain gradient.
3. Install piping to conserve building space and not interfere with use of space.
4. Group piping whenever practical at common elevations.
5. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
6. Sleeve pipe passing through partitions, walls and floors. Refer to Division 15, project mechanical requirements for penetration and firestopping requirements. Maintain integrity of all rated partitions.
7. Provide clearance for access to valves and fittings.
8. Provide access where valves and fittings are not exposed
9. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer and two top coats.
10. Prepare uncoated pipe, fittings, supports, and accessories to a hand tool clean finish, apply primer and 2 top coats to match surrounding walls and ceilings.
11. Install identification on piping systems including underground piping. Refer to signage and identification requirements.
12. Install valves with stems upright or horizontal, not inverted.
13. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

B. Installation – Cable Leak Detection and Location System

1. Install cable in interstitial space in piping system.
2. Install exterior cable in conduit.
3. Graphic Locator Map: Provide location map with system reflecting actual installation showing system configuration and sensing string layout. Furnish length along cable as references to locate leaks. Base footage on calibration points.
4. Calibration Points: Record calibration points along sensing string in accordance with manufacturer's procedures. Provide sensor cables not in containment piping with cable tags every 50 feet.

C. Testing and Commissioning

1. Flush all aboveground piping with valves and equipment disconnected. Submit a flushing and cleaning procedure to the engineer for approval.
2. Complete 100% non-destructive welds as described in Section 2.
3. Pressure test piping in accordance with the CFC and ASME B31.3. Submit test protocol to the engineer for approval. Aboveground primary test pressure shall be no less than 75

psi measured at the third level, i.e. drop in pressure of test fluid shall be accounted for such that the entire system experiences 150% of working pressure.

4. Do not subject dispensers to test pressures, or any pressure exceeding 50 psi.

D. PAINTING

1. Piping Systems
 - a. Steel or ferrous piping systems without factory applied coatings: Prepare, prime, and paint entire exposed area of the piping system. All aboveground gasoline and windshield washer systems shall be painted yellow, in their entirety, in accordance ASME A13.1. All other piping systems, including all vents, shall be painted white.
2. Supports and Appurtenances
 - a. Prepare, prime, and paint all steel, other ferrous, or aluminum supports, bollards, brackets, mounting hardware or associated appurtenances. All supports and brackets should be painted white. All traffic and vehicle protection bollards shall be painted yellow.
3. Do not prepare, prime, or paint the following:
 - a. Galvanized piping or supports.
 - b. Galvanized rigid metal conduit.
 - c. Stainless steel piping or supports (with the exception of any WWF and gasoline piping)
 - d. NEMA 4X or other corrosion resistant exterior electrical enclosures or boxes.
 - e. Interior electrical enclosures.
4. Preparation
 - a. On factory primed piping systems: After installation and final testing of the piping system, clean all areas where the factory primer was disturbed during installation, or any exposed steel areas to an SSPC SP-2 (Hand Tool Cleaning) Standard. Perform any additional preparation required by the coating manufacturer instructions.
 - b. On bare steel or ferrous metal parts, clean all areas to a SSPC SP-2 (Hand Tool Cleaning) Standard. Perform any additional preparation required by the coating manufacturer instructions.
5. Primer
 - a. Apply one coat of primer where specified.
 - b. Brush or spray in accordance with manufacturer instructions.
 - c. The Primer shall be applied in accordance with manufacturer instructions, including:
 - d. Thoroughly stirred to produce a uniform mixture.
 - e. Thinned for workability and improved spray characteristics, but only according to the manufacturer's instructions.
 - f. Applied uniformly at the minimum wet-film thickness specified by the manufacturer.
 - g. Special attention shall be given when coating sharp edges, corners, and crevices to ensure complete coverage.
 - h. Applied to show good hiding characteristics and uniform appearance.
6. Finish Coats
 - a. Apply two (2) finish coats in all areas specified.

- b. Brush or spray in accordance with manufacturer instructions.
 - c. The Finish coats shall be applied in accordance with manufacturer instructions, including:
 - d. Thoroughly stirred to produce a uniform mixture.
 - e. Thinned for workability and improved spray characteristics, but only according to the manufacturer's instructions.
 - f. Applied uniformly at the minimum wet-film thickness specified by the manufacturer.
 - g. Special attention shall be given when coating sharp edges, corners, and crevices to ensure complete coverage.
 - h. Applied to show good hiding characteristics and uniform appearance.
7. Inspection
- a. Take Wet and Dry Film Thickness Measurements every 100 feet of coated pipe length and provide inspection reports to LAWA.
 - b. Conduct additional thickness measurements at LAWA's request.

3.14 PIPE HANGERS AND SUPPORTS

A. Preparation

- 1. Obtain permission from Engineer before using powder-actuated anchors.
- 2. Do not drill or cut structural members.
- 3. Seek approval of the project structural engineer prior to all coring and anchoring in the concrete structure.

B. Installation

- 1. Install hangers and supports in accordance with ASME B31.3, MSS SP-58, MSS SP-69 and MSS SP-89.
- 2. Anchors and Fasteners:
 - a. Concrete Structural Elements: Provide expansion anchors or powder actuated anchors.
 - b. Concrete Surfaces: Provide self-drilling anchors or expansion anchors.
 - c. Solid Masonry Walls: Provide expansion anchors and preset inserts.
- 3. Support horizontal piping hangers.
- 4. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- 5. Place hangers within 12 inches of each horizontal elbow.
- 6. Install hangers to allow 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
- 7. Support vertical piping as scheduled. Support riser piping independently of connected horizontal piping.
- 8. Where installing several pipes in parallel and at same elevation, provide multiple pipe hangers or trapeze hangers.
- 9. Support riser piping independently of connected horizontal piping.
- 10. Design hangers for pipe movement without disengagement of supported pipe.

C. Cleaning

- 1. Comply with requirements of Divisions 1 and 15.

2. Clean adjacent surfaces of firestopping materials.
- D. Protection of Finished Work
 1. Comply with Divisions 1 and 15.
 2. Protect adjacent surfaces from damage by material installation.
- E. Hanger Spacing
 1. 3/4 inch galvanized carbon steel threaded rod shall be used for all hanger attachment.
 2. Horizontal spacing of hangers shall not exceed 10 feet, 0 inches.
 3. Vertical spacing of hangers shall not exceed 10 feet, 0 inches.
 4. Pipe hangers/supports shall be provided within 3 feet, 0 inches of any change of direction.

3.15 FLEX CONNECTORS

- A. Install flex connectors in accordance with manufacturer instructions.

3.16 FLEX PROTECTORS

- A. Install flex protectors in accordance with manufacturer instructions.

3.17 TANK VENT

- A. Install tank vents in accordance with manufacturer instructions and the installation instructions in for the applicable Phase 1 EVR CARB executive order.

3.18 VALVES

- A. Examination
 1. Verify piping system is ready for valve installation – ensure valves are not installed during system flushing and cleaning.
- B. Installation
 1. Install valves with stems upright or horizontal, not inverted.
 2. Install valves with clearance for installation of insulation and allowing access.
 3. Provide access where valves and fittings are not accessible.
- C. Valve Applications
 1. Install shutoff and drain valves at locations indicated on drawings in accordance with this Section.
 2. Install ball or gate valves for shut-off and to isolate equipment or parts of systems.
 3. Install ball or globe valves for throttling, bypass, or manual flow control services.
- D. Flanged Connections
 1. Align flange surfaces parallel.

2. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on pipe threads. Tighten bolts gradually and uniformly with torque wrench.

E. Adjusting

1. Contractor shall adjust all valves for flows and pressure setting specified in part 2.

3.19 STRAINERS

- A. Install strainers in accordance with manufacturer instructions.

3.20 SURGE TANKS/ACCUMULATORS

- A. Install surge tanks and accumulators in accordance with manufacturer instructions.

3.21 FIRE EXTINGUISHERS

A. Installation

1. Install fire extinguishers, cabinets and signage in accordance with the CFC and Los Angeles Fire Code Requirements, in locations shown on the drawings.
2. Coordinate location of extinguisher mounts so as not to conflict with other fuel islands or aboveground storage tank equipment.

3.22 FUEL DISPENSERS

- A. Dispensers shall be installed in strict accordance with manufacturer instructions.
- B. The Contractor shall furnish and install filters designated by the dispenser manufacturer for each gasoline dispenser. This aims to eliminate the potential for additional and unforeseen flow restrictions. At startup, activate each dispenser and inspect filter for leaks. Allow approximately 100 gallons of product to flow through the filter, then remove and replace filter.
- C. Perform an electric circuit test on the fuel dispensers to confirm complete system functionality and all safety and environmental interlocks.
- D. The Contractor shall add 87 Octane, and ethanol (10 percent) stickers to the appropriate dispensers, as applicable.
- E. Calibrate all dispensers and provide documentation of calibration by a manufacturer certified dispenser technician. Arrange for testing, registration, and inspection of the dispensers with the Los Angeles County Agricultural Commissioner, Weights and Measures Bureau. Ensure all dispensers are tagged and sealed by regulatory Weights and Measures authorities. Provide written report of Weights and Measures certification.

- F. Install dispenser such that they do not operate when the corresponding fuel area ventilation system is not operating.
- G. Commission dispensers under the supervision of a factory authorized technician, and complete warranty registration with the manufacturer.

3.23 DISPENSER FUEL FILTER ASSEMBLY

- A. Install fuel filter assemblies in accordance with manufacturer instructions.

3.24 DISPENSER CONTAINMENT

- A. Install in accordance with drawings.

3.25 DISPENSER EQUIPMENT

- A. Install dispenser equipment in accordance manufacturer instructions in locations as shown on the drawings.

3.26 EMERGENCY SHEAR VALVES

- A. Install emergency shear valves in accordance with manufacturer instructions, requirements, and regulations.
- B. Test all under-dispenser crash/emergency valves and provide written report. Ensure that all crash valves are free to operate prior to introducing fuel into the system.

3.27 ISLAND FORMS

- A. Coordinate island form installation with structural sections. All islands and island forms shall be installed so as to be watertight at floor level.

3.28 SIGNAGE, LABELING, AND DESIGNATION

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.
- C. All emergency signs shall be unobstructed and easily readable from as wide an area as possible.

- D. Install detectable magnetic warning tape, colored appropriately, 12-inch above the pipe it is protecting.

3.29 FIELD QUALITY CONTROL

- A. Test all tanks, piping systems, sumps, interstitial spaces in accordance with manufacturer requirements and guidelines, and PEI RP100. All test results shall be submitted to LAWA within 24 hours of completion. The primary and secondary chambers of all product carrying vessels (pipes and tanks) shall be tested prior to and after final backfill. The test pressure on the interstitial piping space shall be maintained through the final backfill process and verified after backfill is complete.
- B. After completion of the gasoline system installation, and after backfilling and setting concrete, Test all underground piping and tanks with a precision method capable of detecting leaks of 0.005 gallons per hour. The precision test shall be performed by a third party independent testing company, and shall provide a certified report of tightness to LAWA within 5 days of completion. Also complete a precision test of all piping prior to pouring concrete protective slab.
- C. Pressure test piping in accordance with NFPA 30A, NFPA 30, and ASME B31.3.
- D. Notify LAWA at least 10 working days prior to setting the tanks into the excavation and 10 working days prior to final backfill of the tank top and underground piping. LAWA may be present during tank setting and for a final-pre-backfill inspection of all underground components, and neither of these evolutions shall be conducted until LAWA has had the opportunity to observe.
- E. In addition to the requirements outlined above, hydrostatically test all dispenser containment sumps, tank sumps, turbine enclosures, and other containment structures by filling each sump with water to within 6 inches of the top and monitoring the water level of 2 hours. This test shall be conducted by a testing agency and the results reported to LAWA within 24 hours of completion.
- F. Provide documentation of all tests signed by certified personnel to LAWA prior to the operation of the facility and in the closeout documents.
- G. Test all safety devices, including but not limited to crash valves, emergency stop devices, and leak detection devices, in the presence of LAWA. Provide a written report of all tests.
- H. Test all leak detection sensors, automatic line leak detectors, and level probes. Report results on State required forms that document annual test for these devices. Tests shall be in accordance with manufacturer requirements for startup tests and in accordance with State requirements for annual testing.
- I. Inspect installed firestopping in accordance with Section 078400 for compliance with specifications and submitted schedule.

- J. Commission and calibrate the fuel dispensers using the services of a manufacturer certified service organization. Provide a report of startup and calibration from that agency.
- K. Contact the Los Angeles County Agricultural Commissioner, Weights and Measures Bureau for inspection and registration of the dispensers, and affix the weights and measures seal on each dispenser face, one per nozzle and meter. Provide a report from the certifying agency.
- L. Adjust/calibrate/commission the submersible pump controllers, adjusting output pressures as required to achieve the desired flow rate performance.
- M. Test the flow rate of fuel at each dispenser in the presence of LAWA. Flow rate shall be 8-10 gallons per minute, with a minimum of 50 percent of the nozzles pumping, i.e. one nozzle per dispenser operating. Adjust the submersible turbine pump variable frequency drive output pressures to deliver equal flow rates to all dispensers.

3.30 INITIAL FUEL DELIVERY AND CALIBRATION

- A. The Contractor shall provide all fluids required to commission and test the fuel system.

3.31 COMMISSIONING

- A. The Contractor shall commission the gasoline fuel system. Commissioning shall include all testing, start-up, calibration, programming, and documentation. At the conclusion of the commissioning, the facility shall be ready for LAWA and tenants to conduct unrestricted operations and use all systems to their full intended and designed capacity.
- B. The Contractor shall submit a system commissioning plan to LAWA for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The Contractor shall be responsible for supplying all fluids and commodities required to startup and calibrate systems.
- C. Commissioning of the fuel system shall commence no less than 21 days prior to date of beneficial occupancy.
- D. Train facility personnel on system operations, including all valves, actuators, and controls. Training shall be a minimum of 8 hours.
- E. Fuel or flammable liquids shall not be introduced into the underground tanks until the environmental monitoring and leak detection system is fully programmed, operational, and tested. Fuel shall not be introduced into the dispensing system until all safety (including emergency stop, crash valves, etc.) and leak detection devices have been tested, fire extinguishers installed, and both the QTA fire alarm and fire suppression systems are tested, operational, and fully armed.

- F. Notify LAWA no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the Contractor shall facilitate a final inspection by LAWA. The Contractor shall have all necessary trade personnel on-site to operate equipment, open containment areas, and open electrical enclosures and equipment during LAWA's final Commissioning inspection. That final inspection shall include, but not be limited to:
1. Operational test of all systems.
 2. Operational test of all safety devices (e-stop switches, crash valves, overfill alarms);
 3. General review of the installation against plans, specs, and manufacturer requirements;
 4. Review of all test reports and manufacturer start-up reports;
 5. Test of all leak detection sensors;
 6. Closeout document requirements review;
 7. Tank registration form review, to include all outstanding regulatory reports;
 8. Inspection of all tank level probes to verify 90 percent setting;
 9. Inspect of mechanical overfill protection devices to verify/measure 95 percent setting;
 10. Inspect of all sumps and containment areas;
 11. Review and validation of monitoring system programming;
 12. Operational test of the fuel management system and verification that the system is recording transactions and that the operator is able to generate fuel invoices.
 13. Confirmation that system training has been completed; and
 14. Verification that remote monitoring in accordance with Section 136102, Environmental Monitoring and Fuel Control System and Section 136103, Fuel Management and Revenue Control System is set up and functioning properly.

3.32 MANUFACTURER'S FIELD SERVICES

- A. Furnish factory trained representative of system supplier for 8 hours of on-site time during leak detection and location system sensor and electronics installation.
- B. Furnish factory trained representative of system supplier for 8 hours of on-site time during final checkout of leak detection and location system.

3.33 TANK REGISTRATION

- A. The Contractor shall submit to LAWA, prior to the operation of the facility, all UST information required to register the USTs with the local CUPA.
- B. Submit all other forms, notifications, and reports as required by the State/City, and provide copies to LAWA prior to operation of the system, and in the closeout documents.

END OF SECTION 136100

SECTION 136101 – GASOLINE ELECTRICAL SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install gasoline and specialized electrical systems as shown on the drawings and as specified herein, including but not limited to the following:
 - 1. Hazardous locations
 - 2. Conduits
 - 3. Seal-off fittings
 - 4. Wire and cable
 - 5. Panelboards
 - 6. Outlet, junction and pull boxes
 - 7. Formed steel channel
 - 8. Underground warning tape
 - 9. Emergency stop
 - 10. Dispenser emergency stop interrupt
 - 11. Fuel system status panels
 - 12. Emergency stop signage
 - 13. Identification, signage and labeling
 - 14. Grounding and bonding
 - 15. Surge suppression
 - 16. Uninterruptable power supplies
 - 17. Seismic switch

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 111113, Compressed Air System
- B. Section 111127, Windshield Washer Fluid System
- C. Section 111128, Vacuum System
- D. Section 136100, Gasoline Storage and Dispensing System
- E. Section 136102, Environmental Monitoring and Fuel Control System
- F. Section 260543, Underground Ducts and Raceways for Electrical Systems
- G. Section 260545, Seismic Restraints for Electrical Systems
- H. Section 263353, Static Uninterruptible Power Supply

1.3 REFERENCES

- A. ASTM: ASTM International
- B. CEC: 2013 California Electrical Code
- C. NEMA: National Electrical Manufacturers Association
- D. NFPA: National Fire Protection Association
 - 1. NFPA 70: National Electrical Code (NEC)
- E. UL: Underwriters Laboratories
 - 1. UL 1238: Standard for Control Equipment for Use with Flammable Liquid Dispensing Devices

1.4 SUBMITTALS

- A. Shop drawings
 - 1. Include voltage drop calculations and wire sizing on all branch circuits
- B. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by LAWA.
- C. No electrician will be employed on the work who has not been fully qualified under the herein specified procedures and so certified by the State of California or similar testing authority.
 - 1. Each operator's certificate shall be on file at the site and shall be made available upon request.
- D. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the gasoline electrical system installation. Verification of permits shall be submitted.

1.5 QUALITY CONTROL

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project. Stricter requirements indicated on the drawings or specifications will have precedence over the requirements listed below:
 - 1. City of Los Angeles
 - 2. State of California
- B. Contractor Qualifications: The Contractor shall be a licensed Master Electrician in the State of California and the City of Los Angeles, and shall have a minimum of ten years' experience with installation of gasoline and petroleum electrical systems, including those regulated by Articles 514 and 515 of the California Electrical Code.

1.6 EXTRA MATERIALS AND SPARE PARTS

- A. Relays: Provide 20 spare relay of each type used in the project.

PART 2 - PRODUCTS

2.1 HAZARDOUS LOCATIONS

- A. The hazard areas for this project have been expanded beyond those required by code. The Contractor shall comply with the hazard area designations as depicted in the drawings.

2.2 CONDUITS

- A. Rigid metal conduit: Threaded, galvanized rigid metal conduit (GRMC) is required for all QTA systems wiring and all wiring passing through the defined Class I hazard areas. Non-metallic conduit is permitted on underground QTA systems only. Non-metallic conduit shall have GRMC stub ups as required by Article 514 of the California Electrical Code. Refer to Section 260543 for additional conduit requirements.
- B. Flexible steel conduit with listed fittings: only permitted in Class I, Division 2 areas where specifically allowed by the CEC. Shall be single strip, continuous, flexible interlocked, double-wrapped steel, galvanized inside and outside, forming a smooth internal wiring channel. Maximum length is 6 feet. Each section shall contain appropriately sized equipment grounding wire bonded at each end. Provide connectors with insulating bushings. Steel squeeze-type or set screw type fittings.
- C. Liquid-tight flexible electrical conduit with listed fittings: only permitted in Class I, Division 2 areas where specifically allowed by the CEC. Shall be single strip, continuous, flexible interlocked, double-wrapped steel, galvanized inside and outside, forming a smooth internal wiring channel with a water-tight plastic outer jacket. Maximum length is 6 feet. Each section shall contain appropriately sized equipment grounding wire bonded at each end. Cast malleable iron body and gland nut, cadmium plated with one-piece brass grounding bushings which thread to interior of conduit. Spiral molded vinyl sealing ring between gland nut and bushing and nylon insulated throat. Steel squeeze-type or set screw type fittings.
- D. Aluminum conduit is not authorized.

2.3 SEAL-OFF FITTINGS

- A. Cable seals shall be listed for Class I, Division 1 and Division 2 areas where applicable and shall be installed in accordance with the CEC.
- B. All seal fittings shall be 40 percent fill type.

2.4 WIRE AND CABLE

A. General

1. Electrical grade annealed copper, tinned if rubber insulated and fabricated in accordance with ASTM standards. Provide copper conductors for feeders and branch circuits 10AWG and smaller. Stranded conductors for control circuits. Conductors not smaller than 12 AWG for branch circuits. Conductors shall be sized for overcurrent protection. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent. Insulation voltage rating: 600 volts, except for wire used in 50 volts or below in control of signal systems, in this case use 300 volt minimum.
2. Use the following wiring methods in fueling areas:
 - a. Branch circuit wiring: Insulated single conductor type THHN/THWN, flame retardant, heat resistant thermoplastic insulation, nylon jacketed rated for 90 C dry/75 C wet operation.
 - b. Feeder circuit wiring: Insulated single conductor type THHN/THWN or RHW or XHHW, rated for 90 C.

2.5 PANELBOARDS

- A. Provide switched-neutral breakers for gasoline dispenser branch circuits.

2.6 OUTLET, JUNCTION AND PULL BOXES

- A. All exterior, sump, and fuel component outlet boxes, including those used for vehicle service equipment, including gasoline equipment, throughout the QTA not in a designated electrical room, shall carry a NEMA 4 or NEMA 4X rating unless otherwise indicated the specifications or drawings. All boxes in Hazard areas shall be rated in accordance with the CEC.

2.7 FORMED STEEL CHANNELS

- A. Manufacturers: Allied Tube & Conduit Corp., B-Line Systems, Midland Ross Corporation Electrical Products Division, Unistrut Corp., or equal.
- B. Description: Galvanized 12 gauge thick steel. Holes 1-1/2 inches on center.

2.8 UNDERGROUND WARNING TAPE

- A. Manufacturers: TEK ID., PRESCO, or equal.
- B. Description: 3 inch wide plastic detectable type tape, colored red with suitable warning legend describing buried electrical lines. Warning shall list utility covered, e.g. "CAUTION BURIED ELECTRIC LINE BELOW"

2.9 EMERGENCY STOP

- A. Manufacturers (relays): Magnecraft, Square D, Power Integrity, or equal.
- B. Manufacturers (annunciator panels): Fire Control Instruments, or equal.
- C. Description:
 - 1. The emergency stop system shall be controlled by relays. The system shall be fail-safe and interface with the seismic switch, fire alarm, environmental monitoring, compressed air, drainage, vacuum, fueling, and windshield washer systems. Coordinate with Sections 111113, 111127, 111128, 136100, and 136102. The relay types shall be as indicated on the drawings, and have a 120V coil rating, and 15A contactor rating.
 - 2. Furnish and install emergency stop buttons (ESBs). The buttons shall be red momentary push-buttons switches, mounted in NEMA 4X enclosures, supplied with plastic covers, with minimum 120VAC 10A rating.
 - 3. Furnish and install emergency stop reset (ESR). The reset buttons shall be green momentary push-button switches, mounted in NEMA 3 enclosures, with minimum 10A rating. The switches shall be mounted in the fire command rooms and the fuel managers room(s) as shown on the drawings.
 - 4. Furnish and install fuel status panel alarm relays. The relays shall be type as shown on the drawings with 120VAC coil voltage, and 24VDC, 10A contactor ratings.
 - 5. Furnish and install fire alarm relays, DPST type, 24V coil and 120VAC, 15A contact rating.
 - 6. Furnish and install yellow rotating warning lights which indicate the activation of the emergency stop system. The lights shall be UL Listed, 120VAC with a minimum 25W bulb/60W max.
 - 7. Furnish and install 3-Phase contactors for isolation of the fueling panels, as shown on the construction drawings.
 - 8. Furnish and install NEMA rated enclosures for all relays.
 - 9. Provide all wiring, conductors, raceways, mounting hardware, connectors, enclosures, and other equipment necessary for a complete installation.

2.10 DISPENSER EMERGENCY STOP INTERRUPT

- A. Manufacturers: Square D, Power Integrity, Carolina Products, or equal
- B. Provide UL 1238 low voltage dispenser emergency stop interrupts in electrical rooms as shown on the drawings in lockable NEMA 1 enclosures.
- C. Provide 1 UL listed E-Stop low voltage dispenser emergency stop interrupt at each dispenser.

2.11 FUEL SYSTEM STATUS PANEL

- A. Fuel System Status Panels are intended for facility managers, operators, and occupants to be aware of general alarm conditions throughout the building. They are not intended to provide evacuation notices or provide details on the specific conditions, but rather they are intended to

alert managers and other personnel that a condition exists and it requires further investigation or action.

- B. Manufacturers: Honeywell/Gamewell-FCI, or equal.
- C. Description: LED Backlit, 8 point, 24 volt DC, Gamewell-FCI M-08 or equal. Panels shall be UL listed and be supplied with lettering kit. Each panel shall be supplied with identifying sign and manufacturer produced window labels.

2.12 EMERGENCY STOP SIGNAGE

- A. Furnish emergency stop signage and reset signage at each actuator location. Furnish operating instruction for the emergency stop system in the reset location. Emergency stop signage shall meet signage specifications outlined in sections below.

2.13 IDENTIFICATION, SIGNAGE AND LABELING

- A. Cable Tags and Wire Identification Labels. Label and designate all electrical components and wires in accordance with California Electrical Code. Refer to project electrical specifications for additional requirements.
- B. Provide wall mounted, plain English, permanent signage at all manual emergency actuators and any other mechanical/or electrical device that the rental car user would be expected to actuate or operate in the normal course of business or emergency situation.
- C. Supply detectable magnetic warning tape over all underground conduits.
- D. All wall mounted and equipment mounted designation tags shall be 2 or 3-ply phenolic, outdoor and long-life rated, non-flammable, non-conductive, 1/8-inch thick, engraved. All signage shall be 0.020 baked enamel aluminum or FRP sized appropriately for the lettering. Aluminum shall be mounted with stainless steel hardware. Stock adhesive stickers are authorized only where specifically designated on the construction drawings. Designation labels and operating signage shall be white letters on black signage. All emergency, warning or other related signs shall be red signs with white letters, unless otherwise specified on the construction drawings. Designation label material shall be specifically designed to prevent static build-up, ES-1 Phenolic by NORPLEX, or equal. Lettering on designation labels shall be 1/2-inch in height. Lettering for operational signage shall be 3/4-inch in height unless otherwise designated in the construction drawings. Lettering for emergency signage shall be 1-inch in height unless otherwise designated in the construction drawings. Wall mounted signs shall be affixed with anchors and stainless steel screws. Equipment mounted signs shall be mounted with epoxy adhesive.

2.14 GROUNDING AND BONDING

- A. Grounding Conductors

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1. All grounding conductors shall be 2/0 AWG, stranded copper.
 2. Grounding ring conductors shall be 2/0.
- B. Grounding Rods
1. All Grounding Rods shall copper clad and 8 feet minimum in length.
- C. Connectors
1. Make connections in accordance with the California Electrical Code.
- D. Rod Electrodes
1. Product Description: Copper-clad steel.
 2. Diameter: 3/4 inch.
 3. Length: 8 feet.
- E. Mechanical Connectors
1. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.15 SURGE SUPPRESSION

- A. Manufacturers: Incon, Power Integrity, Eaton, or equal.
- B. Description: Supply parallel connected, panel based surge suppression device for the Main Fuel Service Panels (FS1). The panels shall be connected in parallel to the service panels through a circuit breaker. The panel shall be rated for 120kA surge capacity. Provide Incon Power Sentinel or equal.

2.16 UNINTERRUPTABLE POWER SUPPLY

- A. Provide UPS devices for the following equipment:
1. Provide UPS capable of sustaining a combined load of 1500 VA for the Environmental Monitoring Consoles.
 2. Provide a UPS capable of sustaining a combined load of 1500 VA for the primary and backup Fuel Management computer terminals in the Fuel Manager's Office.
- B. Each device shall be capable of powering each piece of equipment for 30 minutes.
- C. Provide each hardwired UPS with lockable fused disconnect switches between the UPS and protected device to serve as a maintenance disconnect.
- D. UPS requirements shall comply with Section 263353.

2.17 SEISMIC SWITCH

- A. Manufacturers: VLF/Enetec, Seismic Switch Inc., Earthquake Safety Systems, Inc., or equal.

- B. The seismic shall detect frequency components between 0.5Hz and 15Hz, and have variable detection settings between 0.025g and 5g of acceleration.
- C. The switch shall be powered by a 120V AC hard wired connection and have an 8-hour battery backup.
- D. The switch shall have the capability to provide a 120V relay output for connection to the emergency stop system.
- E. The switch shall be mounted in NEMA 4 or NEMA 4X enclosure.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Prior to device installation, verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- B. Prior to making equipment connections, verify equipment is ready for electrical connection, for wiring, and to be energized.
- C. Provide seismic restraints for electrical systems in accordance with Section 260545, Seismic restraints for electrical systems.

3.2 CONDUITS

- A. Install conduits in accordance with the CEC Chapter 5, Articles 500, 501, 505, 511, 514, and 515 when installing conduit for gasoline and vehicle service equipment.
- B. Conduit penetrations in the floor of the fueling system/fuel island area (within the horizontal extents of the Class I hazard area) are prohibited, except within the raised concrete fuel island or other raised concrete island.

3.3 SEAL OFF FITTINGS

- A. Install in accordance with the CEC where required in hazardous areas and for conduit passing underneath hazardous areas.

3.4 WIRE AND CABLE

- A. Use No. 12 AWG, minimum.

3.5 PANELBOARDS

- A. Install switched-neutral (SWN) breakers on all gasoline dispenser branch circuits.

3.6 OUTLET, JUNCTION, AND PULLBOXES

- A. Pay particular attention to CEC Chapter 5, Articles 500, 501, 511 514, and 515 when installing seal-off fittings for the gasoline and other vehicle service equipment.

3.7 FORMED STEEL CHANNEL

- A. Support all vertical conduit in the fuel island area with formed steel channel.
- B. Conduit penetrations in the floor of the fueling system/fuel island area (within the horizontal extents of the class I hazard area) are prohibited, except within the raised concrete fuel island or other raised concrete island.
- C. Coordinate the mounting and installation of formed steel channel for conduits on raised fuel islands with vacuum drops and channel mounted for other fuel system service equipment.

3.8 UNDERGROUND WARNING TAPE

- A. Install underground, detectable, magnetic warning tape over all underground conduit. Install 12 inches over conduit. Install one string of tape for each conduit 3 inches or larger. Install one string of tape per 3 smaller conduits. When conduits are placed in a horizontal array in a large trench, the conduits on each extent of the trench (i.e. the “outside” conduits) shall have a dedicated warning tape.

3.9 EMERGENCY STOP

- A. Installation locations:
 - 1. Install the emergency stop system in accordance with the drawings.
 - 2. Install emergency stop buttons in locations shown on the drawings.
 - 3. Install all emergency stop resets and isolation switches as shown on the drawings.
 - 4. Install all latching relays, windshield washer hose reel solenoids, drainage valve relay, and contactors as shown on the drawings. Install all relays in NEMA rated enclosures appropriate for the exposure. Label each relay and post. Install all annunciator relays as shown on the construction drawings in NEMA rated enclosures appropriate for the exposure.
- B. System Operation and Logic
 - 1. Install the system to comply with the operating logic outlined in the drawings and in this section.
 - 2. Modes:

- a. The E-Stop system will operate in three (3) modes.
 - b. "Shut down" mode indicates that the emergency-stop system has been actuated. In shut-down mode, electrical power is secured to all three fueling levels (via the individual fueling panels), all fuel system submersible pumps, the windshield washer fluid submersible pump (via the windshield washer pump relay), vacuum producers via relay input to the vacuum control panel, compressed air, and the windshield washing fluid (WWF) dispensing pump outlets
 - c. "Level reset" mode indicates that power has been secured to one or two of the fueling levels and associated submersible pumps after a building shut down.
 - d. "Full reset" indicates that is restored to all fueling panels and submersible pumps.
 3. Inputs. Shut-down will be activated by any of the following:
 - a. Actuation of any one of the manual emergency stop buttons.
 - b. Activation of fire alarm.
 - c. Flow of sprinkler water.
 - d. Activation of ultraviolet/infrared or visual flame detection sensor.
 - e. Seismic switch actuation.
 - f. A "critical alarm" from the environmental monitoring system. A critical alarm is defined as gasoline discovered by a discriminating sensor in the second or third floor aboveground dispenser containment sumps.
 4. Outputs: Upon shut-down, the following will occur:
 - a. Power secured to all fueling panels via the fueling panel contactors. De-energizing submersible gasoline pumps and fuel dispensers.
 - b. Isolation of the gasoline and windshield washer fluid systems by closing isolation valves.
 - c. Isolation of all data circuits in and out of the fuel dispensers.
 - d. De-energizing the associated vacuum systems.
 - e. Isolation of the compressed air systems by closing a solenoid valve.
 - f. Isolation of the WWF distribution system by closing solenoids on the dispensing hose reels.
 - g. Signaling the emergency stop system has been actuated in the respective building status panels in the Fire Command Centers and the Fuel Manager's/Supervisors Offices.
 - h. Energizing yellow warning lights to notify occupants that the emergency stop system was actuated.
- C. Tests and Inspections
1. Conduct a test with LAWA present that the system is operating properly. Every actuation method and environmental alarm sensors shall be actuated to demonstrate functionality.
 2. After successful completion of the LAWA test, conduct the same test in the presence of the AHJ.
 3. In no way shall the above tests substitute for or be in lieu of any other tests, inspections, or trials required by the AHJ or other regulatory authorities. The Contractor is responsible for the conduct of all required system tests and shall all equipment, supplies, and materials, including test fluids, to complete the tests.

3.10 DISPENSER EMERGENCY STOP INTERRUPT

- A. Installation Locations
 - 1. Install interrupts as shown on the drawings.
- B. System Wiring
 - 1. Install wiring to each dispenser emergency stop interrupt.
- C. Tests and Inspections
 - 1. Conduct tests with LAWA present that dispenser emergency stop interrupts are operating properly.
 - 2. After successful completion of the LAWA test, conduct the same test in the presence of the AHJ.
 - 3. In no way shall the above tests substitute for or be in lieu of any other tests, inspections, or trials required by the AHJ or other regulatory authorities. The Contractor is responsible for the conduct of all required system tests and shall all equipment, supplies, and materials required to complete the tests.

3.11 FUEL SYSTEM STATUS PANEL

- A. Install fuel system status panels in locations shown on the construction drawings.
- B. Install a red sign over the panel with one-inch letters indicating "FUEL SYSTEM STATUS PANEL"
- C. Bring all inputs from all associated devices to actuate the alarm conditions required.
- D. Commission, program, and test each panel.
- E. Provide permanent lettering on windows in accordance with manufacturer instructions as outlined below
- F. At a minimum, the following individual alarm conditions shall be programmed into the device
Each fire Command Room will contain status panels for alarm conditions at both QTA buildings. The exact number of inputs and programmed text is subject to changes based on input from the City of Los Angeles Fire Department:

Fire Command Rooms:

Building A
Emergency Stop Button Pushed Level 1
Emergency Stop Button Pushed Level 2

Emergency Stop Button Pushed Level 3
Emergency Stop Activated from Building B
Auto Initiation by Fire Signal
Auto Initiation by Seismic Switch
Fuel Leak Emergency Stop Level 2
Fuel Leak Emergency Stop Level 3
Ventilation Warning Level 1
Ventilation Warning Level 2
Ventilation Warning Level 3

Building B
Emergency Stop Button Pushed Level 1
Emergency Stop Activated from Building A
Auto Initiation by Fire Signal
Auto Initiation by Seismic Switch
Ventilation Warning Level 1

Fuel Managers Offices:

Building A
Emergency Stop Button Pushed Level 1
Emergency Stop Button Pushed Level 2
Emergency Stop Button Pushed Level 3
Emergency Stop Activated from Building B
Auto Initiation by Fire Signal

Auto Initiation by Seismic Switch
Fuel Leak Emergency Stop Level 2
Fuel Leak Emergency Stop Level 3
Ventilation Warning Level 1
Ventilation Warning Level 2
Ventilation Warning Level 3
Motor Oil Emergency Stop Button Pushed Level 1
Environmental System Alarm Level 1
Environmental System Alarm Level 2
Environmental System Alarm Level 3

Building B
Emergency Stop Button Pushed Level 1
Emergency Stop Activated from Building A
Auto Initiation by Fire Signal
Auto Initiation by Seismic Switch
Ventilation Warning Level 1
Motor Oil Emergency Stop Button Pushed Level 1
Motor Oil Emergency Stop Button Pushed Level 2
Motor Oil Emergency Stop Button Pushed Level 3
Environmental System Alarm Level 1

Building A Level Fueling Area Dispatcher's Offices (1 per floor):

Emergency Stop Button Pushed Level 1
Emergency Stop Button Pushed Level 2
Emergency Stop Button Pushed Level 3
Emergency Stop Activated from Building B
Auto Initiation by Fire Signal
Auto Initiation by Seismic Switch
Fuel Leak Emergency Stop Level 2
Fuel Leak Emergency Stop Level 3
Ventilation Warning Level 1
Ventilation Warning Level 2
Ventilation Warning Level 3

Building B Fueling Area Dispatcher's Office (first floor only)

Emergency Stop Button Pushed Level 1
Emergency Stop Activated from Building A
Auto Initiation by Fire Signal
Auto Initiation by Seismic Switch
Ventilation Warning Level 1

Building A Maintenance Area Dispatcher's Offices (first floor only):

Emergency Stop Button Pushed
Motor Oil Emergency Stop Button Pushed

Building B Maintenance Area Dispatcher's Offices (first floor)

Emergency Stop Button Pushed
Motor Oil Emergency Stop Button Pushed Level 1

Building B Maintenance Area Dispatcher's Offices (second floor)

Emergency Stop Button Pushed
Motor Oil Emergency Stop Button Pushed Level 2

Building B Maintenance Area Dispatcher's Offices (third floor)

Emergency Stop Button Pushed
Motor Oil Emergency Stop Button Pushed Level 3

3.12 EMERGENCY STOP SIGNAGE

- A. Emergency Stop signage and Emergency Stop Reset signage and instructions shall be posted respectively at each emergency stop button and emergency stop reset location.

3.13 IDENTIFICATION, SIGNAGE AND LABELING

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.
- C. All emergency signs shall be unobstructed and easily readable from as wide an area as possible.
- D. Install detectable magnetic warning tape, colored appropriately, 12 inches above the conduit it is protecting.
- E. Label all conduits at the point of emergence from ground, and the entry point of all wiring troughs with a permanent paint marking pen. Paper labels are not acceptable.

3.14 GROUNDING AND BONDING

- A. Examination
 - 1. Verify final backfill and compaction has been completed before driving rod electrodes.
 - 2. Clear and verify the location of all underground structures and utilities prior to beginning work.
 - 3. Verify trenching is completed before installing horizontal electrodes.
- B. Installation
 - 1. Install rod electrodes in vertical position with bottom at least 5 feet below frost line.
 - 2. Install interconnecting wire 2 feet below finished grade level.
 - 3. Demonstrate location of each accessible grounding connection and each chemical treatment well.
 - 4. Connection to the piping shall be made to base metal. Restore disturbed coating with manufacturer approved materials to match pre-manufactured coating.
- C. Grounding
 - 1. Install a grounding electrode system which includes ground rods, and concrete encased electrodes. Install all electrodes per the California Electrical Code.
 - 2. Install 2 ground rods spaced not less than 6 feet apart.
 - 3. Install 2 bonded, concrete encased electrodes.
 - 4. Install one each set of rods and electrodes in the vicinity of the fuel piping transition room and one in the vicinity of the tanks.
 - 5. Ground each aboveground fuel and windshield washer fluid piping system to the grounding rods and electrodes. Bond all grounding electrodes.
 - 6. Provide all other grounding in accordance with the California Electrical Code and the State of California Building Code.
- D. Bonding
 - 1. Bond all aboveground piping and service systems, to the piping grounding electrodes, and to the main grounding electrode system:
 - 2. Bond the windshield washer fluid piping to the windshield washer fluid AST and the windshield washer fluid vent line.
 - 3. Bond the vacuum system units and piping to the windshield washer fluid piping.
 - 4. Bond the aboveground motor and used oil piping to the motor oil tanks.
 - 5. Bond the motor and used oil piping and the compressed air piping from all systems.
 - 6. Bond both grounding systems with each other and to the main facility electrical service grounding and bonding system.
 - 7. Bond the electrical system in accordance with California Electrical Code and the State of California Building Code.

3.15 SURGE SUPPRESSION

- A. Install surge suppression system in accordance with manufacturer requirements on Main Fuel Service Panels (FS1).

3.16 UNINTERRPTIBLE POWER SUPPLY (UPS)

- A. Connect each device to the specified protected equipment in accordance with manufacturer instructions.

3.17 SEISMIC SWITCH

- A. Install the seismic switch in accordance with manufacturer instructions.
- B. Provide proposed settings in the commissioning plan for approval.
- C. Connect seismic switch output to the emergency stop system, such that actuation of the switch results in an Emergency Stop event.

3.18 CLEANING

- A. Clean interior of boxes to remove dust, debris, and other material.
- B. Clean exposed surfaces and restore finish.
- C. Clean adjacent surfaces of firestopping materials.

END OF SECTION 136101

SECTION 136102 – ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Furnish and install the environmental monitoring and fuel control system as shown on the drawings and as specified herein, including but not limited to the following.
 - 1. Environmental monitoring and fuel control system consoles.
 - 2. Environmental monitoring and fuel control system sensors and probes.
 - 3. Environmental monitoring and fuel control system communications equipment.
 - 4. Environmental monitoring and fuel control system signage and labeling.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 136103, Fuel Management and Revenue Control System
- B. Section 271000, Structured Cabling

1.3 REFERENCES

- A. CEC: 2013 California Electrical Code
- B. NWGLDE: National Work Group on Leak Detection Evaluations

1.4 SUBMITTALS

- A. Shop Drawings, Product data and samples
- B. Test Data: Submit test data for the following field testing and inspection reports:
 - 1. Test of all sensors, probes, and overfill alarm.
 - 2. Test of interconnection rules between systems.
 - 3. Certifications that the system is free of leaks and has passed all required tests.
- C. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by the Project.
- D. The person installing the monitoring system shall be a manufacturer certified technician of the appropriate level. Each operator's certificate shall be on file at the site and shall be made available to LAWA upon request.

- E. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the environmental monitoring and fuel control system installations. Verification of permits shall be submitted.
- F. Provide certification that the system is free of leaks and has passed required tests required in Part 3 of this section.

1.5 QUALITY CONTROL

- A. Regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the Project. Stricter requirements indicated in the drawings or the specifications shall have precedence over the requirements listed below:
 - 1. Installer Qualifications: The Installer shall be a manufacturer certified installer and programmer of the system.
 - 2. Manufacturer Qualifications: The manufacturer shall at least ten years' experience with manufacturing systems of this type.

1.6 EXTRA MATERIALS AND SPARE PARTS

- A. Provide 3 spare sensors of each type specified in the system.

PART 2 - PRODUCTS

2.1 SYSTEM MANUFACTURER

- A. All consoles, sensors, level probes, and high-level annunciating devices shall be supplied from the same manufacturer to form an integrated system. The system shall be approved by the National Work Group on Leak Detection.
- B. Manufacturers: Incon, or pre-bid approved equal.

2.2 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM CONSOLE

- A. Provide environmental monitoring and fuel control system consoles in numbers as specified in the construction drawings. Incon TS 5000 or TS-550 evo, or pre-bid approved equal.
- B. System shall be equipped with intrinsically safe monitoring probe and sensing devices, a touch screen, integral printer. Supply expansion boxes for functionality specified. Supply system management software.
- C. Monitoring requirements:
 - 1. Continuous monitoring of up to the sensor inputs as shown on the drawings, including discriminating and non-discriminating sensors.

2. Continuous liquid level monitoring for up to 10 tanks for Building A, and 3 tanks in Building B.
 3. Continuous monitoring of submersible turbine pumps.
 4. External inputs for signals from other monitoring systems.
 5. An integrated line leak detection system per level for up to 18 underground lines, with a “smart” system that adjusts for site specific conditions.
 6. Pressure transducer inputs from various places on the fuel system.
- D. Control capabilities:
1. A minimum number of relay output channels as shown on the drawings.
 2. Submersible turbine interfaces.
 3. The ability to manage submersible turbine pump hook signals and provide hook signal isolation for dispensers through up to 36 AC input channels and the submersible turbine interface.
 4. The ability to secure air to the windshield washing fluid (WWF) diaphragm pumps when the fluid level approaches the minimum allowable.
 5. The ability to program rules into the system to allow for certain submersible pumps to be prevented from operating in the case of ventilation system shutdown or line leak detector alarm, and to allow for submersible turbine pump activation in the case a valid hook signal is received.
 6. The ability to turn off power to dispensers when the corresponding ventilation system is not running.
- E. Communication requirements:
1. E-mail notification capability.
 2. Direct Ethernet connection capability.
 3. USB 2.0 connectivity.
 4. RS-232/485 connectivity.
 5. IP addressable web-based interface for remote monitoring.
 6. Output relays to alert other systems, e.g., fire alarm under certain alarm conditions.

2.3 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM SENSORS AND PROBES

- A. Provide containment sump leak detection probes. Dispenser and sump leak detection probes shall be the discriminating type.
- B. Provide interstitial monitoring probes for all monitored tanks.
- C. Provide transducers for the line leak detection system for both gasoline and WWF systems.
- D. Provide level probes for all tanks monitored (gasoline and WWF)
- E. Provide functionality as shown on the construction drawings.
- F. Provide vacuum sensors as shown on drawings for monitoring the interstitial space of underground fuel and WWF piping.

- G. Provide vapor sensors in the first floor gasoline transition rooms capable of detecting gasoline vapors.
- H. Provide vapor sensors in the WWF storage rooms that are capable of detecting methanol vapors.

2.4 WIRING

- A. Provide conduit, wiring, junction boxes, seal fittings, and other components for a complete system in accordance with manufacturer instructions and the CEC.
- B. Provide CAT 6 cables in accordance with Section 271000.
- C. All conduit shall be galvanized rigid metal.

2.5 REMOTE TANK LEVEL DISPLAY

- A. Manufacturers: Omntec Proteus Mini-Me, Pneumercator, Incon, or equal.
- B. Provide a remote display at the fill area to display lube oil tank levels at the fill ports to the delivery driver. Connect the remote display to the Environmental Monitoring and Fuel Control System.

2.6 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM COMMUNICATIONS EQUIPMENT

- A. Provide networking and communications equipment necessary for each console to be monitored in Fuel Manager's Office and by the internet. Provide equipment necessary for consoles to send e-mails over the internet.
- B. Provide networking and communication wiring to monitor the gasoline submersible turbine pumps.
- C. Provide one remote overfill alarm annunciator for each underground tank monitored. Do not assign a single overfill annunciator to multiple tanks.
- D. Provide remote fuel tank product digital level gauge at the UST filling station. Manufacturers: Omntec Proteus Mini-Me or equal.

2.7 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM SIGNAGE AND LABELING

- A. Provide designation labels on all equipment in this specification outlines on the related equipment designation drawings. All labels shall bear the abbreviations as described on the drawings and legends, and shall match exactly the designation abbreviations programmed into

the Inventory and Leak Detection System and the Fuel Management and Revenue Control System, in accordance with Section 136103.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM INSTALLATION

- A. Install consoles in strict conformance with manufacturer requirements, recommendations, and instructions.
- B. Install consoles in the locations shown on the drawings.
- C. Protect power the Environmental Monitoring Consoles via UPS devices. Coordinate with other sections.
- D. Load and connect all wires required for a fully functioning system as described on the construction drawings. Install all necessary expansion cards, modules, and boxes to provide the functionality below:
- E. Configuration and Programming
 - 1. Program and configure the system to monitor the following:
 - a. Discriminating leak monitoring of all dispenser containment and transition sumps.
 - b. Leak monitoring of all tank containment sumps.
 - c. Line leak monitoring of all underground gasoline and WWF piping.
 - d. Interstitial leak monitoring of al underground gasoline and WWF piping.
 - e. Monitoring of vapors in the gasoline fuel risers.
 - f. Monitoring of vapors in the WWF storage rooms.
 - g. Monitoring of the WWF and gasoline vapor sensor malfunction status.
 - h. Interstitial leak monitoring of all underground and aboveground tanks.
 - i. Interstitial leak monitoring of all underground tank containment sumps.
 - j. Interstitial leak monitoring in first floor dispenser containment sumps.
 - k. Interstitial leak monitoring in all transition and vent sumps.
 - l. Level monitoring of all underground and aboveground tanks. Coordinate with other sections.
 - m. Performance monitoring of all gasoline submersible turbine pumps.
 - n. Monitoring the fuel system ventilation signals. Coordinate with other sections.
 - o. Each different emergency stop signal.
 - p. Input from the Fuel Management and Revenue Control System.
 - 2. Program and configure the system to send the following outputs:
 - a. Output signals to the appropriate fuel status panels (coordinate with other sections).
 - b. Output signals to the Emergency Stop System for critical environmental alarms (critical environmental alarms are gasoline detected by a discriminating sensor in Level 2, or 3 dispenser sumps).

- c. Output signals to actuate the submersible pumps when hook signals are received, the line leak detection system is not in alarm, and the ventilation system that the dispenser is in indicates that airflow is established. Output signals authorizing fuel dispensers to dispense.
 - d. Output signals to the appropriate overfill protection annunciators.
 - e. Output signal to warning light and alarm outside of WWF storage rooms when WWF room vapor sensor detects vapors.
 - f. Output signal to warning light and alarm outside of gasoline riser rooms when gasoline vapor sensor detects vapors.
3. Program and configure the system for the following rules:
- a. Actuate the appropriate submersible pump when a hook signal is received, appropriate line leak detector is not in alarm, appropriate ventilation is running, and there are no critical environmental alarms.
 - b. Send the appropriate signal to the appropriate overfill alarm annunciator when a tank liquid level reaches 90 percent.
 - c. Send a signal to the Fuel System Status Panels when the following conditions are present:

Fuel System Status Panels:

Fire Command Room:

Fire Command Rooms		
Panel	Annunciated Condition	Alarm Condition
Building A	Emergency Stop Button Pushed Level 1	Output from other system
Building A	Emergency Stop Button Pushed Level 2	Output from other system
Building A	Emergency Stop Button Pushed Level 3	Output from other system
Building A	Emergency Stop Activated from Building B	Output from other system
Building A	Auto Initiation by Fire Signal	Output from other system
Building A	Auto Initiation by Seismic Switch	Output from other system
Building A	Fuel Leak Emergency Stop Level 2	Any discriminating dispenser sump sensor on level 2 that detects gasoline
Building A	Fuel Leak Emergency Stop Level 3	Any discriminating dispenser sump sensor on level 3 that detects gasoline
Building A	Ventilation Warning Level 1	Output from other system
Building A	Ventilation Warning Level 2	Output from other system
Building A	Ventilation Warning Level 3	Output from other system

Building B	Emergency Stop Button Pushed Level 1	Output from other system
Building B	Emergency Stop Activated from Building A	Output from other system
Building B	Auto Initiation by Fire Signal	Output from other system
Building B	Auto Initiation by Seismic Switch	Output from other system
Building B	Ventilation Warning Level 1	Output from other system

Fuel Manager's Offices:

Fuel Manager's Offices		
Panel	Annunciated Condition	Alarm Condition
Building A	Emergency Stop Button Pushed Level 1	Output from other system
Building A	Emergency Stop Button Pushed Level 2	Output from other system
Building A	Emergency Stop Button Pushed Level 3	Output from other system
Building A	Emergency Stop Activated from Building B	Output from other system
Building A	Auto Initiation by Fire Signal	Output from other system
Building A	Auto Initiation by Seismic Switch	Output from other system
Building A	Fuel Leak Emergency Stop Level 2	Any discriminating dispenser sump sensor on level 2 that detects gasoline
Building A	Fuel Leak Emergency Stop Level 3	Any discriminating dispenser sump sensor on level 3 that detects gasoline
Building A	Ventilation Warning Level 1	Output from other system
Building A	Ventilation Warning Level 2	Output from other system
Building A	Ventilation Warning Level 3	Output from other system
Building A	Motor Oil Emergency Stop Button Pushed Level 1	Output from other system
Building A	Environmental System Alarm Level 1	All environmental leak sensor alarms on the level 1 systems, including USTs, and WWF AST alarms
Building A	Environmental System Alarm Level 2	All environmental leak sensor alarms on the level 2 systems, including USTs, and WWF AST alarms

Building A	Environmental System Alarm Level 3	All environmental leak sensor alarms on the level 3 systems, including USTs, and WWF AST alarms
Building B	Emergency Stop Button Pushed Level 1	Output from other system
Building B	Emergency Stop Activated from Building A	Output from other system
Building B	Auto Initiation by Fire Signal	Output from other system
Building B	Auto Initiation by Seismic Switch	Output from other system
Building B	Ventilation Warning Level 1	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed Level 1	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed Level 2	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed Level 3	Output from other system
Building B	Environmental System Alarm Level 1	All environmental leak sensor alarms on the level 1 systems, including USTs, and WWF AST alarms

Building A Level Fueling Area Dispatcher's Offices (1 per floor):

Building A Level Fueling Area Dispatcher's Offices		
Panel	Annunciated Condition	Alarm Condition
Building A	Emergency Stop Button Pushed Level 1	Output from other system
Building A	Emergency Stop Button Pushed Level 2	Output from other system
Building A	Emergency Stop Button Pushed Level 3	Output from other system
Building A	Emergency Stop Activated from Building B	Output from other system
Building A	Auto Initiation by Fire Signal	Output from other system
Building A	Auto Initiation by Seismic Switch	Output from other system
Building A	Fuel Leak Emergency Stop Level 2	Any discriminating dispenser sump sensor on level 2 that detects gasoline
Building A	Fuel Leak Emergency Stop Level 3	Any discriminating dispenser sump sensor on level 3 that detects gasoline
Building A	Ventilation Warning Level 1	Output from other system

Building A	Ventilation Warning Level 2	Output from other system
Building A	Ventilation Warning Level 3	Output from other system

Building B Level Fueling Area Dispatcher's Offices (first floor only):

Building B Level Fueling Area Dispatcher's Offices		
Panel	Annunciated Condition	Alarm Condition
Building B	Emergency Stop Button Pushed Level 1	Output from other system
Building B	Emergency Stop Activated from Building A	Output from other system
Building B	Auto Initiation by Fire Signal	Output from other system
Building B	Auto Initiation by Seismic Switch	Output from other system
Building B	Ventilation Warning Level 1	Output from other system

Building A Maintenance Area Dispatcher's Offices (first floor only):

Building A Maintenance Area Dispatcher's Offices		
Panel	Annunciated Condition	Alarm Condition
Building B	Emergency Stop Button Pushed	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed	Output from other system

Building B Maintenance Area Dispatcher's Offices (level 1):

Building B Maintenance Area Dispatcher's Offices		
Panel	Annunciated Condition	Alarm Condition
Building B	Emergency Stop Button Pushed	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed	Output from other system

Building B Maintenance Area Dispatcher's Offices (level 2):

Building B Maintenance Area Dispatcher's Offices		
Panel	Annunciated Condition	Alarm Condition

Building B	Emergency Stop Button Pushed	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed Level 1	Output from other system

Building B Maintenance Area Dispatcher's Offices (level 2):

Building B Maintenance Area Dispatcher's Offices		
Panel	Annunciated Condition	Alarm Condition
Building B	Emergency Stop Button Pushed	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed Level 2	Output from other system

Building B Maintenance Area Dispatcher's Offices (level 3):

Building B Maintenance Area Dispatcher's Offices		
Panel	Annunciated Condition	Alarm Condition
Building B	Emergency Stop Button Pushed	Output from other system
Building B	Motor Oil Emergency Stop Button Pushed Level 3	Output from other system

- d. Upon completion and testing of programming, provide LAWA with a hard copy output of all programming and rules. Additionally, the Contractor shall download the programming configuration to a flash drive so that the system can be quickly re-programmed by electronic upload.

3.2 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM SENSORS AND PROBES

- A. Install sensors and probes in strict accordance with manufacturer recommendations, requirements, and instructions.

3.3 WIRING

- A. Install sensors and probes in strict accordance with manufacturer recommendations, requirements, and instructions.

3.4 REMOTE TANK LEVEL DISPLAY

- A. Install the remote display in accordance with Manufacturer's instructions.

- B. Install remote display so as to be accessible and readable to delivery vehicle operator.
- C. Connect to Environmental Monitoring and Fuel Control System Consoles with RS 232 cables.

3.5 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM COMMUNICATIONS EQUIPMENT

- A. Coordinate with other sections to configure the on-site fuel system network.
- B. Engage the services of an information technology professional to wire, configure and program the network.
- C. All system consoles shall be monitored by each computer in the Fuel Manager's office.
- D. Configure the system and program rules to send e-mail on certain system alarms at the direction of LAWA and Fuel Manager. At a minimum, configure e-mail notifications for leak alarms and low fuel levels.
- E. Configure the system so that each console is capable of monitoring over the internet.
- F. Install and configure system software on both Fuel Manager's computers.

3.6 ENVIRONMENTAL MONITORING AND FUEL CONTROL SYSTEM SIGNAGE AND LABELING

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.

3.7 COMMISSIONING

- A. The Contractor shall submit a system commissioning plan to LAWA for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety equipment. The plan shall also include all testing and commissioning procedures specifically outlined in this section. The Contractor shall be responsible for supplying all fluids and commodities required to startup and calibrate systems.
- B. Engage the services of a manufacturer certified representative to program and configure the system and otherwise oversee installation. The manufacturer certified technician shall be present during all system testing, startup procedures, and fuel system testing.

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- C. In the presence of LAWA, test all sensors and probes. Measure all probes to demonstrate overfill alarm settings. Coordinate testing and commissioning with other sections.
- D. In the presence of LAWA, test all interconnections and rules between systems. Verify that all system functionality is operating properly.
- E. Train LAWA's personnel to operate system.
- F. Do not introduce fuel into any aboveground or in-building system until all safety features of the Environmental Monitoring and Fuel Control System have been fully tested.

END OF SECTION 136102

SECTION 136103 – FUEL MANAGEMENT AND REVENUE CONTROL SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes furnishing and installing the fuel management system as shown on the drawings and as specified herein, including but not limited to the following.
 - 1. Fuel management system.
 - 2. Control computers and network equipment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 136100, Gasoline Storage and Dispensing Systems
- B. Section 136101, Gasoline Electrical System
- C. Section 136102, Environmental Monitoring and Fuel Control System
- D. Section 271000, Structured Cabling

1.3 REFERENCES

- A. CEC: 2013 California Electrical Code
- B. NFPA: National Fire Protection Association
 - 1. NFPA 30A: Code for Motor Fuel Dispensing Facilities and Repair Garages

1.4 SUBMITTALS

- A. Shop drawings, product data and samples: Submit the following product data:
 - 1. Fuel management card reader manufacturer information and features.
 - 2. HID card specifications.
 - 3. Controller specifications.
 - 4. Desktop computer product data.
- B. Test Reports: Indicate procedures and results for specified field testing and inspection.
- C. Contractor's certificates certifying that installers are licensed and qualified to install equipment as required by the Project.
- D. The person installing the fuel management system shall be a manufacturer Certified Technician of the appropriate level.

1. 1. Each operator's certificate shall be on file at the site and be made available upon request.
- E. At no expense to LAWA, the Contractor shall obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the fuel management system installation. Verification of permits shall be submitted.
- F. Provide certification that inspections and tests, as described in PART 3 of this Section, have been performed, system is free of leaks, and has passed specified testing requirements.

1.5 QUALITY CONTROL

- A. Regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the Project. Stricter requirements indicated in the drawings or the specifications have precedence over the requirements listed below:
- B. Installer Qualifications: A manufacturer certified installer, or engage the services of a manufacturer certified installer.

1.6 EXTRA MATERIALS AND SPARE PARTS

- A. Supply 2,000 HID cards for issue and for use by operators. The HID cards shall be compatible with other security systems used at the facility.
- B. Provide 2 spare computers with requirements found from the control computers and network equipment article.

PART 2 - PRODUCTS

2.1 FUEL MANAGEMENT SYSTEM

- A. Manufacturers: Wayne iX Fleet Fuel Management System, or approved equal
- B. Supply fuel management system with 125 kHz HID proximity readers capable of reading HID ProxCard II and ProxCard Plus, and the same HID protocols used for security equipment facility-wide. HID readers shall be mounted within dispenser cabinet and supplied with the dispenser from manufacturer as factory installed. One HID card reader for each nozzle (one reader on each side of 2-nozzle dispensers). Each HID reader associated with a single nozzle.
- C. Site controllers or control modules that connect the card readers to the controlling software.
- D. Software to control the authorizations and collect transaction information.

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- E. Provide 2 personal computers (one primary, one backup) in each fuel manager's office, as indicated in the drawings, connected to the internal network and the internet, loaded with the manufacturer provided software and controller, from which the entire system can be controlled.
- F. Provide 1 commercial-grade desk for the setup of the Fuel Management Computer. Manufacturer: Bush Office Advantage 60-inch or equal.
- G. Provide 1 commercial office task chair for the Fuel Management Computer desk. Manufacturer: WorkPro 769T or equal.
- H. Provide wiring and cabling in accordance with Section 271000.
- I. Note: The Wayne iX is the basis of design. The drawings depict the wiring required for this system. Alternate systems may require alternate wiring requirements. The Contractor shall be responsible for providing whatever alternate wiring design and installation is required, and shall submit to LAWA for approval.
- J. Supply 2,000 ProxCard II HID cards with the system.
- K. The system shall have the following capabilities:
 - 1. Direct Ethernet connectivity with Cat 6 cabling to the desktop control computer without need for additional control modules or boxes.
 - 2. Authorizing a fuel dispensing transaction after an authorized card is read by the HID proximity card reader.
 - 3. Associating each issued HID card with a person and company.
 - 4. Be capable of having at least 1000 persons in the system working for up to 25 companies, in any combination thereof.
 - 5. Be capable of specifically authorizing certain cards. For example, only authorizing cards that have been issued to persons. Additionally, the capability of de-authorizing cards at any time by the manager, for example, in the case of employee termination.
 - 6. Be capable of recording and reporting each transaction, including person, company, time, date, fueling position number, and gallons dispensed, accurate to 0.1 gallon.
 - 7. Setting a pre-authorized, system-wide dispensing limit of 25 gallons per authorization, as required by the fire department.
 - 8. Generating individual invoices on a periodic basis (weekly, monthly, etc.) for each customer/tenant company. Each invoice shall have the ability to list total gallons dispensed, price per gallon, total invoice value, and a listing of each transaction in detail (time/date/person/amount dispensed).
 - 9. The ability to centrally control fueling at the entire facility, collectively or on an individual dispenser basis. That is, the manager, from the control computer, shall be able to "turn-on" or "turn-off" any fueling position at the facility at any time by allowing or dis-allowing the system to authorize any particular position.
 - 10. Be managed from a remote computer at the facility (within the facility LAN) or be managed remotely from a computer over the internet.

2.2 CONTROL COMPUTERS AND NETWORK EQUIPMENT

- A. Supply two (2) personal computers (Windows 10 Operating System) each with the following characteristics:
1. Intel I7 Processor.
 2. Windows 10 (or latest version) Enterprise OS.
 3. 2 TB Hard Drive.
 4. 16 GB Memory.
 5. 24" Flat Screen display.
 6. Dedicated Video Card.
 7. Sound Card and Speakers.
 8. Minimum of 5 USB 2.0 ports.
 9. Minimum of 2 USB 3.0 ports.
 10. Ethernet Port.
 11. Desktop Tower.
 12. USB Laser Printer.
- B. Network Equipment: Provide cables, connecting equipment, power supplies, and software to interface with LAWA-supplied network equipment and virtual private network (VPN) (routers, switches, fiber optic cables, fiber converters) to create an internal virtual private network to which all fuel system control equipment will be connected. The network shall have the capability for the fuel control desktop computers to see and control all fuel system equipment, and have the ability for an outside user, monitoring company, or manufacturer service person to access each system software or web-based interfaces.
1. Coordinate materials with Sections 136100, 136101, 136102, and 271000

PART 3 - EXECUTION

3.1 FUEL MANAGEMENT SYSTEM INSTALLATION

- A. Install the Fuel Management System in accordance with manufacturer requirements, instructions, and recommendations, in accordance with the State of California Building Code, the California Electrical Code, and in accordance with NFPA 30A.
- B. Run wires, cables, conduits, and raceways as necessary to complete all system connections, including fiber optic pathways and converters where necessary.
- C. Test all Cat 6 cables in accordance with LAWA IT Standards.
- D. Make all remaining connections to system to function as described above.
- E. Commission and test the system as specified below.
- F. Connect the Fuel Management and Revenue Control System to the Environmental Monitoring and Fuel Control system to provide inventory reconciliation functionality, in accordance with Section 136102.

3.2 COMMISSIONING, PROGRAMMING AND TESTING

- A. Engage the services of a manufacturer field representative for a minimum of 2 field visits (but in any case as many field visits as necessary to startup and program the system) to program, start up, calibrate, and test the system and provide training to fuel management personnel on all system functionality. Complete sample transactions and generate sample invoices from those transactions.
- B. Test the dispensing authorization limit in the presence of LAWA and fire department inspector.
- C. Provide a written report to LAWA documenting the system test and confirming that all required functionalities have been tested.
- D. Test all network cabling in accordance with LAWA IT requirements.

3.3 COMMUNICATIONS AND NETWORK CONNECTIONS

- A. Engage the service of an information technology professional to connect to LAWA established fuel management network and provide all functionality as described above. Network professional shall determine connection points and necessary IP addresses for the iX Fleet controller and In-Dispenser-Terminals.
- B. Provide training and assist the fuel manager with initial startup and configuration of both fuel managers' computers.
- C. Verify and test all required functionality described above.

3.4 MANUFACTURER FIELD SERVICES

- A. Provide manufacturer field services as described above. Provide sufficient field services so that facility is fully functional prior to date of operational occupancy.

END OF SECTION 136103

SECTION 14 20 00 - VERTICAL TRANSPORTATION, GENERAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes vertical transportation for the entire project. The vertical transportation work includes, but is not limited to the, following:
1. All elevator work.
 2. All escalator work.
 3. All moving walk work.
 4. Anchors, embedments, shims, fasteners, inserts, hoisting equipment, fall protection/prevention tie-offs, expansion devices, accessories, support brackets, hoist beams, temporary work platforms, backing and attachments for the above.
 5. All testing for the above.
 6. CCTV, security system, and BMS components will be incorporated into the vertical transportation work. Coordinate with the CCTV, security system, and BMS component contractors to incorporate CCTV, security system, and BMS components and interface requirements during the course of the Work.

NOTE: During any retrofit, LAWA is to be provided the opportunity to identify any parts they deem beneficial for use at another LAWA location. The Design Professional and Contractor shall work directly with LAWA staff, to identify any salvageable parts and their respective handling requirements.

- B. Related work specified elsewhere includes, but is not limited to, the following:
1. Elevator Hoistway and Pit:
 - a. Clear, plumb, substantially flush hoistway with variations not to exceed 1" at any point.
 - b. Bevel cants not less than 75° from the horizontal on any rear or side wall ledges and beams that project or recess 2" or more into the hoistway. Not required on hoistway divider beams.
 - c. Divider beams between adjacent elevators at each floor, pit, and overhead. Supports at each floor for car and counterweight guide rail fastening including supports for car guide rail fastening above top landing. Intermediate car guide rail support when floor heights exceed 14'-0" or as designated on contract drawings. Intermediate counterweight guide rail supports where floor heights exceed 16'-0". Provide rail bracket supports as required to meet Code required bracket spacing and/or Installer needs. Building supports not to deflect in excess of 1/8" under normal conditions, 1/4" under applicable seismic conditions.
 - d. Continuous vertical car and counterweight guide rail support between floors shown on Contract documents full height of hoistway.
 - e. Installation of guide rail bracket supports in concrete. Inserts or embeds, if used, will be furnished under Division 14.
 - f. Hoist machine supports including two (2) additional horizontal supports above the

top terminal landing on the machine side of the hoistway. Locate as required for selected providers' equipment.

- g. Wall blockouts and fire rated closure for control and signal fixture boxes which penetrate walls.
 - h. Cutting and patching walls and floors.
 - i. Concrete wall pockets and/or structural steel beams for support of hoist machine, rope sheaves, and dead-end hitch beams. Support deflection shall not exceed 1/1666 of span under static load.
 - j. Erect front hoistway wall after elevator entrances are installed.
 - k. Grout floor up to hoistway sills and around hoistway entrances.
 - l. Lockable, self-closing, fire-rated pit door, if pit depth exceeds 10'-0" (3.048 m).
 - m. Pit access ladder for each elevator and pit divider screens.
 - n. Structural support at pit floor for buffer impact loads, guide rail loads.
 - o. Waterproof pit. Indirect waste drain or sump with flush grate and pump. Locate sump pump outside of hoistway/pit.
 - p. Protect open hoistways and entrances during construction per OSHA Regulations.
 - q. Protect car enclosure, hoistway entrance assemblies, and special metal finishes from damage.
 - r. Hoistway smoke relief venting or hoistway pressurization for smoke control.
 - s. Hoist machine ventilation, heating and/or cooling. Maintain minimum temperature of 55°F, maximum 90°F at the location of the hoist machine.
 - t. Seal fireproofing to prevent flaking.
 - u. Glass enclosed hoistways. Laminated glass to meet the requirements of ANSI Z97.1. Interior ledges created by glass mullions not to exceed 4".
 - v. Access ladders and platform to governor(s), if required.
2. Elevator Control Room and Machinery Spaces:
- a. Enclosure with access. Provide ships ladder or stair with guard railing. Include similar access to overhead machinery space.
 - b. Self-closing and locking access door.
 - c. Ventilation and heating. Maintain minimum temperature of 55° F, maximum 90° F. Maintain maximum 80% relative humidity, non-condensing.
 - d. Paint walls and ceiling.
 - e. Class "ABC" fire extinguisher in each elevator controller space.
 - f. Seal fireproofing to prevent flaking.
 - g. Self-closing and locking governor access door and access means.
 - h. Fire sprinklers.
3. Elevator Electrical Service, Conductors and Devices:
- a. Lighting and GFCI convenience outlets in pit, controller space, and overhead machinery spaces. Provide one additional non-GFCI convenience outlet in pit for sump pump.
 - b. Three-phase mainline copper power feeder to terminals of each elevator controller in the controller space with protected, lockable "open," disconnecting means.
 - c. Single-phase copper power feeder to each elevator controller for car lighting and exhaust blower with individual protected, lockable "open," disconnecting means located in the controller space. Emergency telephone line to each individual elevator control panel in elevator controller space. Fire alarm initiating devices in each elevator lobby, for each group of elevators or single elevator and each

controller space to initiate firefighters' return feature. Device at top of hoistway if sprinklered. Provide alarm initiating signal wiring from hoistway or controller space connection point to elevator controller terminals. Device in machine room

and at top of hoistway to provide signal for general alarm and discrete signal for Phase II firefighters' operation.

- d. Temporary power and illumination to install, test, and adjust elevator equipment.
 - e. Category 6 (distance ≤ 300 feet) or Fibre Optic (distance > 300 feet) Ethernet connection and junction box in each elevator machine room space.
 - f. Firefighters' telephone jack and announcement speaker in car with connection to individual elevator control panels in the controller space and elevator control panel in firefighters' control room.
 - g. Conduit from the closest hoistway of each elevator group or single elevator to the firefighters' control room and/or main control console. Coordinate size, number, and location of conduits and junction boxes with Elevator Contractor.
 - h. Means to automatically disconnect power to affected elevator drive unit and controller prior to activation of the controller space fire sprinkler system, and/or hoistway fire sprinkler system. Manual shut-off means shall be located outside bounds of the controller space.
 - i. When sprinklers are provided in the hoistway all electrical equipment, located less than 4'-0" above the pit floor shall be identified for use in wet locations. Exception, seismic protection devices.
 - j. Single-phase power feeders to main control console and firefighters' control panel.
 - k. Single-phase power feeder to elevator intercom amplifier in the elevator controller space.
 - l. Single-phase power feeders to controller(s) for CCTV with lockable "open" disconnecting means.
 - m. 10 footcandles illumination level in elevator lobbies of elevator threshold.
4. Elevator Standby Power Provision:
- a. Standby power of normal voltage characteristics via normal electrical feeders to run one elevator at a time in each elevator group and/or single elevator unit at full-contract car speed and capacity.
 - b. Conductor from auxiliary form "C" dry contacts, located in the standby power transfer switch to a designated elevator control panel in each elevator group and/or single elevator unit. Provide a time delay of 30 - 45 seconds for pre-transfer signal in either direction.
 - c. Standby single-phase power to group controller, and each elevator controller for car lighting, exhaust blower, emergency signaling device, intercom amplifier and hoist machine cooling fan.
 - d. Means for absorbing regenerated power during an overhauling load condition per NEC 620.91. Elevator(s) will employ IGBT drive, presenting a non-linear active load.
 - e. Standby power to hoist machine and control room ventilation or air conditioning.
 - f. Standby power to emergency communications device(s).
5. Escalator Wellway and Pit
- a. Clear, plumb, wellway with variations not to exceed 1" at any point.
 - b. Floor pockets and/or structural beams for support of escalator truss at each end and at intermediate locations as shown on Architect's drawings. Steel supports, if used, shall meet deflection requirements of AISC Specifications for Design, Fabrication,

- and Erection of Structural Steel for Buildings.
 - c. Fire rated enclosure of escalator truss including ends, sides and bottom in ceiling plenum.
 - d. Patching and finishing around escalator landing plates after installation.
 - e. Cladding and finishing of exposed truss surfaces.
 - f. Waterproof pit. Sump pit with flush grate and pump or indirect waste drain with oil separator for outdoor units.
 - g. Protect exposed exterior escalators with weatherproof canopy entire length of truss per Code.
 - h. Protect open wellways during construction per OSHA Regulations.
 - i. Protect escalator truss, steps, landing plates, balustrades, handrails, and special metal finishes from damage.
 - j. Venting or other means to prevent accumulation of smoke and gas in escalator truss as required by Local Building Code.
 - k. Fire sprinklers per local Code requirement with protective guards.
 - l. Finished flooring surrounding floor landing plates. All patching of flooring including floor covering adjacent to the escalators. Any damage caused by the Contractor shall be replaced at no additional cost to LAWA. Expansion joint treatment at the lower escalator support to accommodate sliding escalator attachment.
 - m. Well way railing at top openings, pit edge angles and pit drains.
6. Escalator Electrical Service, Conductors and Devices
- a. Light with guard and GFCI convenience outlet in each pit and machine room space.
 - b. Three phase mainline copper power feeder to terminals of each escalator controller in the machine room space with protected, lockable "open", disconnect switch. Auxiliary disconnect, as required, for multiple drive units.
 - c. Telephone and/or CATV Ethernet line to each individual escalator control panel in escalator machine space.
 - d. Supports, conduit and wall blockouts for remote controller installations.
 - e. Fire alarm initiating devices in each escalator pit. Provide alarm initiating signal wiring from connection point to escalator controller terminals. Device to provide signal for general alarm and interruption of escalator operation.
 - f. Temporary power and illumination to install, test, and adjust escalator equipment.
 - g. Category 6 (distance ≤ 300 feet) or Fibre Optic (distance > 300 feet) Ethernet connection and junction box in each escalator machine room space.
 - h. Conduit from the closest wellway of each escalator group or single escalator to the firefighters' control room and/or the control console. Coordinate size, number and location of conduits and junction boxes with escalator contractor.
 - i. Single phase copper power feeder to each lower end intermediate location, and upper end escalator pit for under handrail lighting with individual protected, lockable "open", disconnect switch located in machine room space.
7. Moving Walk Wellway and Pit
- a. Clear, plumb, wellway with variations not to exceed 1" at any point.
 - b. Floor pockets and/or structural beams for support of moving walk truss at each end and at intermediate locations as shown on drawings. Steel supports, if used, shall meet deflection requirements of AISC Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings.

- c. Fire rated enclosure of moving walk truss including ends, sides and bottom in ceiling plenum.
 - d. Patching and finishing around moving walk landing plates after installation.
 - e. Cladding and finishing of exposed truss surfaces.
 - f. Waterproof pit. Sump pit with flush grate and pump or indirect waste drain with oil separator for outdoor installations.
 - g. Protect exposed exterior moving walks with weatherproof canopy entire length of truss per Code.
 - h. Protect open wellways during construction per OSHA Regulations.
 - i. Protect moving walk truss, pallets, landing plates, balustrades, handrails, and special metal finishes from damage.
 - j. Venting or other means to prevent accumulation of smoke and gas in moving walk truss as required by Local Building Code.
 - k. Fire sprinklers per local Code requirement with protective guards.
 - l. Finished flooring surrounding floor landing plates. All patching of flooring including floor covering adjacent to the moving walks. Any damage caused by the Contractor shall be replaced at no additional cost to LAWA
8. Moving Walk Electrical Service, Conductors and Devices
- a. Light with guard and GFCI convenience outlet in each pit and machine room space.
 - b. Three phase mainline copper power feeder to terminals of each moving walk controller in the machine room space with protected, lockable "open", disconnect switch. Auxiliary disconnect, as required, for multiple drive units.
 - c. Telephone and/or CATV Ethernet line to each individual moving walk control panel in moving walk machine space.
 - d. Supports, conduit and wall blockouts for remote controller installations.
 - e. 10 footcandles minimum illumination escalator landings and along the entire escalator run.
 - f. Fire alarm initiating devices in each moving walk pit. Provide alarm initiating signal wiring from connection point to moving walk controller terminals. Device to provide signal for general alarm and interruption of moving walk operation.
 - g. Temporary power and illumination to install, test, and adjust moving walk equipment.
 - h. Category 6 (distance ≤ 300 feet) or Fibre Optic (distance > 300 feet) Ethernet connection and junction box in each moving walk machine room space.
 - i. Conduit from the closest wellway of each moving walk group or single moving walk to the firefighters' control room and/or the control console. Coordinate size, number and location of conduits and junction boxes with moving walk contractor.
 - j. Single phase copper power feeder to each lower end intermediate location, and upper end moving walk pit for under handrail lighting with individual protected, lockable "open", disconnect switch located in machine room space.

1.2 QUALITY REQUIREMENTS

- A. Manufacturer Qualifications: Award the fabrication of the vertical transportation work to one of the following firms who are specialized in the fabrication of vertical transportation equipment and who have successfully produced work similar in design and extent to that required for the project:

1. Schindler Elevator Corporation
 2. Otis Elevator Company.
 3. KONE Inc.
 4. Substitutions: Other manufacturer's products may be incorporated into the Work if approved by LAWA.
- B. Installer Qualifications: Engage the vertical transportation manufacturer or an experienced Installer approved by the vertical transportation manufacturer who has completed not less than 3 elevator, escalator, and moving walk installations similar in material, design, and extent to that indicated for this Project, as determined by LAWA, for a period of 5 years and with a record of successful in-service performance and who is acceptable to LAWA.
- C. Contractor's Statement: The Contractor shall furnish a statement giving a complete description of all parts wherein the vertical transportation systems that he proposes to furnish do not comply with these specifications, or are in conflict with the Contract Documents. Failure to furnish such a statement will be interpreted to mean that the Contractor agrees to meet all requirements of this specification, and any conflicts with the work of other trades brought about by the use of the selected manufacturer's equipment will not result in any added cost to LAWA.
- D. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of California and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of elevators and escalators that are similar to those indicated for this Project in material, design, and extent.
- E. Standards: The following standards shall govern the vertical transportation work. Where standards conflict, that standard with the more stringent requirements shall be applicable.
1. Elevator, Escalator and Moving Walk Code: In addition to requirements of authorities having jurisdiction, comply with the latest edition of ASME A17.1, "Safety Code for Elevators and Escalators", ASME A17.2 "Guide for Inspection of Elevators, Escalators and Moving Walks", and ASME A17.5 "Requirements for Elevator and Escalator Electrical Equipment", including supplements, as published by the American Society of Mechanical Engineers. Wherever "Code" is referred to in the vertical transportation specifications, the ASME A17.1 Code shall be implied.
 - a. The vertical transportation systems shall be designed to resist the seismic loads required under the 2007 California Building Code taking into account IBC Seismic Design Category, IBC Design Spectral Response Acceleration (SDS), IBC Importance Factor and Seismic Story Drift. Conform to the applicable portions of Section 8.4 'Elevator Safety Requirements for Seismic Risk Zone 2 or Greater' of ASME A17.1 and Section 8.5, "Escalator and Moving Walk Safety Requirement for Seismic Risk Zone 2 or greater" of ASME A17.1 also comply with CCR Title 8, Rules 3137(a) and 3137(d).
 2. Electrical Code: For electrical Work included in the vertical transportation Work, comply with "National Electrical Code" (ANSI C1), by NFPA, all applicable local codes, and the Authorities having jurisdiction.
 3. Welding: Comply with AWS standards.
 4. Americans with Disabilities Act (ADA).
 5. Local fire Jurisdiction.
 6. Requirements of IBC and all other Codes, Ordinances and Laws applicable within the governing jurisdictions.

7. Life Safety Code, NFPA 101 and CCR Title 19.
8. California Code of Regulations Title 8 and California Building Code Title 24.
9. City of Los Angeles Elevator Code.

F. Electrical Devices and Equipment:

1. Elevators:
 - a. Furnish and install all necessary wiring for proper operation of the equipment including conduit and fittings for machine rooms beginning at the light and power outlets furnished under Division 26 ELECTRICAL sections. Include all wiring and connections required to elevator devices remote from hoistway and between elevator machine rooms. Provide additional components and wiring to suit machine room layout.
 - b. Provide grounded metal shielded GFCI receptacles for work lights on the underside of each platform and the crosshead of each car.
2. Escalators/Moving Walk:
 - a. Furnish and install all necessary wiring for proper operation of the equipment including all wiring, conduit and fittings beginning from the disconnect switch in the escalator machine space to all electrified escalator equipment.
 - b. Install all conductors, except control panel wiring, in rigid conduit except short connections where equipment may require shifting for adjustments. Conduit shall be liquid tight on outdoor installations. Such wiring shall be installed in liquid tight flexible metal conduit not exceeding 6' in length.
 - c. Provide flame retardant panel wiring.
 - d. Provide grounded metal shielded GFCI receptacles for work lights in the upper and lower pit areas.
3. All electrical and wiring interconnections shall comply with the governing codes, ASME A17.1, ASME A17.5 and NFPA 70.
 - a. Conductors: Copper throughout with individual wires coded and all connections at accessible, numbered terminal blocks and connected with lugs and pressure connectors. Use no splices or similar connections in wiring except at terminal blocks, control cabinets, junction boxes and conduits. Provide 10% spare conductors throughout.
 - b. Elevator Traveling Cables: All wiring shall be insulated with a moisture-proof, flame retardant, outer covering. Non-traveling cable hoistway wiring shall be run in tubing, conduit, or electrical wireways. Provide flexible traveling cables which are properly suspended to relieve stress on individual cables. Provide six (6) pairs of 18 ga. shielded wire in the traveling cables for telephone or other electronic equipment in the car. Provide 10% spare conductors. Provide four space pair of shielded communication wires. Terminate them to barrier-type terminal strip behind each elevator return panel at one end of cable and within a machine room security junction box. Provide two RG-6 traveling coax cables for CCTV equipment in the car. Provide two pair 14 gauge wires for CCTV power. Prevent traveling cables from rubbing or chafing against hoistway or car items.
 - c. Conduit and Fittings: Galvanized steel conduit. Minimum conduit size shall be 3/4" diameter unless larger size is required per NFPA 70 for use intended. Fittings may be steel compression type unless otherwise permitted or required by NFPA 70.

- G. Testing and Inspections: Advise LAWA in advance of dates and times that tests and inspections are to be performed.
1. Regulatory Testing and Inspections: Upon nominal completion of each elevator, escalator, and moving walk installation, and before permitting use of the same (either temporary or permanent), perform tests as required and recommended by the "Code" and applicable law. Verification that such tests have been completed, all corrective work accomplished and installation approved for issuance of a permit or certificate to operate, shall be required before acceptance of each unit.
 - a. Before final acceptance, the Contractor shall furnish permits, or certificates, by the Building Department or other City, County or State departments having legal jurisdiction, as required to allow the use of each unit. All certificates shall be furnished to LAWA through the Contractor.
 2. Acceptance Testing: Upon completion of each elevator, escalator and moving walk installation and before final acceptance, make a contract load test of each in the presence of the local authorities having jurisdiction with full maximum load, (or in accordance with local code requirements) to determine whether the equipment as installed meets the speed, capacity and all other requirements of the specifications.
- H. Manufacturer Labeling: Names, trademarks and other identifying symbols shall not be permitted on surfaces visible to the public.
- I. Obtain and pay for permits, fees, licenses, and inspections necessary to complete the vertical transportation installations.

1.3 SUBMITTALS

- A. Submit shop drawings and required material samples for review in accordance with Section SPECIAL CONDITIONS, Submittals. Include certification or other data verifying compliance with required characteristics. Indicate by transmittal form that copy of each has been distributed to the installer.
1. Scaled Fully Dimensioned Layout: Plan of pit, hoistway, wellway and machine room indicating equipment arrangement, elevation section of hoistway, and wellway, details of car enclosures, hoistway entrances, car/hall signal fixtures, and seismic attachments.
 2. Design Information: Indicate equipment lists, reactions, and design information on layouts.
 3. Power Confirmation Information: Design for existing conditions for Elevators, Escalators and Moving Walks. Provide complete power data submittals including heat emission data.
 4. Fixtures: Cuts, samples, or shop drawings.
 5. Finish Material: Submit 3" x 12" samples of actual finished material for review of color, pattern, and texture. Compliance with other requirements is the exclusive responsibility of the Provider. Include, if requested, signal fixtures, lights, graphics, Braille plates, and detail of mounting provisions.
 6. Design Information: Provide calculations verifying the following:
 - a. Adequacy of existing electrical provisions.
 - b. Adequacy of retained equipment relative to Code requirements if car weight increased by more than 5%.
 - c. Machine room heat emissions in B.T.U.s.

- d. Adequacy of existing retained elevator machine beams and escalator supports.
 - e. Adequacy of existing car platform structure for intended loading.
- B. Senate Bill 1886 Submittals: Provide copies of all Code Authority/Permit submittals to the Architect.
- C. Submittal review shall not be construed as an indication that submittal is correct or suitable, nor that the work represented by submittal complies with the Contract Documents. Compliance with Contract Documents, Code requirements, dimensions, fit, and interface with other work is Provider's responsibility.
- D. Acknowledge and/or respond to review comments. Promptly incorporate required changes due to inaccurate data or incomplete definition so that delivery and installation schedules are not affected. Identify and cloud drawing revisions, including Provider elective revisions on each re-submittal. Revision response time is not justification for equipment delivery or installation delay.
- E. Perform review and evaluation of all aspects of its work prior to requesting Design Consultant's final review. Work shall be considered ready for Consultant's final contract compliance review when copies of Provider's test and review sheets are available for Design Consultant's review and all elements of work or a designated portion thereof are in place and a unit or group are deemed ready for service as intended.
- F. Documents required prior to final payment:
 - 1. Provide three sets of neatly bound written information necessary for proper maintenance and adjustment of equipment within 30 days following final acceptance of the project. Final retention will be withheld until data is received, accepted, and approved by Engineer and reviewed by Design Consultant. Include the following as minimums:
 - a. Straight line wiring diagram of "as installed" circuits, with index of location and function of components. Provide one reproducible master set. Mount one set wiring diagrams on panels, racked, or similarly protected, in machine room. Provide remaining set rolled and in a protective drawing tube. Maintain machine room set with addition of all subsequent field changes. These diagrams are LAWA's property.
 - b. Lubricating instructions, including recommended grade of lubricants.
 - c. Parts catalogs for all replaceable parts including ordering forms and instructions.
 - d. Four sets of neatly tagged keys for all switches and control features properly tagged and marked.
 - e. Neatly bound instructions explaining all operating features including all apparatus in the car, exterior escalator and moving walk switches and remote control panels.
 - f. Neatly bound maintenance and adjustment instructions explaining areas to be addressed, methods and procedures to be used and specified tolerances to be maintained for all equipment.
 - g. Diagnostic test device complete with access codes, adjusters manuals and set-up manuals for adjustment, diagnosis and troubleshooting of elevator system and performance of routine safety tests.
 - 2. Preventive Maintenance Contract: Furnish properly executed contract for continuing, preventive maintenance. Utilize contract form provided, by LAWA.
 - 3. Acceptance of such records by LAWA/Design Consultant shall not be a waiver of any Provider deviation from Contract Documents or shop drawings or in any way relieve

Provider from his responsibility to perform work in accordance with Contract Documents.

- G. Materials, And Tools: General: Within sixty days following initial acceptance of the elevator/escalator/moving walk installation, provide written information and diagnostic tools necessary for proper maintenance and adjustment of the equipment, as follows:
1. Provide two copies and one mylar reproducible of all wiring diagrams, including straight-line wiring diagrams of all "as built and installed" elevator electrical circuits with index of location and function of all components. Provide logic diagram for all microprocessors. NOTE: Leave one complete set of corrected installation diagrams and wiring dope sheets on the job for each unit.
 2. Provide two copies of all "final" construction and installation drawings.
 3. Provide three neatly bound and indexed sets of the following:
 - a. Sequence of operation and/or floor charts of the motion control and supervisory control panels, and related operating equipment, including individual and group microprocessors.
 - b. Operating instructions and complete, detailed adjustment and application data and instructions for all equipment components including controller, microprocessor, selectors, motors, drives, valves, switches, etc.
 - c. Lubricating instructions, including recommended grade of lubricants.
 - d. Parts catalogs for all replaceable parts, including ordering forms and instruction. If a given component is made up of smaller parts, the smaller parts shall also be clearly identified by number.
 - e. Provide a summary of contract data for each type of equipment furnished, including quantity and part number.
 - f. Supplemental data required or requested by LAWA to facilitate equipment maintenance and adjustment.
 4. Provide all special tools, including top-level solid-state diagnostic equipment, which the Manufacturer and Installer supplies to his adjusters and service personnel for proper maintenance and adjustment of all equipment. Special tools shall become the property of LAWA. NOTE: If solid-state microprocessor or group supervisory diagnostic equipment and/or tools are not available for sale Elevator Contractor shall quote LAWA on lease or rental of this equipment, including acceptable terms. Quote as a separate item.
 5. The following supplemental information will be required by LAWA for this project.
 - a. Step-by-step adjusting procedures, as used by elevator Manufacturer's/Installer's field adjustor, for each type of equipment used in this specific installation. This shall include, but not be limited to the following:
 - 1) Selectors / encoders.
 - 2) Brakes: Shoe clearance, core clearance, brake switch, brake torque and all other adjustments necessary to give a satisfactory functioning brake.
 - 3) Controllers: Relay air gaps, current operated relays, timed circuits, set-reset relays, and all other necessary adjustments and settings.
 - 4) Electronic devices and circuits.
 - 5) Dispatching controller: Timed circuits, etc.
 - 6) Computer type dispatcher: Data and procedure to change settings.
 - 7) Overload relays: Current settings upon tripping, testing and maintenance procedures.

- 8) Acceleration and deceleration patterns, including time and slow-down settings.
 - 9) Governor: Over-speed switch. Jaw pull-through in pounds.
 - 10) Hydraulic elevators: Pump flow and leveling control valves, relief valves, and jack packing gland.
 - 11) Hoistway switches and cams.
 - 12) Terminal landing slow down device.
 - 13) Leveling and re-leveling units in hoistway.
 - 14) Load compensation: Load weighing device settings and load compensation adjustments.
 - 15) Safeties: Clearance to rails and pull out in pounds for the releasing carrier. Setting of safety operated switch.
 - 16) Door protective devices: Focusing, testing, maintenance, and adjusting procedures.
 - 17) Roller guides: Spring tension and stop settings.
 - 18) Motors: Air gap, compounding, neutral setting and all other necessary adjustments.
 - 19) Door operator and doors: Door operator control switches, door operator control potentiometers or resistances, door motor, door checks, door closers, door and gate locks, clutches/bayonets, door unlocking cams, encoders, and door restrictors.
 - 20) Communications, annunciating, and security systems.
 - 21) Escalator Safety devices
 - 22) Escalator Code clearances
- b. List of necessary tools, instruments, and other equipment used in the adjusting procedure, including method for incorporating them in procedures.
- c. Final adjusting data for each elevator/escalator/moving walk, including, but not limited to, settings for the following:
- 1) Load compensation sensing device in voltage or current for empty fully loaded car.
 - 2) Selectors/encoders.
 - 3) Brakes: Shoe running clearance and brake coil current. Escalator brake torque settings.
 - 4) Hatch switches and devices.
 - 5) Door operator control switch settings.
 - 6) Safety device: Full-load, full-speed, test data.
 - 7) Full-load starting and running current.
 - 8) Current settings or current operated relays.
 - 9) Motor field resistance settings.
 - 10) Timers: Time delay settings, including method and equipment needed to program microprocessor.
 - 11) Electronic power supply voltages necessary for correct functioning of equipment and from where measured.
 - 12) Skirt/Step clearance settings.
 - 13) Safety switch settings.
6. Warranty: Submit a copy of the following written warranty for the vertical transportation work. The Contractor will correct defects and non-compliant work which develop or

become known within one year from the date of acceptance by LAWA to the satisfaction of LAWA at no additional cost. Make modifications, adjustments, improvements, etc., to meet the specified performance requirements. No earlier than 1 month prior to the conclusion of the warranty period each elevator, escalator, and moving walk, will be

inspected jointly by LAWA, and the Contractor. All maintenance and warranty deficiencies requiring correction by the Contractor shall be mutually agreed to at this time. A written report shall be provided by LAWA detailing the required actions.

- a. The warranty shall not deprive LAWA of other rights LAWA may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents. Elevator/Escalator Maintenance Agreement: Provide full preventative maintenance service of the elevator equipment for a period of 12-months from the date of acceptance by LAWA. This service shall include a monthly examination of not less than 1 hour per examination per hydraulic elevator, a semi-monthly (twice per month) examination of each traction elevator, of not less than 1 hour and a weekly examination of each escalator/moving walk of not less than 1 hour by competent and trained personnel and shall include all necessary adjustments, greasing, oiling, cleaning, supplies, and replacements of parts to keep the equipment in perfect operation, except such parts made necessary by negligence not caused by this Contractor. Use parts and supplies as used in the manufacture and installation of original equipment. All costs in connection with such maintenance shall be included in the agreement price.
- b. Include 24 hour per day, 7 day per week emergency Call Back Service for all elevators, escalators and moving walks should operational problems or shut downs develop between service periods.
 - 1) Response Time: Two hours or less.
- c. Take equipment out of service for scheduled routine preventative maintenance during non-peak usage of the equipment, as approved by LAWA.
- d. Perform preventative maintenance during regular working hours.
- e. Require service and emergency personnel to report to the LAWA representative on site upon arrival at the building and again on completion of the required work. Furnish a copy of the work ticket containing a complete description of the work performed to the County's representative.
- f. Maintain a preventative maintenance checklist in the machine room to itemize individual component parts, as determined by the original equipment manufacturer, which require weekly, monthly, quarterly or yearly inspection. Include on the checklist the building name, elevator/escalator serial numbers, examination or service frequency, examination hours, individual elevator/escalator components examined or serviced.
- g. Maintain an inventory at all times and available for immediate delivery and installation, a sufficient supply of emergency parts for repair of each unit. Provide materials or parts to be used which are genuine original manufacturer's renewal parts.
- h. Regularly and systematically examine, inspect, properly adjust, clean, lubricate, and if conditions warrant, repair or replace, all mechanical, structural and electrical elevator and escalator/moving walk equipment components, including, but not limited to, the following:

- 1) Controller, selector, dispatching equipment, solid state drive units and all related equipment, including but not limited to relays, solid state components, resistors, condensers, transformers, contacts, leads, overloads, dash pots, timing devices, computer devices, selectors components, cables, safety devices and tapes and all switches in the machine rooms, hoistways, wellways and pits.
 - 2) Motors, including but not limited to, windings, rotating elements, bearings, brakes and gear boxes.
 - 3) Door operating equipment, including but not limited to, operators, interlocks, gate switches, hangers, tracks, rollers, door gibs and closers.
 - 4) Bull gears, sheaves and pulleys including bearings and shafts.
 - 5) Car guide rails, guide rail brackets and backing, guide rail lubricators, buffers, buffer supports, guide shoes, guide shoe mounts, guide shoe rollers and guide shoe gibs.
 - 6) Car frame, platform and sill, including all related components.
 - 7) Car and corridor operating and signal fixtures components, including light bulbs.
 - 8) Car fan and emergency lighting units.
 - 9) Electric wiring and traveling cables necessary for the operation of the elevators equipment and associated accessory equipment.
 - 10) Hydraulic cylinders, plungers, packing, and related components.
 - 11) Pump unit and all related components, including but not limited to tank, filters, strainers, pumps, motors, belts, pipe, valves and all component parts thereof, muffler and scavenger pump.
 - 12) Hydraulic oil.
 - 13) All hydraulic piping, valves, and fittings.
 - 14) Governor, including but not limited to governor sheave and shaft assembly, bearings, contacts, governor jaws and governor tension sheave assembly.
 - 15) Escalator/Moving Walk tracks, chains, chain and step/pallet rollers, handrails, steps, pallets and safety devices.
 - 16) Repair and replacement coverage is intended to be full and complete, and to include the cost of providing all elevator replacement components, including those not mentioned above.
- i. Provide fireman's recall tests as required by the governing code.
- j. Maintain the efficiency, safety and speeds of the equipment at all times, including acceleration, retardation, contract speed, with or without full load, floor to floor time, door opening and closing time. Maintain escalator hand rail speed within 2 fpm of step tread. Maintain the vertical transportation system monitoring system at all times.
- k. Housekeeping: Provide and maintain industry standard parts cabinets for the orderly storage of replacement parts. Keep the premises free of accumulation of waste material or rubbish. Store combustible materials in closed metal containers. Regularly brush lint and dirt from the guiderails, car tops, bottom of platform and remove dirt, excess lubricant and accumulated rubbish from pits, and machine room floors. Take necessary actions to prevent oil and grease from creating unsightly appearances on the equipment and/or accumulating on the floor of equipment room, elevator pit, escalator pits, escalator steps, moving walk pits or pallets.
- l. Clean all of the elevator/escalator/moving walk equipment. Cleaning of the

equipment shall occur at regular intervals sufficient in frequency to maintain a professional appearance and preserve the life of the equipment. Perform complete clean down of escalator/moving walk interiors and elevator hoistways during the 11th month of Warranty Maintenance. Report to LAWA the need for cleaning and/or janitorial services for all items not covered by the Contract. Lubricate all

moving parts of the equipment requiring lubrication. Apply lubricants at intervals recommended by the equipment manufacturer. Provide lubrication more frequently, if dictated through use of the equipment. Utilize lubricants suitable for the purpose intended that meet or exceed the minimum requirements specified by the manufacturer of the equipment to which the lubricant is applied. Remove and properly dispose of used and oily wiping materials from the building on the same day that they are used.

- m. Adjust the equipment as necessary in accordance with the check list and when the operation of the equipment varies from its normal or originally designed performance standards. Utilize qualified individuals properly equipped with tools and instruments, employed by the installer for adjustments. Parts or assemblies which have worn (or otherwise deteriorated) beyond "normal" adjustment limits shall be replaced as provided for under the following paragraphs titled "Replace" and "Repair".

1) Replace: Replace items during the course of scheduled preventative maintenance, when such replacement will prevent an unscheduled equipment shutdown and/or ensure the continued safe normal operation of the equipment or which otherwise will extend the useful life of the equipment. Make all replacements using original manufacturer's parts or LAWA approved equals.

2) Repair:

a) Repairs which are the Responsibility of the Installer: Make (or cause to made) all repairs stipulated herein, made necessary due to normal wear and use of the elevator or escalator/moving walk system. All costs for labor, materials, expanses, and supplies which occur as a result of the stated repair.

- n. Periodic Tests: Perform periodic safety tests of the elevator and escalator/moving walk components, as required by Code. The periodic tests shall be conducted as indicated in the code. Test results shall be witnessed as required and recorded on forms supplied by or acceptable to LAWA. Provide certified copies of the completed test forms to LAWA. Coordinate the periodic testing with LAWA Inspection/Clean Down Procedure which is required once annually by LAWA.

7. Elevator/Escalator/Moving Walk Extended Preventative Maintenance Agreement: Quote monthly cost for a five year preventative maintenance agreement commencing upon completion of the warranty maintenance. Price adjustment will be made at Agreement commencement date and thereafter as provided in the Agreement. Use competent personnel, acceptable to LAWA, employed by and supervised by the equipment installer.
8. Escalator/Moving Walk Maintenance Agreement: Provide full preventative maintenance service of the equipment for a period of 12-months from the date of acceptance by LAWA. This service shall include weekly examinations of not less than 1 hour per examination per escalator/moving walk by competent and trained personnel and shall include all necessary adjustments, greasing, oiling, cleaning, supplies, and replacements

of parts to keep the equipment in perfect operation, except such parts made necessary by negligence not caused by this Contractor. Use parts and supplies as used in the manufacture and installation of original equipment. All costs in connection with such maintenance shall be included in the agreement price.

- a. Include 24 hour per day, 7 day per week emergency Call Back Service for all escalators, and moving walks should operational problems or shut downs develop between service periods.
 - 1) Response Time: Two hours or less.
- b. Take equipment out of service for scheduled routine preventative maintenance during non-peak usage of the equipment, as approved by LAWA.
- c. Perform preventative maintenance service during regular working hours.
- d. Require service and emergency personnel to report to LAWA's representative on site upon arrival at the building and again on completion of the required work. Furnish a copy of the work ticket containing a complete description of the work performed to the LAWA representative.
- e. Maintain a preventative maintenance checklist in the machinery space to itemize individual component parts, as determined by the original equipment manufacturer, which require weekly, monthly, quarterly or yearly inspection. Include on the checklist the building name, equipment serial numbers, examination or service frequency, examination hours, individual escalator components examined or serviced. Make check list adjustment intervals frequent enough to maintain the escalators and moving walks in optimum operating condition.
- f. Maintain an inventory at all times and available for immediate delivery and installation, a sufficient supply of emergency parts for repair of each unit. Provide materials or parts to be used which are genuine original manufacturers renewal parts.
- g. Regularly and systematically examine, inspect, properly adjust, clean, lubricate, and if conditions warrant, repair or replace, all mechanical, structural and electrical escalator/moving walk equipment components, including, but not limited to, the following:
 - 1) Machine and related components including but not limited to thrust bearings, sprockets, gears, shafts, bearings, brake and component parts, motors, and chains.
 - 2) Controller and all related equipment, including but not limited to relays, solid state components, resistors, condensers, transformers, contacts, leads, overloads, dash pots, timing devices, computer devices, and mechanical and electrical driving equipment, including all switches.
 - 3) Motors, including but not limited to, windings, rotating elements and bearings.
 - 4) Handrails, brush guards, guide rollers, and alignment devices.
 - 5) Stop switches and related components.
 - 6) Conductor cables and wiring.
 - 7) Truss, steps, step treads, pallets, wheels, rollers, axle bushings, comb plates and tracks.
 - 8) All sprockets, chains and bearings.
 - 9) Demarcation lighting.
 - 10) Safety switches.
 - 11) Step Demarcation

- 12) Repair and replacement coverage is intended to be full and complete, and to include the cost of providing all escalator and moving walk replacement components, including those not mentioned above.
- h. Maintain the efficiency, safety and speeds of the equipment at all times. Maintain the vertical transportation system monitoring system at all times.
- i. Housekeeping: Provide and maintain industry standard parts cabinets for the orderly storage of replacement parts. Keep the premises free of accumulation of waste material or rubbish. Store combustible materials in closed metal containers. Clean step treads, pallets, and comb plates on a monthly basis. Regularly brush lint and dirt from the units and remove dirt, excess lubricant and accumulated rubbish from pans, pits, and machine spaces. Take necessary actions to prevent oil and grease from creating unsightly appearances on the equipment and/or accumulating on pans in escalator, and moving walk pits.
- j. Conduct weekly evaluations of equipment performance, including smoothness of ride, unusual vibration or noise, condition of handrails. Inspect comb plates at both ends of escalators for broken teeth and check for proper clearance between combs and step treads. Inspect comb plates at both ends of moving walks for broken teeth and check for proper clearance between combs and pallets. Check for broken step treads and check clearance between steps and skirt panel. Check for broken pallets and check clearance between pallets and skirt panel. Look for anything (loose trim, screws or bolts) that could snag or damage clothing and luggage, or cause injury. Check condition of handrail brushes. Proceed immediately to make, or cause to be made, replacements, repairs and corrections found as a result of the weekly evaluations.
- k. Clean all of the escalator equipment. Cleaning of the equipment shall occur at regular intervals sufficient in frequency to maintain a professional appearance and preserve the life of the equipment. Report to LAWA the need for cleaning and/or janitorial services for all items not covered by the Contract.
- l. Lubricate all moving parts of the equipment requiring lubrication. Apply lubricants at intervals recommended by the equipment manufacturer. Provide lubrication more frequently, if dictated through use of the equipment. Utilize lubricants suitable for the purpose intended that meet or exceed the minimum requirements specified by the manufacturer of the equipment to which the lubricant is applied. Remove and properly dispose of used and oily wiping materials from the building on the same day that they are used.
- m. Adjust the equipment as necessary in accordance with the check list and when the operation of the equipment varies from its normal or originally designed performance standards. Utilize qualified individuals properly equipped with tools and instruments, employed by the installer for adjustments. Parts or assemblies which have worn (or otherwise deteriorated) beyond "normal" adjustment limits shall be replaced as provided for under the following paragraphs titled "Replace" and "Repair".
 - 1) Replace: Replace items during the course of scheduled preventative maintenance, when such replacement will prevent an unscheduled equipment shutdown and/or ensure the continued safe normal operation of the equipment or which otherwise will extend the useful life of the equipment. Make all replacements using original manufacturer's parts or LAWA approved equals. Repair: Repairs which are the Responsibility of the Installer: Make (or cause to make) all repairs stipulated herein, made

necessary due to normal wear and use of the escalators, and moving walks. Absorb all costs for labor, materials, expenses, and supplies which occur as a result of the stated repair.

- n. Periodic Tests: Perform periodic safety tests of the escalator, and moving walk components, as required by Code. The periodic tests shall be conducted as indicated in the code. Test results shall be witnessed as required and recorded on forms supplied by or acceptable to LAWA. Provide certified copies of the completed test forms to LAWA. Coordinate the periodic testing with LAWA.
- 9. Escalator/Moving Walk Extended Preventative Maintenance Agreement: Quote monthly cost for a five year preventative maintenance agreement commencing upon completion of the warranty maintenance. Price adjustment will be made at Agreement commencement date and thereafter as provided in the Agreement. Use competent personnel, acceptable to LAWA, employed by and supervised by the escalator installer.
- 10. Test Reports: Submit test results to governing authorities and to LAWA. Include computer generated events and results.
- 11. Maintenance and Operating Instructions: Submit six (6) sets of maintenance manuals. Each maintenance manual shall include operation and maintenance instructions, parts listing with sources indicated; recommended parts inventory listing, emergency instructions for elevators, escalators, and moving walks. Include diagnostic and repair information for disassembly, inspection/gaging/torque requirements, reassembly, testing and other related information. Detailed lubrication and cleaning schedule indicating weekly, monthly, quarterly, semiannual, and annual lubrication; and a description of each lubrication point, lubrication type, and specification. Provide exploded view drawings to facilitate repair and maintenance functions. Assemble manuals for component parts into a single binder. In addition provide the following for escalators and moving walks:
 - a. Procedures for adjusting brake, handrail tension, handrail chain drive tension, step and pallet chain tension, track system, and mechanical components, including pictorials.
 - b. Instructions for removing floor plate, replacing comb segments, and removing and installing steps and pallets.
- 12. Maintenance Log: Upon completion of the installation submit and provide 1 copy of the following in each machine room:
 - a. Maintenance log and Maintenance Control Program for each unit, indicating the various items requiring examination, the procedure to be followed, the frequency of the examination and place to record compliance with the recommended procedure. The log shall cover a period of at least 1 year.
 - b. Call back log, indicating permanent record of visits. The log shall indicate the date of the visit, person making the visit, unit involved, reason for the visit and work accomplished.
 - c. Fire firefighters service test log for each elevator to comply with the requirements of the code.
 - d. Hydraulic elevator oil usage log, to record all hydraulic oil added to the system. Log to include reason for loss of hydraulic oil.
 - e. Replace maintenance logs when available space within the maintenance log is filled. Furnish to LAWA a copy of the maintenance log that is being replaced.
- 13. All 'as-built' record drawings, wiring diagrams, parts manuals, catalogs, instructions, keys, etc. shall be submitted before final payment.

14. Submit copies of Installer qualifications.

- H. Certificates and Permits: Submit inspection and acceptance certificates and operating permits as required by authorities having jurisdiction for normal, unrestricted use of vertical transportation systems.

1.4 JOB CONDITIONS

- A. Temporary Use: Do not use vertical transportation components during construction period, unless permitted in writing by LAVA.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Protect vertical transportation work components during delivery storage, handling, erection and construction period against damage and stains.
- B. Do not deliver the vertical transportation components to Project site until they can be placed 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.

1.6 COORDINATION

- A. Coordinate fabrication and installation of vertical transportation systems with HVAC, EMS, security, telephone/data, audio/visual, CCTV, and fire alarm systems.
- B. Coordinate start up and testing of vertical transportation systems with other Work required for complete installation and operation.
- C. Field verify all conditions affecting the work of this section.

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

- A. Refer to the specification sections for materials, components and fabrication criteria for the vertical transportation systems:

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the spaces and areas to receive the vertical transportation work, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance of the vertical transportation work. Examine wellways, hoistways, hoistway openings, pits, terminal end truss pits, and machine rooms, as constructed; verify critical dimensions; and examine supporting structure and other conditions under which vertical transportation work is to be installed. Do not proceed with installation until unsatisfactory

conditions have been corrected.

3.2 PREPARATION

- A. Verify dimensions of supporting structure from the working drawings and shop drawings so that the vertical transportation work will be accurately fabricated and fitted to the structure. The Contractor shall satisfy himself by review of the working drawings that the clearances and the alignments are proper for the installation of his equipment.
- B. Coordinate vertical transportation work with the work of other trades and provide items to be placed during the installation of other work at the proper time so as to avoid delays in the overall work. Place such items, including inserts and anchors, accurately in relation to the final location of vertical transportation components. Use Contractor's bench marks.

3.3 INSTALLATION

- A. General: Install component parts of the vertical transportation work in accordance with referenced standards and the manufacturers printed instructions and recommendations, unless otherwise shown or specified. Keep work areas orderly and free from debris during progress of the work. Remove all loose materials and filings resulting from this work from wellway and hoistway surfaces.
- B. Elevator Hoistway Entrances: Coordinate the installation of hoistway entrances with the installation of elevator guide rails, for accurate alignment of entrances with cars. Wherever possible, delay the final adjustment of sills and doors until the car is operable in the shaft. Set sills flush with finished floor surface at landings. Reduce clearances between hoistway entrance sill and car sill to minimum, safe, workable dimension at each landing. Hanger supports shall be erected in perfect alignment, with edges of the sills, sill grooves and head jambs to insure smooth operation of the doors. Guide grooves in the thresholds shall be cleaned and free of debris.
- C. Elevator Guide Rails: Erect guide rails plumb and parallel and secure guide rail joints without gaps and file any irregularities to a smooth surface. Fasten guide rail brackets to concrete structures with proper inserts and insert bolts, through bolts, or adhesive anchors. Fasten guide rail brackets to structural steel with through bolts and attach guide rails to brackets with throughbolts or steel clips. Compensate for expansion and contraction movement of guide rails. Balance cars to equalize pressure of roller guide shoes on rails.
- D. Escalators: Set escalators true to line and level, or to indicated slope, properly supported, and anchored to building structure. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.
- E. Machine Room and Machine Space Equipment: Install machine room and machine space equipment with clearances complying with the referenced codes and standards. Install items so that they may be removed by portable hoists or other means for maintenance and/or repair. Install items so that access for maintenance is safe and readily available. Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby, eliminate sources of structure-borne noise from vertical transportation equipment.
 - 1. Pack wall openings thru which oil lines and conduit pass with fire resistant, sound

isolating, mineral wool insulation and fire stopping material.

- F. Lubrication and Adjustment: Adjust installed components for smooth, efficient operation, complying with required tolerances and free of hazardous conditions.
1. Traction Elevators: Lubricate operating parts of system. Adjust motors, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks and safety devices to achieve required performance levels.
 2. Hydraulic Elevators: Lubricate operating parts of system. Adjust pumps, valves, motors, brakes, controllers, leveling switches, limit switches, stopping switches, door operators, interlocks and safety devices to achieve required performance levels.
 3. Escalators and Moving Walks: Lubricate operating parts, including bearings, tracks, chains, guides, and hardware. Test operating devices, equipment, signals, controls, and safety devices. Install oil drip pans and verify that no oil drips outside of pans.

3.4 PROTECTION

- A. Provide final protection and maintain conditions, in a manner acceptable to the vertical transportation Installer, that ensure vertical transportation equipment is without damage or deterioration at the time of acceptance by LAWA.
- B. Repair damaged finishes so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 FIELD QUALITY VERIFICATION

- A. General: On completion of each type of vertical transportation equipment installation and before permitting use thereof, perform acceptance tests as required and recommended by ASME A17.1, procedures with the following additions or adaptations, and by authorities having jurisdiction.
1. Traction Elevators/Hydraulic Elevators, Escalators and Moving Walks: Comply with ASME 17.2 "Inspectors Manual for Traction Elevators, Hydraulic Elevators, Escalators and Moving Walks" procedures:
 - a. Contractor shall perform the following tests on each escalator without load:
 - 1) Comb impact device shall be tested and calibrated with an appropriate scale at both ends of the escalator in both the horizontal and vertical direction.
 - 2) Brakes: Measure deceleration rate with no load over 5 consecutive stops in the down direction using test equipment designed to obtain this information.
 - 3) Skirt/Step Index test.
 - b. Contractor shall perform the following tests on each escalator under full load:
 - 1) Brake test. The stopping distance in the down direction shall meet all requirements of ASME A17.1.
 - 2) Twenty Four Hour Test: Each escalator shall be operated continuously for 24 hours after the acceptance test with no faults. If any fault occurs that shuts the escalator down, the fault shall be corrected. Run additional 24 hour tests until all faults are corrected.

- B. Perform testing during times approved by LAWA. Perform tests that are disruptive to normal building operations, as determined by LAWA, after normal building occupancy hours.
 - 1. Supply all required labor, material, supervision, material, tools, test weights and test instruments for all required tests, inspections and reviews.
 - 2. In all elevator test conditions, obtain specified speed, performance times, floor accuracy without re-leveling, and ride quality.
 - 3. In all escalator test conditions, obtain specified speed, and ride quality.
 - 4. Label each device with calibration sticker indicating test results and date of test.
 - 5. Provide permanently affixed escalator brake torque tag.
 - 6. Affix mental safety, buffer and governor test tags.
- C. Performance Guarantee: Should these tests indicate defects or poor workmanship, variance or noncompliance with the requirements of the specified codes and/or ordinances or variance or noncompliance with the requirements of these specifications, the following work and/or repairs shall be completed at no expense to LAWA.
 - 1. Replace all equipment that does not meet Code or specification requirements.
 - 2. Perform all work and furnish all materials and equipment necessary to complete the specified operation and/or performance.
 - 3. Perform all retesting required by the governing Code Authority and LAWA to verify the specified operation and/or performance.

3.6 DEMONSTRATE, INSTRUCT

- A. Instruct LAWA personnel in proper use, operations, and daily maintenance of elevators, escalators and moving walks. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train LAWA personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with LAWA on requirements for a complete vertical transportation maintenance program.
- B. Make a final check of each type of vertical transportation equipment with LAWA personnel present and before date of acceptance by LAWA. Determine that operation systems and devices are functioning properly.

3.7 VERTICAL TRANSPORTATION SCHEDULES

END OF SECTION 14 20 00

SECTION 14 21 00 - HEAVY DUTY TRANSIT TYPE MACHINE ROOM- LESS ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes heavy duty machine-room-less electric traction passenger and service elevators. Conventional geared or gearless equipment should be employed where passenger capacity needs or material movement needs exceed those offered within machine room-less product lines.

1.2 DEFINITIONS

- A. Definitions in the latest version of ASME A17.1 apply to work of this Section.
- B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- C. Service Elevator: A passenger elevator that is also used to carry freight.
- D. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.

1.3 SUBMITTALS

- A. Refer to Section 14 20 00, 3.7.2.
- B. Product Data
 - 1. Submit manufacturer's product data for each product and material.
 - 2. Indicate manufacturer, trade names, and model numbers, components, arrangement, optional and accessories being provided.
 - 3. Include applicable literature, catalog material or technical brochures.
 - 4. Include material and equipment specifications, sizes, types, dimensions, weights, rated capacities, and performance curves.
 - 5. Include utility requirements for wiring, piping, and service connection data, motor sizes complete with electrical characteristics.
- C. Shop Drawings
 - 1. Six (6) copies of the layout and shop drawings shall be provided by the contractor for review within three weeks of notice to proceed.

2. All drawings, views and details shall be developed and presented in accordance with ANSI Y14.3 Multi and Sectional View Drawings.
3. Drawings shall clearly reflect dimensional data for elevator hoistways including cross references to building column lines and finish elevations depicted in the Contract Drawings.
4. Elevator layout shall be shown in three orthogonal views and shall include key dimensions, support details, power connection locations and power connection terminal points.
5. Shop drawings: Six (6) copies of the shop drawings shall be provided by the Installer. Submit approval layout drawings to scale. Drawings shall include, but not be limited to the following:
 - a. Car, guide rails, buffers and other components in hoistway.
 - b. Maximum rail bracket spacing.
 - c. Maximum loads imposed on guide rails requiring load transfer to the building structure.
 - d. Loads on hoisting beams.
 - e. Clearances and travel of car and counterweight run-by.
 - f. Clear inside hoistway and pit dimensions.
 - g. Location and sizes of access doors, hoistway entrances and frames.
 - h. Car & Hall signal and operating fixtures.
 - i. Remote wiring layouts for each elevator.
 - j. Refuge space on top of car and pit.
 - k. Control room, machine area, pit and hoistway layout.
 - l. Cab design, dimensions and layout.
 - m. Hoistway-door and frame details.
6. Complete assembly detail of machine, machine mounting, machine beam assembly, dead end hitch and beam assemblies, governors, safeties, counterweights, with all load calculations.
7. Shop drawings shall include complete schematic and connection diagrams for the controller and all electrical devices including a legend for components.
8. Controller information should include complete I/O list.
9. All drawings shall be provided on CD-ROM in AutoCAD 2008 format.

D. Samples

1. Submit six (6) samples minimum 4" by 4" in size of all finish materials including but not limited to the following:
 - a. Cab Flooring.
 - b. Ceiling, including surface material, supporting frame and light fixture.
 - c. Cab Interior including car door, front return, wall finish etc.
 - d. Fixture faceplate.
2. Samples shall be clearly labeled to reflect:
 - a. Project Name
 - b. Contract Number
 - c. Description of Sample

- E. Maintenance Control Programs: within sixty (60) days after notice to proceed, and prior to installation, Installer shall submit detailed equipment specific interim and revenue service Maintenance Control Programs, showing functions to be performed and their scheduled frequency.
- F. Operating and Maintenance manuals: Prior to installation, Installer shall submit six (6) complete sets of Operation and Maintenance manuals for approval. After LAWA approval and prior to the beginning of acceptance testing, six (6) sets of the approved manuals shall be provided by the Installer. Provide all material on CD-ROM in a format approved by LAWA. The manuals shall include the following:
1. Complete table of contents.
 2. Complete instructions regarding operation and maintenance of equipment, including complete illustrated, exploded views of all assemblies, and a complete, illustrated, exploded view for identifying all system parts.
 3. Complete nomenclature of replaceable parts, part numbers, current cost, and warehouse location. If product source is another vendor, Installer shall include name and address of other vendor.
 4. Sample copies of a preventive maintenance chart.
 5. Descriptions of safety devices.
 6. Safety rules, tests, and procedures, including testing of all systems and subsystems.
 7. Procedures for adjusting all elevator equipment, including pictorials.
 8. Troubleshooting techniques.
 9. Detailed lubrication and cleaning schedule indicating weekly, monthly, quarterly, semiannual, and annual lubrication; and a description of each lubrication point, lubrication type, and specification.
 10. Control and schematic electrical wiring diagrams of controller, including wiring of safety devices to connections with remote indication and control panels for each elevator or group of elevators.
 11. Electrical layout showing placement of lighting, light switches, receptacles, light fixtures, disconnect switches, and convenience outlets in machinery/control room spaces and pits.
 12. Complete detailed drawings and wiring diagram of elevator system fault-finding device and connection to annunciator panel.
 13. As built drawings for final elevator installation, controller and truss wiring. Also provide As-built drawings on CD-ROM in AutoCAD 2008 format.
- G. Certification
1. The elevator manufacturer shall provide copies of all documents related to maintenance, safety, operations, design changes, modifications, retrofits, etc., which relate to any part, component, equipment, system, subsystem, or material and services applicable to the elevators provided.
 2. All of the above referenced shall be provided as it pertains to the original installation and for a period of ten (10) years after final acceptance of the last elevators provided under any contract.
 3. The referenced material shall be provided within thirty (30) days of publication or internal distribution by the elevator manufacturer. The material, even if labeled PROPRIETARY, shall be delivered without prejudice or delay and at no additional cost.
 4. Provide all material on CD-ROM in a format approved by the Owner.

- H. MSDS and product data sheets: Shall be submitted with an index listing each product, along with the application method of the product, approximate quantity of product per elevator and the component the product is applied to or associated with. The Installer shall allow 6 (six) weeks for review of MSDS.
- I. Senate Bill 1886 Submittals: Provide copies of all Code Authority/permit submittals.

1.4 QUALITY ASSURANCE

- A. Regulatory agencies: elevator design, materials, construction clearances, workmanship, and tests shall conform to the requirements of the codes and regulations listed in Part 1.5.
- B. Welding: Welding shall be performed in accordance with the requirements of AWS or CWB. Welders shall produce evidence of current certification by AWS or CWB.
- C. Requirements of Regulatory Agencies
 - 1. Installer shall obtain and pay for all necessary permits, and perform such tests as may be required for acceptance and approval of elevators by jurisdictional agencies.
 - 2. Installer shall notify the proper inspectors to witness required testing.
- D. Factory Visit
 - 1. The Installer shall provide for the costs of up to three of LAWA's representatives to visit the factory where the elevators are being manufactured, per contract, per unit type.
 - 2. Installer shall not ship the elevator without the approval of LAWA's representative after the conclusion of the factory visit.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing, Shipping Packing, Shipping, Handling, and Unloading
 - 1. Accept equipment, materials, and other Products on site in factory containers, bundles, and shipping skids.
- B. Delivery and Acceptance at Site
 - 1. Deliver material in original packages, containers, skid loads, or bundles bearing brand names and identification of source of manufacture or supply.
 - 2. Inspect deliveries for damage.
- C. Storage and Protection
 - 1. Store materials inside under cover and in a dry location.
 - 2. Protect from weather, direct sunlight, surface damage, corrosion, and construction traffic and activity.
 - 3. Installer shall make necessary provisions to protect systems from damage, deterioration, and environmental conditions during installations and until elevator systems are fully operative.
- D. Handling
 - 1. Handle material to prevent damage to edges, ends, surfaces, and finishes.

1.6 INSTALLATION CONTRACT ACCEPTANCE, WARRANTY, INTERIM SERVICE
AGREEMENT AND SERVICE AGREEMENT

- A. Warranty: The Contractor shall warrant in writing that all equipment manufactured and installed under this Contract be free of defects in design, materials, and workmanship, under normal use and service ("Warranty") for a period of twelve (12) months. Defects in design, materials, and workmanship shall be repaired or replaced with all materials and labor at no additional cost to LAWA ("Warranty Work"). (Defects shall include, but not be limited to, noisy, rough, or substandard operation; failures; loose, damaged, and missing parts; and fluid leaks.)
- B. In addition to the Warranty
1. Contractor shall provide, concurrently with each Warranty Period, a 1-Year Preventative Maintenance ("PM") service for all units.
 2. Beginning one year after the Contract Completion Date, the Contractor shall provide a 5-Year Extended Preventative and Routine Maintenance Service Agreement ("SA"), per Section 14 20 00, 3.7.2 and Exhibit A, for all units installed in this Contract.
 3. The 5-year SA period shall be executed in strict compliance with all of the terms and conditions set forth in Exhibit A ("Exhibit A"). Upon conclusion of the SA, the parties may mutually agree to extend the SA for an additional sixty (60) months, via a renewable option ("Option").
- C. The Contract/Warranty, PM, Interim and SA services shall include all services necessary to maintain the equipment in proper working order for use at a major international airport including, but not limited to.
1. "Tasks":
 - a. Inspection of completed installation and periodic testing to maintain elevators in completely operable, like new condition.
 - b. Provide preventative maintenance on elevators for a minimum of four (4) hours each month (Total On-Site Time). Provide monthly documentation of the same to LAWA.
 - c. Periodic lubrication of parts and equipment components as per OEM's recommendation. Charts are to be provided for each elevator indicating when services are provided.
 - d. Perform work without removing elevators from service during peak traffic periods determined by LAWA as 7:00 a.m. to 10:30 p.m. daily.
 - e. Provide twenty (24) hour emergency service during the maintenance period consisting of a prompt response (within 30 minutes) to emergency request by telephone or otherwise from LAWA or designated representative if an elevator is inoperable or in case of injury, entrapment, or potential injury to persons.
 - f. Unlimited regular time callbacks are included with a required response time of one (1) hour. Regular time will be Monday through Friday, 8:00am to 4:30pm, exclusive of holidays. Overtime\Premium time call backs originating from an operational error related to the performance requirements of the equipment shall be borne by the Contractor.
 - g. All other services as required by Section 14 20 00, 3.7.2 and Exhibit A.

1.7 EXTENDED PREVENTATIVE AND ROUTINE MAINTENANCE SERVICE
AGREEMENT

- A. The Contractor shall perform the SA (including all tasks listed herein and in Exhibit A) for a period of sixty (60) months from the date of Elevator Warranty expiration, or one year after the Contract Completion Date, whichever is later. A Faithful Performance Bond and a Payment Bond (“SA Bonds”), each for 100 percent of the contract price for the SA shall be submitted for LAWA approval no less than 30 days prior to Contract Completion Date. The SA Bonds shall be submitted to the City Attorney for approval as to form.
- B. Optional Second 5-year SA: No less than six (6) months prior to the conclusion of the 60 month SA, the parties may mutually agree to extend the SA (“Extended SA”) for a single, additional 60 month period at a cost no greater than 9percent more than the amount of the initial SA. Should the parties mutually agree, a Faithful Performance Bond and a Payment Bond, each for 100 percent of the contract price for the Extended SA shall be submitted for LAWA approval no less than one (1) month prior to the conclusion of the initial 60 month SA.
- C. All Contract Provisions, Appendices and Addenda, as well as the Conditions of Section 14 20 00, 3.7.2 and Exhibit A shall govern the SA and the Extended SA.

1.8 GUARANTEES

- A. Notwithstanding the Specifications forming a part of this Contract, any inspection or approval of the Work, or the existence of any patent or trade name, the Installer nevertheless unconditionally guarantees that the equipment furnished and installed hereunder shall be of the best quality, shall be fully fit for the purpose for which it is intended, and shall be of the heavy duty transit type in compliance with APTA guidelines unless augmented per these contract documents.

1.9 LAWA INSTRUCTION/DEMONSTRATION AND COORDINATION

- A. The manufacturer shall provide eight (8) hours of onsite demonstration and instructions to LAWA and existing service personnel upon completion of the elevator installation. Instructions are to include safety procedures, proper operation of all equipment, and routine maintenance procedures. All instructions and demonstrations are to be video recorded and remain the property of LAWA.
- B. Check operation of the elevators with LAWA’s personnel or designated representative present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

PART 2 - PRODUCTS:

2.1 GENERAL:

- A. Installer shall furnish and install elevators that shall comply with the following requirements:
 - 1. All elevators supplied under this contract shall be the product of a single manufacturer.

- B. Subject to compliance with the requirements of the Section, Elevator Cab design shall be per Contract Drawings.

2.2 MATERIALS:

- A. Except where product conformance to specific standards is indicated on the Contract Drawings and in ASME/ANSI A17.1, OEM's standard materials and equipment may be used in elevator construction, subject to approval. Materials cited below are intended to establish the standard of quality for comparable materials used by the manufacturer.
- B. Structural Shapes, Plates, Sheets, and Tubing: ASTM A36 Steel.
- C. Sheet Steel: ASNI/ASTM A446, Grade B.
- D. Stainless Steel: ASTM A167, Type 316L
 - 1. Stainless steel with embossed texture to be rolled into exposed surface.
 - 2. Type 304 or 316L, match specified color/finish in drawings.
 - 3. No. 4: Directional polish (satin finish). Graining directions as shown or, if shown, in longest dimension.
 - 4. No. 8: Reflective polish (mirror finish).
 - 5. Textured: 5WL or 4LB as manufactured by Rigidized Metals or Windsor pattern 5-SM as manufactured by Rimex Metals or approved equal with .050 inches mean pattern depth with bright directional polish (satin finish).
 - 6. Burnished: Non-directional, random abrasion pattern.
- E. Aluminum: ASTM B211 or ASTM B221, Alloy 6061, T6.
- F. Flooring: as specified.
- G. Plastic Laminate: ASTM E84 Class A and NEMA LD3.1, Fire-Rated Grade (GP-50), Type 7, 0.050" plus or minus .005" thick, color and texture as follows:
 - 1. Exposed Surfaces: Color and texture selected by Architect.
 - 2. Concealed Surfaces: Provider's standard color and finish.
- H. Fire-Retardant Treated Particle Board Panels: Minimum 3/4 inch thick backup for natural finished wood and plastic laminate veneered panels, edged and faced as shown, provided with suitable anti-warp backing; meet ASTM E84 Class "I" rating with a flame-spread rating of 25 or less, registered with Local Authorities for elevator finish materials.
- I. Natural Finish Wood Veneer: Standard thickness, 1/40-inch thoroughly dried conforming to ASME/HPMA HP-1983, Premium Grade. Place veneer, tapeless spliced with grain running in direction shown, belt and polish sanded, book-matched. Species and finish designated and approved by Architect.
- J. Paint: Clean exposed metal parts and assemblies of oil, grease, scale, and other foreign matter and factory paint one shop coat of standard rust-resistant primer. After erection, provide one finish coat of industrial enamel paint. Galvanized metal need not be painted.
- K. Prime Finish: Clean all metal surfaces receiving a baked enamel paint finish of oil, grease,

and scale. Apply one coat of rust-resistant primer followed by a filler coat over uneven surfaces. Sand smooth and apply final coat of primer.

- L. Baked Enamel Finish: Prime finish per above. Unless specified "prime finish" only, apply and bake three (3) additional coats of enamel in the selected solid color.
- M. Glass: Laminated safety glass, minimum 9/16-inch thick, conforming to ANSI Z97.1 and CPSC 16 CFR Part 1201.

2.3 SPECIAL FEATURES:

A. General

1. Elevator size, arrangement and capacity shall be justified via thorough analysis of passenger and material transport needs and shall comply with design criteria specified in this Section 3.7.1 and 3.7.2. Elevators shall be provided in accordance with the requirements of CCR Title 8 and the ASME A17.1-Safety Code for Elevators and Escalators, hereinafter in this Section the "Code".
2. Provide all material and equipment necessary for the complete execution of all elevator work as specified in this Section and as shown on the Contract Drawings.
3. Provide hoistway guards for protecting hoistway during construction. In existing terminals, hoistway protection shall include high solid panels surrounding each hoistway opening at each floor.
4. All electric equipment, conduit, fittings and wiring shall conform to the requirements of ANSI/NFPA No. 70 National Electric Code.
5. Provide concrete inserts and other similar anchoring devices for the installation of guide rails, machinery and other elevator components. Epoxy ceiling anchors or epoxy side wall anchors shall not be permitted.
6. Clearance around equipment located in each elevator control room and machine area shall comply with the applicable provisions of ANSI/NFPA No. 70 National Electrical Code.

2.4 SUMMARY OF FEATURES:

A. Machine Room-Less Passenger Elevators

Elevator Use	Passenger C-3 Loading
Contract Load, in Pounds	4000 minimum
Contract Speed, in FPM	350 for travel distances of 20'-0" or more. 200 for travel distances of less than 20'-0"
Machine Location	Overhead in hoistway
Machine Type	Gearless
Type of Control	AC variable voltage, variable frequency

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Operation	Simplex selective collective or Group automatic
Platform Size	8'-0" wide by 6'-2" deep
Clear Car Inside	7'-8" wide by 5'-5" deep
Car and Hoistway Door Size	4'-0" wide by 7'-0" high
Car and Hoistway Door Type	Single speed, side slide center opening
Car and Hoistway Door Operation	Power operated. High-speed, heavy-duty (minimum opening speed 3.0 FPS)
Hoistway Entrance	As specified
Cab Enclosure	As specified
Car Operating Station	Dual
Direction Indicator	Hall
Hall Call Stations	Single riser
Special Features:	Fire Control Panel, Machine Room Monitor, Load Weighing Device, Communication System, Security Features, Handicap Features, Standby Power, Monitoring Features

B. A. Machine Room-Less Service Elevators

Elevator Use	Service C-3 Loading
Contract Load, in Pounds	5000 minimum
Contract Speed, in FPM	350 for travel distances of 20'-0" or more. 200 for travel distances of less than 20'-0"
Machine Location	Overhead in hoistway
Machine Type	Gearless
Type of Control	AC variable voltage, variable frequency
Operation	Simplex selective collective or Group automatic
Platform Size	6'-0" wide by 9'-4" deep
Clear Car Inside	5'-8" wide by 8'-4" deep
Car and Hoistway Door Size	4'-6" wide by 7'-0" high

Car and Hoistway Door Type	Two speed, side slide
Car and Hoistway Door Operation	Power operated. High-speed, heavy-duty (minimum opening speed 3.0 FPS)
Hoistway Entrance	As specified
Cab Enclosure	As specified
Car Operating Station	Single (Dual with front and rear entrances)
Direction Indicator	Hall
Hall Call Stations	Single riser
Special Features:	Fire Control Panel, Machine Room Monitor, Load Weighing Device, Communication System, Security Features, Handicap Features, Standby Power, Door Hold Button, Monitoring Features

2.5 CAR PERFORMANCE:

- A. Car Speed: $\pm 3\%$ of contract speed under any loading condition.
- B. Car Capacity: Safely lower, stop and hold 125% of rated load.
- C. Car Leveling Zone: $\pm 1/4"$ under any loading condition.
- D. Door Opening Time:
 - 1. Passenger Elevators: 1.8 seconds.
 - 2. Service Elevators: 3.0 seconds.
- E. Door Closing Time:
 - 1. Passenger Elevators: 2.7 seconds.
 - 2. Service Elevators: 5.1 seconds.
- F. Car Floor-to-Floor Performance Time: Seconds from start of doors closing until doors are $3/4$ open and car level and stopped at next successive floor under any loading condition or travel direction. (Based on a floor height of 16'-0". Adjust .3 seconds per foot of travel for 200 fpm elevators and .2 seconds for 350 fpm elevators.)
- G. Car Ride Quality
 - 1. All elevators shall have a maximum decibel reading of 65 dBA with the doors closed during a run in the up direction, measured 5 feet above the floor in the center of the cab.
 - 2. All elevators shall have a maximum vibration of 15 milligrams in the X, Y and Z axis measured with an A95 filter.
 - 3. Acceleration and Deceleration: Smooth constant and not more than 3 feet/second² with initial ramp between 0.5 and 0.75 second.

4. Sustained Jerk: Not more than 8 feet/second³.
- 2.6 DOOR OPERATOR EQUIPMENT
- A. Provide GAL's MOVFRW-HSL door operator with encoder-less VVVF drive or approved equal. Closed loop door operator designed to operate car and hoistway doors simultaneously at the speed specified. Door shall open automatically when car stops at landing to discharge passengers or to answer valid calls and close automatically after predetermined time interval has elapsed. The doors shall be capable of smooth and quiet operation without slam or shock. Door operator to have the following features.
 1. 1/2 hp motor and heavy duty sprocket, chain, belt, and sheaves.
 2. Closed loop regulated speed performance.
 3. Hand-held keypad programming.
 4. Adjustments can be stored in the keypad and downloaded to another operator.
 5. Adjustable door obstruction reversal unit.
 6. Optical cams with LED indicators.
 7. Test switches for open, close, nudging and speed zone set up.
 8. Universal inputs for open, close, and nudging.
 9. Reversing switch to back up the door reversal device.
 - B. Cab Door Interlock. The doors on cab doors shall be equipped with approved cab door interlocks of the cab unit system type tested as required by the Code.
 1. Interlock shall prevent operation of the car away from a landing until doors are locked in the closed position. Interlock shall prevent doors from opening at any position within the hoistway and or landing from the cab side unless car is at rest at that landing, or is in the leveling zone and stopping at that landing.
 2. Provide an electric contact mounted on the car that will prevent the car from moving away from landing unless car doors are closed.
 - C. Door Control Device
 1. Door Protection – Electronic Entrance Detector Screen: Provide an electronic door detector device and or approved equal, which projects a three dimensional infrared curtain of light guarding the door opening. Arrange to reopen doors if one beam of the curtain is penetrated. Unit shall have transmitters and receivers spaced at a minimum distance to provide the maximum amount of protection within the height of the doorway. Systems, which have the availability to turn Off or On individual zones within the curtain, will not be allowed.
 2. Nudging Operation: After beams of door control device are obstructed for a predetermined time interval (minimum 20.0 – 25.0 seconds), a warning signal shall sound and doors shall attempt to close with a minimum of 2.5 foot pounds kinetic energy. Activation of the door open button shall override nudging operation and reopen doors.
 3. Interrupted Beam Time: When beams are interrupted during initial door opening, hold door open a minimum of 3.0 seconds. When beams are interrupted after the initial 3.0 second hold time, reduce time doors remain open to an adjustable time of approximately 1.0 – 1.5 seconds after beams are reestablished.
 4. Differential Door Time: Provide separately adjustable timers to vary time that doors remain open after stopping in response to calls.
 - a. Car Call: Hold open time adjustable between 3.0 and 5.0 seconds.
 - b. Hall Call: Hold open time adjustable between 5.0 and 8.0 seconds.

2.7 HOISTWAY EQUIPMENT

A. Guide Rails

1. Guides shall be steel T-section rails. Rail surfaces shall be machined smooth to ensure proper operation of guides. Rail ends shall be accurately machined with tongue and matching groove centrally located on web. Non wearing rail surfaces are to be painted in color selected by the Architect/LAWA.
2. Guides shall be joined and installed in accordance with Section 2.23 of the Code.
3. Guide rails are not to be in view from within the elevator cab.

B. Car Buffers: Oil type with blocking and support for car contract speeds exceeding 200 fpm. Spring type for speeds of 200 fpm or less.

C. Counterweight Buffers: Oil type with blocking and support for contract speeds exceeding 200 fpm. Spring type for speeds of 200 fpm or less.

D. Roller Guides: Roller guides shall be mounted on top and bottom of the car and counterweight frames to engage the guide rails. Provide slide guides with renewable oil less inserts where C3 loading is required.

E. Suspension Means: If steel core ropes are supplied, a means to provide constant lubrication shall be provided.

F. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electromechanical disc brakes and integral traction drive sheave. Machine to be mounted to the car guide rail or support beam mounted at the top of the hoistway.

G. Deflector Sheaves: Provide machined and grooved sheave for diameter of ropes. All bearings are to be shielded or sealed.

H. Stop Switch: An enclosed stop switch, mounted in the pit of each elevator in accordance with the Code, shall prevent operation of elevator when switch is activated. Switch shall be of the type described in Rule 2.2.6 of the Code.

I. Emergency Auxiliary Stop Switch: An enclosed stop switch, mounted in the over-head machine area and/or on the machine of each elevator in accordance with Rule 2.7 of the Code, shall prevent operation of elevator when switch is activated. Switch shall be of the type described in Rule 2.7 of the Code.

J. Dead End Hitch Assemblies: Provide dead end hitch assemblies in accordance with engineered loading requirements.

K. Counterweight: Counterweights shall consist of a steel frame welded or bolted together and necessary steel weight sections. These weight sections shall be held securely in place within the frame. A minimum of two (2) tie rods shall pass through the holes in all weight sections. Paint color as selected.

1. A required counterweight screen where no compensation is used.
2. The bottom of the counterweight shall have a buffer striking plate and means to attach

- knock-off blocks during rope stretch.
- L. Idler Sheave: To be located directly above the counterweight frame and integral with counterweight frame. The sheave material shall be accurately machined of semi-steel of hardness BHN 220-250 or as per manufacturer's requirements.
 - M. Governor: Friction type over-speed self-resetting governor rated for the duty of the elevator specified and to operate the car safety. The finish of pit tension sheave shall be factory paint.
 - 1. Locate the governor where the car or the counterweight in case of over-travel cannot strike it, and where there is adequate space for full movement of governor parts.
 - 2. An electrical governor overspeed protective switch that, where operated, shall remove from the driving machine motor and brake before or at the time of application of the safety.
 - 3. Seal and tag the governor with the running speed, tripping speed, and date last tested as required by Code.
 - 4. Operation/rest of the governor shall not require the installation of an overhead access panel. Status of the governor shall be capable of being monitored remotely at the elevator controller.
 - N. Tension Sheave: Provide tension sheave in accordance with OEM's governor and car safety loading requirements.
 - O. Terminal Limits: Limit switches shall slowdown and stop the car at the terminals if the primary automatic stopping system fails.
 - P. Life Safety Provisions: Life safety hooks and/or other life safety devices for fall protection or prevention to be in accordance with OSHA standards/guidelines. Life safety hook, and/or other life safety devices locations to be coordinated and installed by the Installer.

2.8 MACHNE COMPONENTS

- A. Motor
 - 1. The motors shall be of the alternating current reversible asynchronous or synchronous type of a design adapted to the severe requirements of elevator service. Motor shall be capable of developing the torque required to meet or exceed an acceleration rate of 2 ft/sec^2 for the elevator car.
 - 2. A means to protect the windings and bearings from airborne dust shall be provided.
 - 3. Insulation of all windings shall be impregnated and baked to prevent absorption of moisture and oil. The insulation resistance between motor frame and windings shall not be less than one meg-ohm. The motor windings shall stand a dielectric test of twice the normal voltage plus 1000 RMS volts of 60 Hertz, alternating current for one minute.
 - 4. Motor leads in the conduit box shall have the same insulation class as the windings. Motor lead wire shall be rated 125 C and shall be sized for 105 C at the motor nameplate amperes at 1.0. Power Factor per Electrical Apparatus Service Association (EASA) recommendations. Leads are to be numbered for clockwise rotation when facing opposite the shaft end.
 - 5. The motor shall be designed to stand the severe loads encountered in elevator service and the windings shall have a minimum insulation temperature rating two ratings higher than

- the actual temperature rise of the motor, with a minimum rating of NEMA class F.
6. The motor shall be designed to the ASME A17.1 rated load requirements.
- B. Brake
1. Provide dual brakes that shall be of the self-adjusting fail-safe (spring applied and electrically released) type provided with a remotely operated, in the controller room, manual brake release and designed to meet the service factor demand of its intended use. Access panels at the top of hoistway shall not be required. Dual brakes shall operate independent of each other for ascending car over speed and unintended car movement. Provide operation to prevent the elevator from striking the hoistway overhead or unintended car movement per the requirements of Code.
- C. Gearless Machine
1. Sheave: The sheave material shall be accurately machined of semi-steel of hardness BHN 220-250.
2. Anti-vibration Mounts: For machines that are support beam mounted, anti-vibration mounting pads are to be provided.

2.9 CONTROLLER

- A. General
1. The elevator control equipment shall contain diagnostic capabilities as required for the ease of complete maintenance. The diagnostic system shall be an integral part of the controller and provide user-friendly interaction between the service person and the controls. All such systems shall be free from decaying circuits that must be periodically reprogrammed by the manufacturer.
2. Switch gear shall be mounted in cabinets and labeled terminal strips.
3. The Main controller shall be a non-proprietary programmable automation controller (PAC) based on SCADA compliant Allen Bradley CompactLogic™ 1769-L32E, or equal, to control and monitor the status of the elevator. The PAC shall be designed to communicate in TCP/IP format over Ethernet or approved equal.
4. The controller shall store the last 99 faults, accessible via laptop connection, panel view or remote communications.
5. Provide a copy of all working programs on approved computer medium as well as a printed program listing.
6. The Controller shall have one dedicated serial port, which supports RS-232-C signals. It must be usable for programming purposes or for access to remote programmers via modems.
7. Provide Lift-Net, or equal, ready serial port and signals. Elevator monitoring system shall be building monitoring system compatible and capable of monitoring various elevator control systems.

2.10 OPERATION

- A. Simplex Selective Collective
1. Momentary pressure of car or hall button, other than landing at which car is parked, shall

automatically start the car and dispatch the car to the corresponding floor for which that call was registered. If a call is registered at the floor when the car is idle, the doors shall automatically open.

2. When the direction of travel has been established, the car shall answer all calls corresponding to the direction of travel and shall not reverse direction until all car and hall calls, in that direction, have been answered.
3. Calls registered for the opposite direction of car travel shall remain registered and shall be answered after car has completed its calls in the direction of travel.
4. If no car buttons are pressed, and car starts up in response to several down calls, the car shall answer highest down call first and then reverse to collect other down calls.
5. The car shall remain at the arrival floor for an adjustable interval to permit passenger transfer. Doors shall close after a predetermined interval after opening unless closing is interrupted by car door reversal device or door open button in car.

B. Group Automatic – Groups of Two or More Elevators:

1. Approved microprocessor-based, group dispatch, car and motion control systems as follows.
2. Include as a minimum, the following features:
 - a. Operate cars as a group, capable of balancing service and providing continuity of group operation with one or more cars removed from the system.
 - b. Register service calls from pushbuttons located at each floor and in each car. Slow cars and stop automatically at floors corresponding to registered calls. Make stops at successive floors for each direction of travel irrespective of order in which calls are registered except when bypassing hall calls to balance and improve overall service; stop only one car in response to a particular hall call. Assign hall calls to specific cars and continually review and modify those assignments to improve service. Simultaneous to initiation of slow-down of a car for a hall call, cancel that call. Render hall pushbutton ineffective until car doors begin to close after passenger transfer. Cancel car calls in the same manner. Give priority to coincidental car and hall calls in car assignment.
 - c. Operate system to meet changing traffic conditions on a service demand basis. Include provisions for handling traffic which may be heavier in either direction, intermittent or very light. As traffic demands change, automatically and continually modify group and individual car assignment to provide the most-effective means to handle current traffic conditions. Provide means to sense long-wait hall calls and preferentially serve them. Give priority to coincidental car and hall calls in hall call assignment. Accomplish car direction reversal without closing and reopening doors.
 - d. Use easily reprogrammable system software. Design basic algorithm to optimize service based on equalizing system response to registered hall calls and equalizing passenger trip time to shortest possible time.
 - e. Serve floors below main floor in a manner which logically minimizes delay in passing or stopping at main floor in both directions of travel. Provide manual means to force a stop at the main floor when passing to or from lower levels.
 - f. Required Features:
 - 1) Dispatch Protection: Backup dispatching shall function in the same manner

- as the primary dispatching.
 - 2) Delayed Car Removal: Automatically remove delayed car from group operation.
 - 3) Position Sensing: Update car position when passing or stopping at each landing.
 - 4) Hall Pushbutton Failure: Provide multiple power sources and separate fusing for pushbutton risers.
 - 5) Communication link: Provide serial or duplicate communication link for all group and individual car computers.
- C. Independent Service: Provide controls to remove elevator from normal operation and provide control of the elevator from car buttons only. Car shall travel at contract speed and shall not respond to corridor calls.
- D. Car Top Operation: Provide per Code requirements.
- E. Emergency Recall Operation (Fire Service): Provide operation and equipment per Code requirements. Contractor shall provide relays, wiring, and terminal strips to receive signals from the fire alarm system.
- F. Earthquake Operation: Provide operation and equipment per Code.
- G. Load Weighing: Provide automatic load weighing device set at approximately 80% of full load. The device when activated shall cause the elevator to bypass corridor calls and shall initiate dispatch of car at main terminal prior to elapse of normal dispatching interval. Provide adjustable setting from 50 to 80 percent of full load.
- H. Load Weighing Security Operation: Provide load weighing device to notify ACAMS Controller of weight status in elevator cab when in security mode of operation.
- I. Fan and Light Output Timer: Provide an adjustable timer (Range 1 to 10-minutes) that when activated will turn off the fan and light within the car. The time will start when the car becomes inactive.
- J. Door Hold Operation: Provide controls and a button within operating panel that shall hold the doors open for an adjustable period of 30 to 90 seconds. The following shall resume normal door operation.
1. Activation of door close button.
 2. Expiration of time period.
- K. Standby Power Panel and Operation – Contractor shall provide operation as follows: When standby power is detected by an input, one elevator at a time in each group, and single elevators, shall be returned to the main lobby one elevator at a time, and remain there with the doors open. Once all cars have been returned to the lobby, one elevator in each group, and single elevators may be selected to run under standby power. Selection of the cars shall be done automatically. This automatic selection may be overridden through manual selection. Provide necessary wiring and contacts to allow elevator systems to sequence under standby operation. Provide group selection switches in the fire control panel. Provide standby power indicators in the fire

- control panel and main floor hall station.
- L. Tenant Security Operation
1. The Elevator Contractor shall coordinate with the Sections 28 13 00 - ACCESS CONTROL and ALARM MONITORING SYSTEM (ACAMS) and SECTION 28 23 00 VIDEO SURVEILLANCE SYSTEM (VSS) to provide elevator controls as described below:
 - a. Card readers shall be installed as directed adjacent to, and interfaced with the elevator call button. The call button will be enabled by an authorized card read of the ACAMS system.
 - b. Card readers with keypads shall be installed in each elevator cab and interfaced with the car buttons for as directed.
 - c. Access to and from secured floors shall be by card reader only.
 - d. Elevator departing unsecured floors shall require an authorized card read/PIN to enable the registration of a car call to access secured floors, as programmed in the ACAMS system through access permissions and levels.
 - e. Provide strobe in car transom that illuminates upon notification from ACAMS Controller that weight or motion is detected in elevator cab.
 - f. Fire Service Operation overrides the Security Service Operation.

2.11 HOISTWAY ENTRANCES

- A. Hoistway Frames and Doors
1. Entrance frames shall be of welded and mitered construction for complete one-piece unit assembly. All frames shall be sound deadened and securely fastened to fixing angles mounted in the hoistway. Finish shall be 420 ferritic stainless steel per ASTM A 240/240M.
 2. Entrance frames shall be provided with an extended sill floor plate the full width and depth of each entrance frame assembly.
 3. Hoistway doors shall be reinforced and provided with operating mechanisms and door hangers. Door panels shall be hollow metal flush door construction, 16-gauge furniture steel. Fill with fireproof, sound deadening material. Provide reinforcement by formed vertical sections running full height of door. Doors shall be provided with two removable, non-metallic gibs with fire tabs, located at the leading and trailing edge of the door panel. There shall be no visible exposed or protruding fasteners.
 4. Provide die cast jamb markings (2 per entrance) mounted at 5'-0". Secure with adhesive and unexposed fasteners.
 5. Hoistway door hangers and door operator shall be as specified herein.
- B. Struts and Closer Support Angles: Hoistway entrances adjacent to non-load bearing walls (gypsum dry wall, gypsum block, etc.) shall have hanger housing and door closers supported by steel angles of adequate size. Angles shall be continuous between sill and building beams above and shall be bolted to the hanger support. For load bearing walls (masonry, concrete block), submit for approval Shop Drawings of the method to be used to support hanger housing and door closers on the wall.
- C. Landing Sills: Landing sills shall be designed for Class C-3 loading and shall conform to

Section 2.11 of the Code and shall be extruded stainless steel sills supplied with grooves and trash slots for door guides and machine planed for minimum clearance. Mount sills on combination of concrete/grout and steel supports anchored to floor construction.

- D. Hanger Supports and Cover Plates: Hanger supports shall be T bolted to strut angles and closer support angles. Hanger cover plates shall be nominal 0.078 inch thick stainless minimum and shall extend, as indicated in the contact drawings. Covers shall be made in sections for convenient access when servicing hangers. Hanger sections above door openings shall be removable from within elevator car.
- E. Dust Cover: Dust cover shall be reinforced as necessary to ensure a flat even surface throughout. Dust cover shall extend at least the full width of door opening on each side and fastened to hanger housings. Dust cover shall extend above entrance opening as indicated on Contract drawings.
- F. Interlocks and Contacts:
 - 1. The doors at each hoistway entrance shall be equipped with approved hoistway door interlocks of the hoistway unit system type tested as required by the Code.
 - 2. Interlock shall prevent operation of the car away from a landing until doors are locked in the closed position. Interlock shall prevent doors from opening at any landing from the corridor side unless car is at rest at that landing, or is in the leveling zone and stopping at that landing.
 - 3. Hoistway door unlocking devices shall conform to the requirements of the Code and shall be provided to permit authorized persons to gain access to hoistway when car is away from landing. Ferrules shall be supplied for all hoistway unlocking device keyholes to protect elevator hoistway doors.
 - 4. Provide an electric contact mounted on the car that will prevent the car from moving away from landing unless car doors are closed.

2.12 CAB ENCLOSURE COMPONENTS

- A. General
 - 1. Elevator car and car components shall meet the applicable requirements of the Code. Car control station(s) and position indicator(s) shall be per Contract drawings.
 - 2. Entire car assembly, including car frame and platform, shall be free from warps, buckles, and squeaks and rattles. Joints shall be lightproof.
- B. Car Frame and Platform
 - 1. Loading Classification and Requirements: The elevator shall be designed for Class A C-3 freight elevator loading following the design data and formulas identified in the Code, including, but not limited to, the car frame, platform, sills and guides.
 - 2. Car frame and platform shall be welded galvanized steel units designed and fabricated in accordance with applicable requirements herein and Rule 2.14 of the Code.
 - 3. Protect car platform with fire retardant material. The platform shall be recessed as required to accept floor finish.

4. Sub floor shall be suitably reinforced to support live loads of the elevator cab.
- C. Car Guides: Car guides shall be designed for C3 loading. Provide spring dampened roller guides or swivel type oil less slide guides with renewable inserts.
- D. Sills: Car sills shall be extruded stainless steel sills supplied with grooves and trash slots for door guides and machine planed for minimum clearance. Provide with matching sill extensions to face of front return(s).
- E. Car Enclosures:
 1. General: The enclosure shall be adequately reinforced and ventilated to meet Code requirements. Provide sound-deadening mastic to exterior.
 2. Shell:
 - a. Passenger Elevators: Sides and back shall be 14-gauge sheet steel with baked enamel interior finish as selected by the Architect. Arrange shell to accept interior panels as indicated in drawings.
 - b. Service Elevators: Sides and back shall be 14-gauge, rigidized stainless steel sheet steel. Pattern 5WL or as selected by the Architect. Provide sample.
 3. Canopy: Provide minimum 8'-0" clear height under canopy. Reinforced 14-gauge stainless steel No. 4 brushed finish. Arrange for hinged top emergency exit including lock and electrical contact as required by Code.
 4. Suspended Ceiling and Lighting:
 - a. Provide as shown in Architect's drawings.
 - b. Provide clear access to the emergency exit per Code requirements.
 5. Floor Covering:
 - a. Passenger Elevators: Floor by others Wt/Ft = 10#.
 - b. Service Elevators: 1/4" checker plate stainless steel.
 6. Front Return Panels and Entrance Columns: 14-gauge sheet steel. Return panel shall be stationary type applied type. Provide faceplate to allow access to car station wiring and fixtures. Provide cabinets for special operating features and flush mounted speaker grills for the "Hands Free" telephone and intercom. Finish shall be stainless steel No. 4 brushed finish.
 7. Transoms: 14-gauge sheet steel finishes matching front return panels and entrance columns.
 8. Car Door Panels: Same construction as hoistway door panel. Finish shall be stainless steel No. 4 brushed finish.
 9. Handrails: Provide a 1 1/2" diameter stainless steel tubular handrail at the rear of each passenger elevator. Return ends to wall. Provide adequate mounting. Top of handrail to be 32" above the finished floor. Provide service elevators with side and rear wall mounted handrails and bumper rails. Return ends. Bolt handrails and bumper rails through car shell. Provide backing plates and captive nuts.
 10. Bases: Provide a 4" high base. Finish as shown in Architect's drawings.
 11. Pads and Hooks: Provide pad hooks and pads. Pad hooks shall be conspicuous type

(buttons) at all walls. Mount pad hooks at sides and rear above suspended ceiling line. Pads shall cover all walls and front return panels and include cutouts for access to the operating fixtures.

12. Ventilation: Two-speed exhaust blower. Provide OE type in passenger elevators and AA type in service elevators.

- F. Emergency Car Lighting and Alarm System: Unit shall provide emergency light in car upon failure or interruption of normal car lighting. Emergency lighting unit shall provide a minimum illumination of 0.2 footcandles at 4' above car floor approximately 1' in front of main car operating panel for not less than 4 hours. Battery shall be 6 volt minimum, sealed rechargeable lead acid or equal. Battery charger shall be capable of restoring battery to full charge within 16 hours after resumption of normal power. Provide means within the car service panel for testing battery, lamps, and alarm bell. When multiple units are provided in a car all units shall illuminate. Illuminate a portion of normal car lighting.

2.13 SAFETIES

- A. General: Provide a governor actuated mechanical safety device mounted under the car platform and securely bolted to the car sling.
 1. When tripped, the safety mechanism shall engage the rails with sufficient force to stop a fully loaded car with an average rate of retardation within the limits given by the ASME A17.1 Code for the capacity
 2. Make provisions to release the car safety. In no event shall the safety be released by downward motion of the car. Raising the car to reset the safety shall be allowed.
 3. Include an electrical safety plank switch that will interrupt the power to the hoist machine when the safety is set. Resetting the plank switch shall be separate from resetting the safety jaws.
 4. Install a car safety marking plate of corrosion resistant metal showing the data required by the Code.

2.14 SIGNAL DEVICES AND FIXTURES

- A. General: Provide vandal resistant signal fixtures and control devices for each elevator. Buttons and signals shall be tamper resistant of the illuminated type that light-up when activated and remain lit until call or other function has been fulfilled. All signal fixture and control device faceplates shall be nominal 0.135 inch thick, unless otherwise shown on the Contract Drawings.
- B. Car Operating Station
 1. Provide car operating stations with faceplates flush with front returns. Station shall have illuminating pushbuttons numbered to conform to floors served. Buttons shall light to show registration and extinguish when car stops in response to a call. Buttons shall have a minimum dimension of 3/4", be raised 1/8" \pm 1/32" above the surrounding surface, be of square shouldered design, and have a detectable mechanical motion. A minimum clear space of 3/8" of other suitable means of separation shall be provided. Panel shall include an alarm bell button, Door Open and Door Close buttons. Provide an extended Door Hold button in each service elevator. All operating controls shall be located no higher

than 48" above the car floor, the keyed in car stop switch and alarm button shall be located no lower than 35" above finished floor height. Provide in main car station a fire emergency service cabinet containing. Phase II emergency fire service switch, fire jewel, fireman's phone jack, fire operating instructions, Call Cancel button and Door Open and Door Close buttons. Provide second fire jewel outside of Phase II cabinet. Provide in the return panel an intercom grill and flush mounted speaker grill for the "Hands-free" telephone.

- a. Braille/Arabic designations shall be identified by a minimum of 5/8" Arabic numeral, standard alphabet character, or standard symbol immediately to the left of the control button. Braille shall be located immediately below the numeral, character or symbol. Controls and emergency equipment shall be identified by raised symbols, including but not limited to, door open, door close, alarm bell, emergency stop and telephone. The call button for the main entry floor shall be designated by a raised star at the left of the floor designations. Braille and Arabic designations shall be flush with inconspicuous mechanical mounting. The plaques shall have raised white colored numerals on a black background.
2. Provide a lockable service cabinet with concealed hinges. Cabinet door shall be flush with the faceplate with hairline joints. Door shall include a flush integral certificate frame for viewing the operating permit. The window shall be constructed of durable Plexiglas or similar material and be accessible from backside of locked door. Minimum window size to be 7" wide by 3" high.
 - a. Cabinet shall contain the following type controls:
 - 1) A light switch.
 - 2) Two speed fan switch.
 - 3) Inspection keyswitch, conforming to the ASME Code.
 - 4) Independent service keyswitch.
 - 5) Emergency light test button.
 - 6) Keyed stop switch.
 - 7) A duplex 120-volt, A.C. G.F.C.I convenience outlet.
3. Provide black paint filled (except as noted), engraved signage as follows with approved size and font.
 - a. Phase II firefighters' operating instructions on rear of locked Phase II compartment door.
 - b. Car number over main and auxiliary car operating panel.
 - c. "No Smoking" over main car operating panel. Include reference to Los Angeles Municipal Code.
 - d. Car capacity in pounds on main car operating panel. Include reference to Los Angeles Municipal Code.
 - e. 3/16" "Push for Alarm" and telephone usage instructions.
 - f. 1/8" City of Los Angeles Elevator Code anti-panic signage.
- C. Car Position Indicators: Provide segmented digital readout type with 2" high (minimum) indications. Locate at top of each car operating panel at a height no lower than 6'-6" above the finished floor. Indicator shall provide car position and direction of travel and include an adjustable electronic floor passing chime. As the car passes or stops at a floor served by the

elevator, the corresponding designation shall illuminate, and an audible signal will sound. The audible signal shall be no less than 20-decibels with a frequency no higher than 1500.

- D. Floor Annunciator: Provide digitized voice annunciator providing both male and female voices in a system capable of up to 5-minutes of speech. Messages shall include the following announcements:

1. Floor number.
2. Notice of doors closing prior to nudging operation.
3. Emergency operation announcements:
 - a. Firefighter's Service, "Elevator returning to lobby."
 - b. Seismic operation, "Elevator proceeding to next floor."
 - c. Car has exceeded its rated load, reduce load to resume operation.
 - d. Standby power activated, "Elevator returning to lobby," upon sequencing.
 - e. Security operation, "Elevator in Secure Operation, Exit Elevator Immediately", upon notification from ACAMS Controller.
 - f. Contractor/Installer to submit messages for Owner approval prior to fabrication.

- E. Hall Buttons

1. Provide one riser of vandal resistant hall pushbuttons. Station shall include flush mounted faceplate. Centerline of riser to be at 3'-6" above the finished floor. Buttons shall have a minimum dimension of 3/4", be raised 1/8" \pm 1/32" above the surrounding surface, be of square shouldered design, and have a detectable mechanical motion. A minimum clear space of 3/8" or other suitable means of separation shall be provided. Button design shall match those used on the car operating panel. Provide red and/or green LED illumination. Provide 3-position Code required Phase I key switch and operational instructions engraved minimum 1/8" high on the faceplate, at the main lobby. Incorporate fire service jewel and standby power jewels. Faceplate edges shall be relieved. Finish shall be stainless steel No. 4 brushed finish. Backfill for engraving shall be epoxy filled. Integral signs shall be as follows:
 - a. Fire Operational Instructions. Minimum 1/8" high lettering.
 - b. Fire Service Jewel. Minimum 1/8" high lettering.
 - c. Standby Power Indicators. Minimum 1/8" high lettering.
2. Provide spanner type security fasteners. Finish matching faceplate.
3. No objects adjacent to, and below, the hall push button station shall project more than 4-inches from the wall.

- F. Hall Lanterns: Provide UP and DOWN lanterns at intermediate landings, single lantern at terminal landings. Electronic chimes for each lantern shall sound once for up and twice for the down direction of travel. The lantern shall illuminate for corresponding direction of car travel and the chime shall sound when the elevator is at a predetermined distance from the scheduled floor stop. The design and location of the hall lanterns shall be as selected. Faceplate finish matching hall buttons.

- G. Hoistway Access Switches: Provide without faceplate in entrance frame side jamb at all top and bottom terminals.

- H. Fire Control Station: Provide a common control panel for all elevators, locate as directed. Panel to contain a digital readout type position and direction indicator per elevator; fireman's return switch per group or individual elevator as required; a jewel to indicate if doors are open at the fire egress floor per elevator; in car fire service jewel per elevator; space for fireman's phone jack; a cabinet containing fire service keys; engraved instructions for fire service operation; and emergency power selector switches and status indicators.
- I. Machine Room Monitors: Provide a monitor in each machine room capable of displaying status, position and critical items for trouble shooting the equipment.

2.15 COMMUNICATION SYSTEM

- A. Telephone System: Provide automatic dial "Hands-Free" telephone station located in the car station. A button shall suitably identify activation of auto dialer for the visually impaired. Speaker shall be mounted without faceplate or visible fasteners and located either behind the control station or within the telephone box. Communication shall be capable of being heard from any location within the car enclosure.
 - 1. Provide a telephone symbol minimum 2" high, and raised $\pm 1/32$ " with Braille indications adjacent to a separate activation button mounted on the control panel.
 - 2. Provide engraved emergency instructions above the activation button. Instructions shall read: "To use emergency telephone, press button below. Dialing will occur automatically."
 - 3. Provide a visual indication, approximately 3/4" in diameter, or a jewel that illuminates once a call has been received by the master station. Instructions under the visual indicator or within the lighted jewel shall read: "Assistance is on the way".
- B. Provide wiring from car to telephone terminal box in elevator machine room.
- C. Provide permanent means of communication between the elevator car and the machine room if required by Code.
- D. Provide installation of Life Safety speaker provided by others within the elevator cab. Provide wiring from car to Life Safety junction box in machine room.
- E. Bell Alarm System: Bell alarm system for each elevator shall be properly located within building and audible outside hoistway when activated by the Alarm call button on each car control station.

2.16 CENTRAL MONITORING SYSTEM

- A. Vertical Transportation Central Monitoring/Control System: Provide central monitoring and control system to monitor and record all the building's elevators, escalators and moving walks and their respective operations simultaneously. System shall be compatible with other building monitoring systems. Systems shall be capable of accommodating multiple elevator control systems from various manufacturers.

- B. General: In the event of an elevator shutdown or any other designated emergency, the elevator system shall automatically initiate a call to the Elevator Command Center (ECC). The ECC shall be capable of receiving the call, processing the data and routing the received data to the proper storage or output device, i.e., monitor, hard drive, printer, etc. The system shall have the ability to page designated personnel to notify them of an emergency event. The ECC shall store a chronological listing of the emergency reports received from each elevator. The user shall be able to view or print these reports. The following system hardware shall be provided:
1. Pentium based processor, 1.6GHz or faster.
 2. 512 MB RAM.
 3. 80 GB hard drive.
 4. Parallel port.
 5. CD-ROM drive.
 6. SVGA card and monitor.
 7. Parallel printer.
 8. Ethernet connectivity.
 9. Provide minimum 17-inch LCD monitor displaying real time activity of each group and each escalator and their respective operations status.
- C. Provide a Graphical User Interface Central Monitoring System (CMS) with, but not limited to the following features:
1. Simulated hoistway and car configuration.
 2. Individual elevator position.
 3. Individual elevator car calls.
 4. Individual elevator direction.
 5. Individual elevator door position.
 6. Individual elevator status of operation.
 7. Individual elevator communication status.
 8. Registered up and down hall calls.
 9. Controller real-time clock date and time.
 10. Group mode of operation.
 11. Remote registration of car and hall calls. Send a car to any floor at any time, regardless of operation mode, i.e. normal operation, independent service, swing car operation, floor lockout, etc.
 12. Floor lockout (hall and car).
 13. Independent service to remove car from group to respond to car calls only.
 14. VIP operation to send a car to any floor and remain there for a predetermined time reassigning all other calls to different cars automatically.
 15. Car to lobby feature to call any car to the main lobby. Return car nonstop after answering preregistered car calls, and park with doors open for an adjustable time period of 60-90-seconds. Upon expiration of time, the car shall automatically resume to normal operation.
 16. Standby power operation and selection.
- D. As a minimum, the following reports shall be available from the CMS:
1. Average wait time for each hall call, in each direction of travel.
 2. Number of hall calls registered per event or time period selected.
 3. Emergency faults and events for the selected time period.

4. Number of hall calls answered per elevator.
 5. Door dwell times.
 6. Calculated car times including: door open times, door close time, floor-to-floor time.
- 2.17 WIRING AND ELECTRICAL INSTALLATION

A. Conduit and Wiring

1. Unless otherwise specified, all electrical conductors in the pits and hoistways, except traveling cable connections to the car shall be provided in rigid zinc-coated steel conduit with steel outlet boxes, except that a small amount of flexible conduit may be used where conduit is not subject to moisture or embedded in concrete. Terminal boxes and other similar items shall be of approved construction, thoroughly reinforced, and in no case less than number 12 USSG. All electrical boxes exceeding 150 cubic inches shall be supported independently of the conduits. The rigid conduit shall conform to the specifications here in before specified. All raceway shall be threaded rigid steel conduit. Flexible heavy-duty service cord, type SO, may be used between fixed car wiring and switches on car doors for door reversal devices.
2. All conduits terminating in steel cabinets, junction boxes, wire-ways, switch boxes, outlet boxes and similar locations shall have approved insulation bushings. If the bushings are constructed completely of insulation material, a steel locknut shall be installed under the bushing. At ends of conduits not terminating in steel cabinets or boxes, the conductors shall be protected by terminal fittings having an insulated opening for the conductors.
3. Conduit fittings and connections using set screws or indentations as a means of attachment are not permitted.
4. Connect motors and other components subject to movement or vibration, to the conduit systems with flexible conduit.
5. The Contractor shall furnish all materials and completely wire all parts of the electrical equipment of the elevators including electrical devices on hatch doors.
6. The conduits shall be of such size that the wires or cables can be readily installed and replaced, if necessary. No conduit or raceway shall be less than 3/4" trade size, except that for small devices such as door switches, interlocks, etc., 1/2" conduit may be used. The total overall cross sectional area of the wires contained in any conduit shall not exceed 40 percent of the internal area of the conduit.
7. Conduits shall be neatly and systematically run. All exposed conduit and boxes shall be supported by approved and substantial straps, hangers or clamps to the structural steel, reinforced concrete, or other approved supports. Riser conduits in hoistway shall be supported at each floor level.
8. All screws used for terminal connections of all wiring (control room, machine area, hoistway and pit) shall be provided with "star washers" of proper size and type.

B. Conductors

1. No joints or splices shall be permitted in wiring except at outlets. Tap connectors may be used in wire-ways provided they meet all UL requirements.
2. All wiring shall test free from short circuits or grounds. Insulation resistance between individual external conductors and between conductors and ground shall be not less than one meg-ohm.
3. Provide all necessary conduit and wiring between all remote control rooms, machine areas and hoistway.

C. Traveling Cables

1. Shall be Type EO, rated for a maximum of 300 volts, and shall comply with the requirements of UL Standard #62 and Articles 400 and 620 of ANSI/NFPA No.72
2. Travel cables shall include separate coaxial cable shielded for the communications system.
3. Provide 10 percent spares, but not less than 6 spare conductors in each traveling cable.
4. Provide four pairs of CAT 6A cables for communication, CCTV and security.
5. Provide separate traveling cables for car lighting and fan control circuits.
6. Provide traveling cable for telephone in the elevator car. Cable shall extend from junction box in hoistway to telephone box in car.
7. Provide traveling cable for car work lights.
8. All insulated wiring, control wiring and wiring in traveling cables shall be tag coded at their terminals in the motor room or controller location and hoistway junction box, elevator cab junction box, and push-button stations within the cab, and shall agree with the approved wiring diagrams.
9. All cabinets containing motor drives, filter boxes, transformers and power reactors shall be supported on rails and isolated from the base building structure with elastomer pads having a minimum static deflection of 3/8" (Mason Type N, or equivalent). All connections to and from the cabinetry shall be flexible in order not to compromise the isolation system. Use non-rigid conduit for the final electrical connection, with all other conduit supports and clamps provided on a neoprene sponge insert.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to commencing with the installation of elevator equipment, examine the following and verify that no irregularities exist that would affect the quality of execution of work specified.
1. Hoistway size and Plumbness
 2. Anchor brackets
 3. Sill Support
 4. Pit depth
 5. Overhead clearance

3.2 INSTALLATION

- A. Install elevator in accordance with the OEM's installation procedures and approved Shop Drawings. Install equipment so it may be easily removed for maintenance and repair. Install all equipment to afford maximum accessibility, safety, and continuity of operation.
- B. Verify that electrical wiring installation is in accordance with the OEM's submittal.
- C. Erect all items square, plumb, straight and accurately fitted with tight joints and intersections.
- D. Coordinate with the General Contractor to ensure that the installation of the elevators is not in conflict with the work performed of other trades.

- E. Isolate non-compatible, dissimilar materials from each other by providing vibration isolation, gaskets or insulating compounds.
- F. Provide protective coverings for finished surfaces.
- G. Upon completion, touch up and restore damaged or defaced factory finished surfaces. Touch up any marred finishes and replace as directed.
- H. Remove protective coverings and clean exposed surfaces after completion.
- I. Welding shall comply with AWS D1.1. Identify field welds with welder's identification stamp.

3.3 FIELD TESTING

- A. General: After installation, the Installer shall inspect and test each elevator and related equipment to Owner's satisfaction that operation of every part of the equipment complies with this specification and with applicable requirements of ANSI A17.1 including sound level criteria specified herein. Elevator will be inspected in accordance with the following:
 - 1. Installer shall notify Owner seven (7) days prior to each scheduled test. Installer shall perform testing in the presence of the Owner's representative. This test is in addition to those performed by The City of Los Angeles Elevator Inspector.
 - 2. Installer shall notify the appropriate local authorities having jurisdiction a minimum of seven (7) days in advance of final acceptance tests.
 - 3. Installer shall provide all instruments, materials, and labor required for tests specified herein.
- B. Acceptance Testing:
 - 1. Inspect and test the elevator and related equipment to the Owner's satisfaction that operation of every part of equipment complies with applicable requirements of ASME/ANSI A17.1 and local codes.
 - 2. Notification Requirements: Notify Owner a minimum of five (5) working days prior to each scheduled test.
 - 3. Full Load Run Test: Run elevator continuously a minimum of four (4) hours with full specified rated load, during which time car shall be stopped at top and bottom landings with a minimum standing period of 10 seconds at each landing.
 - 4. Speed Test: Make tests before and after full load tests. Using a tachometer on guide rail, determine actual speed of car in both directions of travel, both with full-specified rated load and no load in car. Tolerances for determining if car speeds meet the specified requirements are as follows:
 - a. Ascending and Descending Car Speed not more than 10 percent above or more than 10 percent below required speed.
 - b. Car Leveling Test: Determine accuracy of floor landing tests both before and after full load run tests. Minimum of 1/4 inch leveling must be maintained. Test accuracy of landing at all floors with full load and no load in car, in both directions of travel.

- c. Electrical Tests: Ensure elevator wiring system is free of short circuits and accidental grounds. Test ground resistance of elevator structure, equipment, and raceways for continuity. Using meg ohm-meter, determine that insulation resistance of each circuit is more than one (1) meg ohm or higher as required by the cable manufacturer. Insulation resistance for motors shall be determined under actual conditions after installation.
- 5. Acceptance: Elevator acceptance will be based upon elevators meeting requirements of Contract Documents and upon evidence of passing specified acceptance tests and inspections. Final testing will be after elevators are connected to permanent power.
- 6. Test Reports: Within five (5) days after completion of a test, submit a test report stating type of test, test requirements, failures, or problems, and name of certifying Engineer and Title. Safety device failure or defective equipment shall be identified, with description of cause and corrective action taken.
- 7. Failures for any reasons shall be identified with cause(s) and corrective action taken.
- C. Re-Inspection: If any equipment is found to be damaged or defective, or if the performance of the escalators does not conform to the requirements of the contract specifications or the Safety Code, no approval or acceptance of escalators shall be issued until all defects have been corrected. When the repairs and adjustments have been completed and the discrepancies corrected, the Owner and Owner's representative shall be notified and the escalators will be re-inspected. Rejected escalators shall not be used until they have been re-inspected and approved.
- D. The certificate of inspection for operational use will be issued to LAWA by the enforcing inspection agency. The certificate shall be posted in the elevator control room and in the car operating station.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train LAWA's maintenance personnel to operate, adjust, and maintain escalators.
- B. Check operation of escalators with LAWA's personnel present and before date of Completion. Determine that operation systems and devices are functioning properly.
- C. Check operation of escalators with LAWA personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 14 21 00

SECTION 14 31 00 - ESCALATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes high-traffic, transit type interior escalators.

1.2 DEFINITIONS

- A. Definitions in the latest version of ASME A17.1 apply to work of this Section.
- B. High-Traffic Escalators: Escalators designed specifically for use where high-traffic volumes produce dense occupancy resulting in structural, machinery, and brake loads much higher than normal.
- C. Defective Escalator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; shipping damage; and similar unusual, unexpected, and unsatisfactory conditions.
- D. C.D. Reference to a device or a part of the equipment applies to the number of devices or parts required to complete the installation.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design escalators including attachment to structure, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Operational Requirements: The escalator systems shall:
1. Be capable of operating under full load conditions, at full contract speed, in either direction, and designed to operate quietly and smoothly without bounce.
 2. Have a rated nominal speed of 100 ft. /min. (.50 m/s) or metric equivalent. The no-load to full load speed shall not vary by more than 4% of the contract speed.
 3. Hours of operation shall be considered as twenty-four (24) hours per day, seven (7) days per week, and 365 days a year.
 4. Direction of travel shall be considered as either direction; and unit shall be up and down reversible.
 5. Handrail speed shall be consistent with step speed.
- C. Braking Performance: Provide brakes that stop escalator in up-running mode at a rate no greater than 3 ft. /s².
- D. Step/Skirt Performance Index: Not more than 0.15.

- E. Structural and Mechanical Performance for High-Traffic Escalators: For the purpose of structural design, driving machine and power transmission calculations, and brake calculations, design high-traffic escalators for loads not less than 2 times the design loads required by ASME A17.1.
- F. Structural Performance of Balustrades, Deck Barricades, and Handrails: Provide components and assemblies capable of withstanding the effects of loads indicated in ASCE 7 for handrail assemblies and guardrail systems.
- G. Regulatory Requirements: Comply with ASME A17.1, CCR Title 8, and escalator design requirements for earthquake loads in ASCE 7.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Refer to Section 14 20 00, Vertical Transportation, General.
- B. Installer Qualifications: Refer to Section 14 20 00, Vertical Transportation, General.
- C. Professional Engineer Qualifications: Professional Engineer Qualifications: Refer to Section 14 20 00, Vertical Transportation, General.
- D. Standards: The following standards shall govern the moving walk work. Where standards conflict, the standard with the more stringent requirements shall be applicable.
 - 1. Escalator Code: In addition to requirements of authorities having jurisdiction, comply with the latest edition of ASME A17.1, "Safety Code for Elevators and Escalators", ASME A17.2 "Guide for Inspection of Elevators, Escalators and Moving Walks", and ASME A17.5 "Requirements for Elevator and Escalator Electrical Equipment", including supplements, as published by the American Society of Mechanical Engineers. Wherever "Code" is referred to in the moving walk specification, the ASME A17.1 Code shall be implied.
 - 2. Electrical Code: For electrical work included in the escalator work, comply with the National Electric Code (NFPA 70), ASME A17.5, all applicable local codes, and the authorities having jurisdiction.
 - 3. Welding: Comply with AWS standards.
 - 4. Americans with Disabilities Act (ADA).
 - 5. Building Code of the City of Los Angeles and the following:
 - a. California Code of Regulations (CCR), Title 8.
- E. Electrical Devices and Equipment: Refer to Section 14 20 00, Vertical Transportation, General.
- F. Manufacturer: Provide all moving walks components from a single source. Where equipment or operation varies from those described, the manufacturer shall provide a complete description of those variations as required under Section 14 20 00, VERTICAL TRANSPORTATION, GENERAL, Article QUALITY ASSURANCE, paragraph 'Contractor Statement'.

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- G. Testing and Inspections: Refer to Section 14 20 00, Vertical Transportation, General.
- 1.5 SUBMITTALS
- A. Scaled Layouts: Fixtures, barricades, etc.
 - B. Design Information: Indicate equipment lists, reactions and design information on layouts.
 - C. Product Data: Include capacities, sizes, performances, safety features, finishes, and similar information.
 - D. Delegated-design Submittal: for installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - E. Shop Drawings: Show plans, elevations, sections, and details indicating coordination with building structure and relationships with other construction. Indicate variations from specified requirements, maximum loads imposed on building structure at points of support, and power requirements. Indicate access and ventilation for escalator machine space. Provide at scale of 1/4" = 1'-0".
 - 1. Load assumptions for maximum loads imposed on trusses requiring load transfer to building structural framing, individual weight of principal components and their dead and live load reactions at points of support, electrical characteristics and connection requirements, loading imposed by truss cladding and any other information requested by the Architect.
 - a. Structural Calculations: Submit, for information only, copies of structural calculations indicating load assumptions. Calculations shall be signed, and sealed by the qualified Professional Engineer responsible for their preparation and who is licensed in the State of California.
 - b. Power Confirmation Sheets: Include motor horsepower, code letter, starting current, full-load running current, and demand factor for applicable motors.
 - F. Glass Treatment Certificates: Submit glass treatment certificates signed by manufacturer of the heat soaked glass products certifying that products furnished comply with requirements.
 - G. Samples: For exposed finishes, 3-inch- square Samples of sheet materials, and 4-inch lengths of running trim members.
 - H. Fixtures: Cuts, samples or shop drawings.
 - I. Manufacturer Certificates: Signed by manufacturer certifying that escalator layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for escalator system being provided.
 - J. Qualification Data: For Installer.
 - K. Operation and Maintenance Data: For escalators to include emergency, operation, and maintenance manuals.

1. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- L. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted escalator use.
- M. Rigging: Installer shall submit a rigging plan for approval. Any use of existing building structures shall be reviewed and approved by a structural engineer.
- N. Operating and Maintenance Manuals: Prior to completion of the installation, contractor shall submit six complete sets of Operation and Maintenance manuals for approval. After LAWA approval and prior to the beginning of acceptance testing, six (6) sets of the approved manuals shall be provided by the Contractor. The manuals shall include the following:
 1. Complete table of contents.
 2. Complete instructions regarding operation and maintenance of equipment, including disassembly and assembly of drive system, handrail drive assembly, and track system. Included will be complete and illustrated exploded views of all assemblies as well as a complete and illustrated exploded view for identifying all system parts.
 3. Complete nomenclature of replaceable parts, part numbers, current cost, and warehouse location. If product source is another vendor, contractor shall include name and address of the other vendor.
 4. Sample copies of a preventive maintenance chart.
 5. Descriptions of safety devices.
 6. Safety rules, tests, and procedures, including testing of all systems and subsystems.
 7. Procedures for adjusting brake, handrail tension, handrail chain drive tension, step chain tension, track system, and mechanical components, including pictorials.
 8. Instructions for removing floor plate, replacing comb segments, and removing and installing steps, and interior panels.
 9. Troubleshooting techniques.
 10. Detailed lubrication and cleaning schedule indicating weekly, monthly, quarterly, semiannual, and annual lubrication; and a description of each lubrication point, lubrication type, and specification.
 11. Control and schematic electrical wiring diagrams of controller, including wiring of safety devices to connections with remote indication and control panels for each escalator and group of escalators.
 12. Electrical layout showing placement of lighting, light switches, receptacles, light fixtures, disconnect switches, and convenience outlets in machinery room, truss envelope, and pits.
 13. Complete detailed drawings and wiring diagram of escalator fault finding device and connection to annunciator panel.
- O. Certification: The escalator manufacturer shall provide certification that the purchaser of the escalators shall be provided with copies of all documents related to maintenance, safety, operations, design changes, modifications, retrofits, etc.; which relate to any part, component,

equipment, system subsystem, or material and services applicable to the escalator provided. All of the above referenced shall be provided as it pertains to the original installation and for a period of twenty (20) years after final acceptance of the last escalator provided under any contract. The referenced material shall be provided within thirty days of publication or internal distribution by the escalator manufacturer. The material, even if labeled PROPRIETARY, shall be delivered to the Authority without prejudice or delay and at no additional cost.

1. Provide all material on CD-ROM in a format approved by the Authority.

P. Material Safety Data Sheets (MSDS): MSDS and product data sheets shall be submitted with an index listing each product, along with the application method of the product, approximate quantity of product per escalator, and the component the product is applied to or associated with. The contractor shall allow six (6) weeks for review of MSDS.

Q. Spare parts and replacement parts list - Contractor shall maintain, at a minimum, a local on site parts inventory for use solely on this Contract. Parts not listed below, including balustrades, decks, skirt panels, handrails and signage shall be available via overnight air delivery. Inventory shall include lubricants, light bulbs, etc. necessary to maintain equipment in original operating condition. The parts listed below shall be made available for inspection by LAWA or its designee. Part storage shall be as directed by LAWA.

1. Parts required for equipment listed under Section 14 31 00: Parts inventory shall be maintained throughout the Warranty Maintenance period and five year contract maintenance period after which parts will become the property of LAWA.

a. Escalators

5 Complete Steps	4 Stop Switch Covers with hardware
10 each – Left, Right and Center Step	2 Key Switches – each kind
Treads Inserts	
15 Comb plate Segments – each kind	1 Motor Starters, each size
17 Step Rollers and Flanges	2 LH Electric Interlocks, each size
7 Step Axel Sets	2 RH Electric Interlocks, each size
1 Matched Pair Step Chains (Longest Unit)	1 Circuit Breakers, each size
2 Sets Gear Box Gaskets and Shims	1 Reverse Phase Relays
1 Automatic Lubrication Reservoir	1 Transformers
2 Sets Skirt and Emergency Switches	2 Step Chain Oilers
2 Sets Start Contacts, each size	2 Handrail Inlet Brushes
3 Stop Switches	7 Handrail Tension Rollers
10 10' Sections skirt deflection brushes	

1.6 QUALITY REQUIREMENTS

A. Installer Qualifications: Escalator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain escalators and elevators/moving walks specified in other sections through one source from a single manufacturer.

- C. Regulatory Requirements: Comply with ASME A17.1, CCR Title 8, and seismic criteria listed above.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.
- B. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's recommendations to prevent damage, deterioration, or soiling. Step chains exhibiting rust shall be replaced prior to final acceptance.

1.8 COORDINATION

- A. Coordinate installation of, escalator equipment with integral anchors, and other items that are embedded in concrete or masonry for escalator equipment. Furnish templates, sleeves, escalator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate sequence of escalator installation with other work to avoid delaying the Work.
- C. Coordinate locations and dimensions of other work relating to escalators including sumps and floor drains in pits, electrical service, and electrical outlets, lights, and switches in pits.
- D. Coordinate and provide hoisting related to escalator installation.
- E. Coordinate installation of truss cladding and all other work related to the escalator installations.
- F. Coordinate seismic attachment with structural design.

1.9 INSTALLATION CONTRACT ACCEPTANCE, WARRANTY, INTERIM SERVICE AGREEMENT AND SERVICE AGREEMENT

- A. Warranty: The Contractor shall warrant in writing that all equipment manufactured and installed under this Contract be free of defects in design, materials, and workmanship, under normal use and service ("Warranty") for a period of twelve (12) months. Defects in design, materials, and workmanship shall be repaired or replaced with all materials and labor at no additional cost to LAWA ("Warranty Work"). (Defects shall include, but not be limited to, noisy, rough, or substandard operation; failures; loose, damaged, and missing parts; and fluid leaks.)
- B. In addition to the Warranty
 - 1. Contractor shall provide, concurrently with each Warranty Period, a 1-Year Preventative Maintenance ("PM") service for all units.
 - 2. Beginning one year after the Contract Completion Date, the Contractor shall provide a 5-Year Extended Preventative and Routine Maintenance Service Agreement ("SA"), per Section 14 20 00, 3.7.2 and Exhibit A, for all units installed in this Contract.
 - 3. The 5-year SA period shall be executed in strict compliance with all of the terms and

conditions set forth in Exhibit A ("Exhibit A"). Upon conclusion of the SA, the parties may mutually agree to extend the SA for an additional sixty (60) months, via a renewable option ("Option").

- C. The Contract/Warranty, PM, Interim and SA services shall include all services necessary to maintain the equipment in proper working order for use at a major international airport including, but not limited to.

1. "Tasks":

- a. Inspection of completed installation and periodic testing to maintain elevators in completely operable, like new condition.
- b. Provide preventative maintenance on escalators for a minimum of four (4) hours each month (Total On-Site Time). Provide monthly documentation of the same to LAWA.
- c. Periodic lubrication of parts and equipment components as per OEM's recommendation. Charts are to be provided for each escalator indicating when services are provided.
- d. Perform work without removing escalators from service during peak traffic periods determined by LAWA as 7:00 a.m. to 10:30 p.m. daily.
- e. Provide twenty (24) hour emergency service during the maintenance period consisting of a prompt response (within 30 minutes) to emergency request by telephone or otherwise from LAWA or designated representative if an escalator is inoperable or in case of injury, entrapment, or potential injury to persons.
- f. Unlimited regular time callbacks are included with a required response time of one (1) hour. Regular time will be Monday through Friday, 8:00am to 4:30pm, exclusive of holidays. Overtime/Premium time call backs originating from an operational error related to the performance requirements of the equipment shall be borne by the Contractor.
- g. All other services as required by Section 14 20 00, 3.7.2 and Exhibit A.

1.10 MAINTENANCE SERVICE

- A. Comply with requirements in Section 14 20 00, 3.7.2; "Vertical Transportation, General, Section 14 21 00 and Exhibit A."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Comply with requirements in Section 14 20 00, 3.7.2; "Vertical Transportation, General."

2.2 MATERIALS

- A. Structural Steel:

1. Rolled Steel Sections, Shapes and Rods: ASTM A36.

- 2. Tubing:
 - a. Cold Formed: ASTM A500.
 - b. Hot Formed: ASTM A501.
- 3. Sheet Steel: ASTM A446, grade B, zinc coated.
- B. Stainless Steel: ASTM A 240/A 240M, Type 304.
 - 1. Satin Finish: No. 4 directional satin.
- C. Aluminum Castings and Extrusions:
 - 1. Castings: ASTM B108 alloy and temper as required to meet the strength and performance requirements.
 - 2. Extruded Aluminum: ASTM B221, Alloy 6061 or 6063, T6.
 - 3. Finish: Commercial mill finish.
- D. Clear Tempered Glass: ASTM C 1048, Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 1 (clear), Quality q3 (glazing, select), Kind FT (fully tempered), 12.0 mm thick. After tempering, heat soak 100% of all fabricated glass units to European Union Standard EN14179 to eliminate inclusion related glass breakage. Statistical heat soaking shall not be permitted. Comply with ASME A17.1, Section 6.1, Rules 6.1.3.3.2 and 6.1.3.3.3.
- E. Fasteners: Provide bolts, nuts, washers, screws, rivets, and other fasteners necessary for the proper erection and assembly of the moving walk work. Fasteners shall be compatible with materials being fastened.
- F. Welding Materials: Comply with AWS D1.1.
- G. Sealants, Joint Fillers and Primers: Sealants, joint fillers and primers internal to the moving walk systems shall be as selected by the moving walk manufacturer. Perimeter sealants, joint fillers and primers are specified under Section 07920, JOINT SEALANTS.
- H. Paint and Corrosion Protection: Each moving walk shall have the following minimum corrosion protection.

2.3 COMPONENTS

- A. General: Provide high-traffic transit type escalators complying with requirements. Unless otherwise indicated, provide heavy-duty components required by the American Public Transportation Association (APTA) Guidelines and as required for a complete escalator.
- B. Performance
 - 1. Step Speed: Unit shall be capable of operating at contract speed under any loading condition in either direction of travel. The no-load-to-full-load speed shall not vary in excess of 4% of the rated speed.
 - 2. Handrail Speed: Consistent with step speed.

C. Operation

1. Each unit shall be capable of operating smoothly and quietly at rated speed with synchronized step and handrail operation and speed in either direction of travel. Units shall be designed to operate twenty-four hours per day, seven days per week.

D. Machine Room Equipment

1. Drive Motor: The driving motors shall be AC induction motors with solid state closed transition starting starters. Voltage 480 V.A.C., 3 phase, Frequency 60 Hertz.
 - a. The motors shall be totally enclosed with external cooling fins.
 - b. The motor protection class shall be equivalent to IP 55 Insulation group: F.
 - c. Driving motors and motor switch gear shall provide a smooth start.
 - d. The motor shall be designed for continuous operations under a load as follows:
 - 1) 1000m wide step with a load of 300 lbs. per step on the incline.
2. Controls and Safety Devices
 - a. Operating Controls:
 - 1) Escalators shall have key operated switches, accessible at both upper and lower landings, located on the exterior deck above the newel base. Alternate locations may be used subject to approval by the Authority.
 - 2) Each keyed switch shall be clearly and permanently labeled, including starting and direction selection.
 - 3) Interlocks shall be provided to bring the escalator to a smooth stop, in either direction of travel, before a change of direction may be made.
 - b. Safety Devices:
 - 1) Safety devices include but are not limited to those which are required by the latest edition of ASME A17.1.
 - 2) A lockable stop switch or disconnect shall be provided in both pits of escalators.
 - 3) Provide skirt deflection devices (brushes). Provide dual profile brushes with anodized aluminum receptacles. Align joints with skirt panel joints.
 - c. A fault-finding device shall be provided in the newels, capable of producing indications of the following data:
 - 1) Date, time, and cause of escalator stoppages.
 - 2) The fault indication shall remain visible until reset by an authorized person.
 - 3) Data shall be transmitted to a remote monitoring location.
3. Brake Operation: Safely decelerate, stop and hold rated load per Code requirements. Brakes shall stop escalator operating in the down direction at a rate not greater than three feet/second/second.

4. Controller: Wire to identified terminal block studs. Identifying symbols or letters identical to those on wiring diagrams permanently marked adjacent to each component on the controller. Enclose all components in steel cabinet removable from machine room for ease of access to switches and wiring. Provide mainline circuit breaker and means to protect against overload and single phasing. Controller shall be labeled with rated load and speed, braking torque, manufacturer serial number and LAWA numbers. Locate controller remote if available space is not sufficient in upper or lower pit.
5. Controller
 - a. The escalator control equipment shall contain diagnostic capabilities as required for the ease of complete maintenance. The diagnostic system shall be an integral part of the controller and provide user-friendly interaction between the service person and the controls. All such systems shall be free from decaying circuits that must be periodically reprogrammed by the manufacturer.
 - b. Switch gear shall be mounted in NEMA 4X cabinets with labeled terminal strips.
 - c. The main controller shall use an Allen Bradley SLC5/03 Programmable Logic Controller (PLC) or approved equal, to control and monitor the status of the escalator. The PLC shall be designed to communicate over Ethernet or approved equal.
 - d. The PLC racks shall provide space for two future single-slot modules.
 - e. The PLC in the remote control panel shall also have hardware and firmware provisions to communicate with interactive operator interface (monitor).
 - f. The PLC shall store the last 99 faults, accessible via laptop connection, panel view or remote communications.
 - g. Provide a copy of all working programs on approved computer medium as well as a printed program listing.
 - h. The Programmable Controller shall have one dedicated serial port, which supports RS-232-C signals. It shall be accessible in ladder logic and provide support for Point to Point and Lift-Net/Slave SCADA communication protocol systems. Alternatively, it must be usable for programming purposes or for access to remote programmers via modems.
 - i. The main control switchgear of an escalator shall contain at least the following devices:
 - 1) Lockable main switch thermal and magnetic motor protection starter for up and down travel, hour counter, auxiliary contactors, phase failure device, phase sequence monitor, and ground fault monitor.
 - 2) The controller cabinet shall contain a permanently mounted fault indicator board with indicator lights. Fault data shall also be displayed at the newel. Each group of safety devices shall be connected to one signal lamp.
 - 3) The indication shall be locked automatically. Reset shall be done by a separate switch installed in the controller. The emergency stop shall not be locked.
 - 4) All terminals shall have identification markings and all cables shall be

provided with cable markers.

- 5) The controller shall be equipped with an AC induction motor reduced voltage starter; installed in line between the standard type contactor and the drive motor. The starter shall be solid state, capable of starting motors smoothly and gradually, reducing inrush current and mechanical shock upon start up. Adjustable settings for accelerating time and starting torque shall be provided. The starter shall also contain auxiliary contacts and a thermal overload relay for motor protection.
 - 6) Maintenance Receptacles: Electric power receptacles shall be furnished and installed in the upper and lower pits. Each receptacle shall be of the GFCI duplex type, waterproof, grounded, and rated for one hundred and twenty volts at twenty amperes. The receptacles in the pits shall be surface mounted on the walls, not less than thirty inches from the floor.
 - 7) Relays shall be provided with visual indication that they are energized.
 - 8) Adjustable settings for accelerating time and starting torque shall be provided. The starter shall also contain auxiliary contacts and a thermal overload relay for motor protection.
- j. Monitoring System Interface: Provide controller with serial data link through RJ 45 Ethernet connection and install all devices necessary to monitor items outlined in Section 2.15. Escalator Contractor responsible to connect monitoring system interface to machine room monitoring compartment and LAN. Wiring from LAN to the machine room monitoring compartment by others.
- k. Remote Monitoring and Diagnostics: Equip each controller with standard ports, interface boards, and drivers to accept maintenance, data logging, fault finding diagnostic, and monitoring system computers, keyboards, modems, and programming tools. The system shall be capable of driving remote color CRT monitors that continually scan and display the status of each escalator. System shall be Lift-Net, or equal, ready/compatible. System shall be compatible with other building management systems. Monitoring system shall not be proprietary to any individual control.
6. Maintenance Drive Unit: Means shall be provided for reduced speed maintenance operation that shall be controlled by a manual handset. When operated, the escalator shall run in the direction selected, at a speed of not more than 25% of rated speed. This speed shall be maintained when steps are removed for servicing. Escalator operation shall be continuous so long as an up or down button on the handset is being pressed. The handset shall be a ten foot retractable type cord with a plug connector. When plugged into receptacle, there shall be no means of operating or running the escalator except by the service handset. Receptacles shall be located in both the upper and lower pits.
 7. Step Drive Assembly: Direct or indirect drive. Machine sprockets at each side over which step chains or step chain rollers shall pass and transmit motion from machine to steps. If indirect chain drive is used between machine and drive sprocket, provide emergency brake on drive assembly to automatically set if drive chain fails. Provide roller-type sealed bearings.
 8. Stop Switch: Per Code.

E. Escalator Power Saving Control

1. Certifications
 - a. The motor controlling device shall be certified to meet US elevator / escalator code (ASME-A A17.5 and CSA B44.1) standard for industrial control equipment as well as CE for the European Standard.
2. Performance
 - a. The supplier shall provide documented proof that the motor controlling device has been tested on an escalator by at least one electric utility in the United States of America and shown positive energy savings test results. Furthermore, the supplier shall provide documented proof that the electric utility approved the motor controlling device for an energy efficiency rebate (if applicable).
 - b. The motor controlling device shall continually monitor motor and be able correct energy requirement within 8ms and be able to respond to a 50% change in load within 1 second without changing the speed of the motor by over 0.5%. The motor controlling device shall be able to provide full power to a motor without using more than 0.5% more energy than an electrical mechanical motor starter.
3. Equipment Manufacturer Acceptance
 - a. The supplier shall show broad industry acceptance of the motor control device by documenting that all major escalator service providers, including Otis Elevator, KONE Inc. Schindler, ThyssenKrupp, and Mitsubishi Electric, have experience installing such device on an escalator.
4. Functions
 - a. The motor controlling device must include the following functions:
 - b. Overload Current Protection
 - c. Over Voltage Protection
 - d. Under voltage Protection
 - e. Over Current
 - f. Under Current
 - g. Phase Loss
 - h. Reverse Direction
 - i. S.C.R. Failure
 - j. Fault logging capability
 - k. Remote monitoring capability
5. Mounting Hardware
 - a. The mounting hardware and enclosure shall be rated NEMA - 1 for indoor installations and NEMA 4 for exterior installations rated and specifically designed for ease of installation in escalator applications.
6. Control voltage Connection

- a. The motor controlling device shall not require an external dedicated power source to operate and shall operate based on existing line serving the escalator.
7. Discrete Inputs and Outputs
 - a. The motor controlling device shall have one input connection that controls the starting and stopping of the motor. The motor controlling device shall have two output contacts to provide the run and fault status of the motor controlling device.
8. Motor Control Functionality
 - a. The motor controlling device shall provide a timed soft start with a start up time range of 0 to 10 seconds or more, to appropriately integrate with other motor starters and reduce the mechanical stress on the escalator system during the starting of the motor.
9. Heat Sink Material
 - a. The motor controlling device shall utilize a metal heat sink material to dissipate operating heat without requiring external cooling devices.
10. Submittal Requirements
 - a. The supplier shall provide motor controlling device drawings including schematic wiring diagram and mounting dimensions.
11. Deliverables
 - a. The supplier shall provide an installation and user's manual.
12. Warranty
 - a. The supplier shall warrant the motor controlling device for a period of two years from the date of sale.

F. Wellway Equipment

1. Truss: Steel truss to safely carry entire load of escalator, including all components, full-capacity load and weight of exterior truss and balustrade covering material; (not to exceed 10 lb. p.s.f.). Provide factor of safety per Code. Provide clearly identified exterior cladding support attachment locations on exposed sides and bottom of the entire length of truss. Escalator intermediate support points shall be provided by installer where required. Submit details and calculations. Provide mounting angles. Truss shall be designed to be accommodated by the existing wellway dimensions.
2. Truss Extensions: Provide truss extensions at upper and/or lower landings as required and/or as shown contract drawings.
3. Noise and Vibration Control: Provide sound isolation within truss as required to limit noise levels relating to escalator equipment and its operation to no more than 60 dBA, measured 3'-0" above escalator at any point of its length.
4. Drip Pans: Oil-tight, steel pans with sufficient strength to withstand weight of workmen, entire width and length of truss. Fabricate all oil pans, chutes, etc. shall be fabricated of galvanized steel.
5. Step Tracks: Construct from steel. Tracks shall be bolted sections including transitions

to facilitate maintenance and replacement if required. Track sections, including transitions, shall be factory installed and aligned to insure smooth, quiet operation of running gear under all conditions. The individual track section, together with transition section, step chain tension carriage, main drive shaft and handrail drive shaft shall form a fully independent assembly. The rolling surface of the track be a minimum thickness of 3 mm.

6. Guiding System: The guiding system for the step chains and step wheels shall be of zinc plated or galvanized steel profiles with smooth and even running surfaces and with the joints cut diagonally to the running direction. The guide profiles shall not be welded together at the joints. A second, continuous guiding profile shall be provided above the step chain rollers so that the step chains are positively guided in the area of the escalator open to passengers.
7. Electrical Wiring
 - a. Conductors: Copper throughout with individual wires coded and all connections identified on studs or terminal blocks. Type SO cable may be utilized for wiring conducting 30 volts or less, per NEC 620-21.
 - b. Conductors: 31 Volt RMS or greater. Provide conduit, junction boxes, connections and mounting means per requirements of Division 16. Provide painted or galvanized steel or aluminum conduit. Conduit size minimum 3/8". Flexible conduit exceeding 18" in length shall not be used.
8. Step Chains: Steel links with hardened pins connecting adjacent steps and engaging drive sprockets. Pins shall have a minimum diameter of 5/8". Provide polyurethane roller assemblies with sealed bearings. A shielding device shall be provided to protect chain, track guides and rollers against water, dirt, and debris. Escalator design shall permit chain inspection and operation while unit is running with steps removed. Roller shall be a minimum of 4" in diameter.
9. Step Chain Tension Carriage: Spring tensioning device to take up chain slack and maintain constant tension.
10. Step Assembly: Single piece die-cast aluminum, fastened to the step chain axles. Step rollers shall have sealed bearings and be tired with synthetic composition material. Treads and riser shall be cleated. Steps shall be covered on the underside with sound-deadening material. Steps shall be removable from unit without disassembly of balustrade or decking. Provide renewable step demarcation inserts on rear edge of each step tread and both sides of each step tread. Paint step tread and riser black between machined surfaces of cleats.
11. Fire Protection
 - a. Escalators shall be constructed of noncombustible materials as defined in ASTM A136 throughout, with the exception of handrails, handrail rollers, chain step wheels, and electrical equipment.
 - b. Handrails shall have a flame spread rating of seventy-six to two hundred when tested in accordance with ASTM E 84.
 - c. Bearings shall be rated for an AFBMA L10 life as specified, under a fluctuating bearing load. All bearings shall have basic dynamic load ratings.

G. Handrails

1. Construction: Laminated canvas and rubber running on brass, bronze or steel guides. Handrail shall be spliced and vulcanized with smooth joint. Handrail shall be driven at the same speed as the steps. Provide tensioning device and slack-tension switch.

H. Balustrade

1. Interior Panel: Reinforced 14 gauge stainless steel.
2. Skirt Panels: Reinforced 14 gauge metal. Install to maintain clearance of step treads to skirt of not more than 3/16". Extend skirt panel beyond combplates to meet front plates.
3. Deck Boards: Reinforced 14 gauge metal. All deck section joints shall abut to provide a smooth surface to surface connection with curved transition, top and bottom, horizontal to incline sections.
4. Finishes
 - a. Interior Panels: No. 4 stainless steel reinforced vertical panels with section joints vertical to horizontal.
 - b. Skirt Panels
 - 1) Black, low friction material applied to metal panels.
 - c. Inner and Outer Deck
 - 1) No. 4 stainless steel.
5. Trim and Moldings: Match deck finish.
6. Anti-Slide Knobs: Provide outer high deck configuration of immediately adjacent units with anti-slide knobs. Finish of knobs to match deck finish.
7. Floor Intersection Guards: Provide clear Plexiglas intersection guards at floor penetrations as required per Code.

NOTE: In areas where luggage carts are used, glass balustrades are not permitted.

I. Landings

1. Flat Steps: Provide upper and lower landings with a minimum two flat steps on vertical travel distances of 15 feet or less. For travel distance above 15 feet, provide three flat steps.
2. Comb plates: Non-corrosive metal provided with non-slip surface. Provide removable comb sections. Apply yellow powder coat finish. Provide comb plate lighting in skirt panel on both sides of units at both upper and lower landings. Comb teeth shall be designed to withstand a load of two hundred and fifty pounds applied in an upward direction at the tip of any one tooth.
3. Landing Plates: Aluminum or other alloy with non-slip surface. Plate shall extend from combplates to equipment access plates at upper and lower ends. Plates shall extend full

width of truss. Plates shall be supported by Type 316 stainless steel frames.

4. Equipment Access Plates: Aluminum or other alloy with non-slip surface. Provide removable access plates to provide for entry into equipment spaces at upper and lower ends. Plates shall cover entire truss openings. Access plates shall match material and finish of adjacent landing plates. Provide landing plate and access floor plate without visible manufacturers name or logo.

J. Signal and Control Fixtures

1. Provide upper and lower newel or stanchion mounted operating stations. Mount on right side when facing unit. Match deck finish. Function and operating positions of switches and buttons shall be identified with engraved characters which are readily visible from a standing position. Each station shall contain the following:
 - a. Red "emergency stop" button. The button shall be covered with a transparent cover which can be readily lifted or pushed aside. When the cover is moved, an audible warning signal shall be activated. The signal shall have a minimum sound intensity of 80 dBA at the button location.
 - b. The cover shall be engraved "EMERGENCY STOP"; "MOVE COVER" or equivalent legend (i.e. "LIFT COVER," "SLIDE COVER," etc.); and "PUSH BUTTON." "EMERGENCY STOP" shall be in letters not less than 1/2" (13mm) high. Other required wording shall be in letters not less than 3/16" (4.8mm) high. The cover shall be self-resetting.
 - c. Key switch to "start" unit.
 - d. Key directional control switch.
 - e. Speed selection switch.

K. Signs

1. Landing Signs: Provide caution signs at top and bottom landings per Code. Provide engraved stainless steel plate with material and finish to match decking and comply with Code coloring requirements.

L. Environmental Requirements

1. General: Escalators shall be capable of operating with full-specified performance capability while exposed to the following climatic and environmental conditions.
 - a. Interior installations: Escalators shall be designed to operate in a temperature range of plus five to plus one hundred and twenty degrees Fahrenheit, dry bulb; and all conditions of relative humidity while exposed to airborne dust and debris.
 - b. Exterior installations: Escalators shall be designed to operate while exposed to the natural elements of weather including sunlight, rain, slush, snow and ice; all conditions of relative humidity while exposed to salt, de-icing chemicals, airborne dust, and debris, and corrosive elements; and in a drybulb temperature range of minus ten to plus one hundred and five degrees Fahrenheit. Exterior installations shall follow APTA Guidelines for material selection/protection water diversion and environmental protection.

M. Monitoring System

1. General: Provide an interactive system to monitor and manage the escalator equipment ("units"), hereinafter called "system". Data collection, data storage and real-time monitoring portion of the system shall be based on Microsoft Windows and be able to run on Windows 2000 Pro, XP Pro, or later operating systems. Provide the following features:
 - a. Network based, capable of interfacing with control systems via either serial data link or hardwired interface connections.
 - b. Operate on any TCP/IP based network system including but not limited to an Ethernet, Token Ring, Arc-Net, Lift-Net, etc.
 - c. Expansion capability to add unlimited number of monitoring terminals on the network.
 - d. Monitoring terminals shall operate "peer" to peer" or with a single client server. Failure of a single network device shall not affect the operation of the remainder of the system.
 - e. Complete backup of system data shall be accomplished at any single terminal/server location.
 - f. Display multiple banks, including multiple buildings, on a single monitoring terminal screen.
2. Monitoring Display: The system shall be capable of simultaneous monitoring of at least five hundred units on a single monitoring station utilizing a graphical representation of a plan view of the facility. Each escalator shown on the plan view shall be individually displayed and shall be visible on the monitoring system display terminal without the need to scroll. Each individual unit, when operating "normally," shall be displayed in green. In the event of a malfunction of any individual unit, the unit shall be displayed by a red blinking light on the monitoring system display. Units which are intentionally placed out of service shall be shown as yellow in the display mode. When malfunctioning units, or units intentionally placed out of service, are returned to normal operation the graphical representation for that unit(s) shall automatically return to green. The user shall have the ability to display additional information, such as the cause of fault/alarm, for all units by selecting the unit with a "mouse click" from the plan view of the facility. All monitored units shall be visible from any monitoring terminal on the network. Entry into the network shall be multi-level password protected.
3. System Capabilities:
 - a. The system shall be capable of real time display of all monitored status points on all monitored equipment. Fault and event notification screens and audible alarms shall be immediately displayed on selected monitoring stations. Different fault and event tables shall be defined on a per-bank basis. The system shall collect and store all status, fault and event information for later reporting and analysis. The system shall provide statistical analysis of hall call response times, traffic patterns, fault conditions, service logs and security usage in graphical and tabular format.
 - b. The system shall maintain a record of every status point change occurring on the monitored equipment, and provide the ability to replay these events in a simulation at a later time in real time, slow speed, and single pallet, reverse or fast forward. This information shall be retained for a period of at least twenty-six weeks and a

- mechanism shall be provided whereby this information may be archived.
- c. The system shall store traffic fault and statistical data for a period of at least three years. The system shall log error type, car number, floor position and major system status points whenever a fault or logged event occurs.
 - d. The system shall provide interactive control of certain features provided in the escalator control system. These features may be revised as the requirements of the building change. Some of these interactive controls may include, but are not limited to, tandem operation, individual safety switches, remote start/stop feature, etc.
 - e. In the case of a power failure the system shall be capable of connecting to emergency power back-up unit. The loss of power shall not affect any stored data. The system shall have the capability to detect the loss (disconnect) of any individual unit from the monitoring system by periodically polling all units to ensure that normal communications between the unit(s) and the terminals/server are maintained.
 - f. The system will automatically re-boot the program and continue to operate after a power loss or other system malfunction.
4. Monitoring Equipment: The monitoring equipment shall have these minimum characteristics:
- a. Monitoring Station Hardware: Provide a minimum of two Monitoring Stations.
 - 1) Central processing unit - IBM compatible microcomputer - desk top or mini-tower (multiple machine rooms or lobby displays)
 - 2) Type - Pentium or most current high-performance processor
 - 3) Speed - most current high-performance
 - 4) Internal hard drive - adequate storage for three years data for entire system
 - 5) Modem - most current high-performance
 - 6) Display monitor (19" - 20" LCD flat panel) - color, capable of simultaneous display of all monitored units
 - 7) Printer - current HP Color Desk Jet Series
 - 8) Keyboard - MS Windows compatible
 - 9) Mouse - MS Windows compatible
 - 10) Power requirements - 90 - 230 Volts AC 50 - 60Hz @ 8A
 - b. Machine Room Hardware (Retained Control):
 - 1) Controller interface panels shall utilize high quality printed circuit boards
 - 2) Input voltage range - 5 - 250V AC/DC
 - 3) Compatible with all types and makes of controllers
 - 4) Operating temperature range - 45 - 112 degrees Fahrenheit
 - 5) Humidity range - 10% - 85% non-condensing
 - 6) Modular design - capable of future expansion
 - 7) Power requirements - 90 - 230 VAC 50 - 60Hz @ 3A
 - 8) The following electrical specifications for interface circuitry shall apply:
 - a) Input circuit loading: < 2 ma
 - b) Input impedance: > 1.5 Megohm @ 100VDC
 - c) Inputs - Optical isolation: > 3500 VRMS @ 1 sec.
 - d) Outputs - Relay form "C" contact rated 1/3 HP inductive, 3A,

250VDC

- c. Monitoring Station Operating System Software
 - 1) MS Windows 2000 Pro, XP Pro, or later
 - 2) MS Windows 2000 Server, or later
- 5. Network requirements:
 - a. Maximum local network rated distance (2-20 gauge shielded TP): > 10 miles
 - b. Maximum number of nodes (combined PC, inputs/outputs): 500
 - c. Maximum I/O points per node (input or output): 2040
 - d. Access time to status bit change (typical 6-car bank): < 25ms
 - e. Must be capable of operating on RS485, RS422, Ethernet, Token Ring, Arc-net, Lift-Net, Fiber-Optic and mixed WAN TCPIP Networks
- 6. Monitoring Requirements: The system shall display and record the following information for each monitored unit. Serial data links may include many more points. Items listed below are minimum requirements.
 - a. Escalators:
 - 1) Power on/off
 - 2) Emergency stop switch, lower
 - 3) Emergency stop switch, upper
 - 4) Travel up
 - 5) Travel down
 - 6) Broken pallet chain device #L
 - 7) Broken pallet chain device #R
 - 8) Comb-pallet impact device, horizontal switch #TL, TR
 - 9) Comb-pallet impact device, horizontal switch #BL, BR
 - 10) Comb-pallet impact device, vertical switch #TL, TR
 - 11) Comb-pallet impact device, vertical switch #BL, BR
 - 12) Handrail entry device #TL
 - 13) Handrail entry device #TR
 - 14) Handrail entry device #BL
 - 15) Handrail entry device #BR
 - 16) Handrail-speed monitoring device #L
 - 17) Handrail-speed monitoring device #R
 - 18) Pallet level device #T
 - 19) Pallet level device #B
 - 20) Broken pallet device #1
 - 21) Broken pallet device #2
 - 22) Broken pallet device #3
 - 23) Broken pallet device #4
 - 24) Skirt obstruction device (landing) #TL
 - 25) Skirt obstruction device (landing) #TR
 - 26) Skirt obstruction device (landing) #BL
 - 27) Skirt obstruction device (landing) #BR
 - 28) Missing bridge (if applicable)
 - 29) Disconnected motor safety device

- 30) Pit stop switch #T
 - 31) Pit stop switch #B
 - 32) Pallet lateral displacement (if applicable)
 - 33) Tandem operation
 - 34) Cumulative run time
 - 35) Pit high water level (Pit Float Switch)
 - 36) Drive machine oil temperature
 - 37) Overspeed shutdown at greater than 20% over rated speed
 - 38) Underspeed shutdown at less than 20% under rated speed
 - 39) Truss heater/air conditioner
7. Reporting Requirements: System shall provide reports in color graphical format both on-screen and in printed form capability to conveniently switch from one report type to another and from one bank to another using minimal mouse clicks and key strokes. Reports shall be displayed after minimal waiting time. Data for all reports shall be continuously recorded and stored. Reports shall be displayed by simply selecting a date and time range, bank of equipment and report type. Date and time range selections shall carry forward from one report selection to the next. Reporting functions shall be subdivided into the following categories:
- a. Events recorded (all status changes in a selected period)
 - b. Faults recorded (all selected faults in a selected period)
 - c. Faults per day/week/month (fault distribution on a per unit basis)
 - d. Run time Vs. Down time
8. Interface to Third Party Building Management Systems: The escalator monitoring system shall be capable of interfacing and exchanging data with a variety of third party building management systems such as Siemens, Landis & Staefa, Johnson Controls, SCADA, and others. Information shall be exchanged by Modbus protocol, open protocol or other suitable methods as required. Integration to FMS:
- a. Provide one summary alarm point to the FMS for each escalator and escalator being monitored. Coordinate with LAWA to identify which functions monitored by the system for each escalator and escalator will activate the summary alarm message
 - b. Coordinate message format with LAWA and the FMS contractor. The message shall include the escalator and escalator number and location at a minimum.
 - c. Communications from the escalator and escalator MDS server/workstation to the FMS server/workstation shall be over the LAWA IT Infrastructure IP network.
 - d. Coordinate message protocols with the FMS contractor. Provide software programming to communicate messages to the FMS.
9. Paging Feature: The monitoring system shall be capable of paging a service technician or other personnel based on pre-defined parameters of escalator faults or conditions. The paging system shall provide the ability to page multiple numbers determined by the type of event triggering the notification and shall be able to page different numbers based on preset times of day (i.e. different shifts). The system shall be capable of sending text messages to full text pagers in addition to supporting standard DTMF pagers.

10. Remote Access Feature: The monitoring system shall be capable of allowing approved individuals under multi-level password control, to access all system features via the local area network, internet, or via modem over the public telephone network to review the performance of the equipment or to evaluate a fault condition. The remote access feature shall be integrated into the monitoring system and shall not use third party "remote control" software products.
11. Data Transmission to Central Support Location: The system shall be capable where desired of transmitting fault, car usage and other data to a remote service desk or other office location for further processing, technician dispatch or other purposes. The data may be transmitted via the local area network, internet, or via modem over the public telephone network.

N. Seismic

1. Provide per ASME A17.1-2004 and CCR Title 8, Group IV requirements. Provide all conduit and wiring for seismic switches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine escalator areas, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance. Examine supporting structure, machine spaces, and pits; verify critical dimensions; and examine conditions under which escalators are to be installed.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.
 2. For the record, prepare written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Set escalators true to line and level, properly supported, and anchored to building structure. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.
- C. Adjust installed components for smooth, efficient operation, complying with required tolerances and free of hazardous conditions. Lubricate operating parts, including bearings, tracks, chains, guides, and hardware. Test operating devices, equipment, signals, controls, and safety devices. Install oil drip pans and verify that no oil drips outside of pans.
- D. Repair damaged finishes so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.3 FIELD QUALITY VERIFICATION

- A. Comply with requirements in Division 14 Section "Vertical Transportation, General."

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train LAWA's maintenance personnel to operate, adjust, and maintain escalators.
- B. Check operation of escalators with LAWA's personnel present and before date of Completion. Determine that operation systems and devices are functioning properly.
- C. Check operation of escalators with LAWA personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.5 ESCALATOR SCHEDULE

- A. Number Required:
- B. Unit Numbers:
- C. Location:
- D. Vertical Rise:
- E. Lengths: As required by the escalator manufacturer.
 - 1. Provide two flat steps at top and bottom for each escalator.
- F. Step Width: 40" (1000 mm).
- G. Maximum Speed: 100 feet/minute (.50 m/s).
- H. Power Characteristics: 480 Volts, 3 Phase, 60 Hertz.

END OF SECTION 14 31 00

SECTION 144510 - ELECTRIC VEHICLE LIFTS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section describes furnishing and installing the vehicle lifts as shown on the contract drawings and as specified herein, including but not limited to the following.
 - 1. Vehicle lifts

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 111113, Compressed Air

1.3 REFERENCES

- A. ALI: Automotive Lift Institute
- B. ANSI/ALI ALCTV - Safety Requirements for the Construction, Testing, and Validation of Automotive Lifts.
- C. CBC: 2013 California Building Code
- D. CEC: 2013 California Electrical Code
- E. ISO: International Standards Organization
 - 1. ISO 9001 Quality management systems - Requirements.
- F. UL: Underwriters Laboratories Inc.
 - 1. UL201 - These requirements cover garage equipment, rated not more than 600 volts, for use in accordance with the National Electrical Code, NFPA 70.

1.4 SUBMITTALS

- A. Product Data and Samples
 - 1. Submit original copies of product data submittals for materials and equipment in Part 2 of this section including but not limited to:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation manual.
 - d. Operations manual.
 - e. Maintenance manual.

f. Safety manual.

- B. Shop Drawings: Template drawings and load reactions for lift application.
- C. Seismic Anchoring Design and Calculations. The Contractor shall submit seismic anchoring designs calculations prepared and sealed by a Professional Engineer licensed in the State of California.
- D. At no expense to the City, the Contractor must obtain State, City of Los Angeles, and other authorities having jurisdiction, permits and certificates required for the vehicle lift installations. Verification of permits must be submitted to the Commissioner.
- E. Provide certification that inspections and tests, as described in Part 3 of this Section, have been performed and the system has passed specified testing requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Submit spare parts list for all vehicle lift equipment.

1.6 QUALITY CONTROL

- A. Unless otherwise shown on the drawings or specified, regulatory requirements from following agencies shall be followed as minimum requirements for equipment required by the project:
 - 1. Local and State building, plumbing, mechanical, electrical, fire and health department codes.
 - 2. National Fire Protection Association (NFPA).
 - 3. Occupational Safety and Health Act (OSHA).
 - 4. Factory Mutual Association (FM).
 - 5. Underwriter's Laboratories (UL).
 - 6. American Petroleum Institute (API).
- B. Contractor Qualifications: Company specializing in performing Work of this section with minimum five years documented experience.
- C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years of experience.
- D. Permanent equipment shall be seismically anchored to resist the total design seismic force prescribed in the California Building Code. Seismic restrains shall be designed by a registered professional structural engineer licensed in the State of California. Design shall include:
 - 1. Number, size, capacity, and location of anchors for floor and wall mounted equipment. For units with a weight greater than 2500 pounds, provide substantiating calculations the floor can accept the prescribed seismic forces
 - 2. Number, size, capacity, and location of braces and anchors for suspended piping on as-built plan drawings. The Contractor shall select a seismic restraint system pre-designed to meet requirements of the California Building Code. Maximum seismic loads shall be

indicated on the drawings at each brace location. Drawings shall bear the stamp and signature of the registered professional structural engineer licensed in the State of California who designed the layout of the braces.

1.7 EXTRA MATERIALS AND SPARE PARTS

- A. Provide list of manufacturer recommended spare parts and exploded assembly drawing showing each highlighted spare part and associated part number.

PART 2 - PRODUCTS

2.1 VEHICLE LIFTS

- A. Supply two-post asymmetrical vehicle lifts designed for small cars up to large SUV's and trucks.
- B. Manufacturers: Rotary (SPOA10), Eagle Equipment (ECL-10AS), Challenger (E10), or equal.
- C. Vehicle lifts shall have the following features:
 - 1. 10,000 lb rated capacity.
 - 2. Field-adjustable overhead stop switch bar elevation.
 - 3. Width of vehicle lifts inside of columns: 107 inches.
 - 4. Rubber door guards.
 - 5. Double telescoping spin up pads with height range of 4"-7.5".
 - 6. Single-point lock release to allow technicians to disengage both columns simultaneously.
 - 7. Minimum lifting height of 6'-0".
 - 8. Minimum drive through clearance 95".
 - 9. Minimum front arm reach of 24".
 - 10. Minimum rear arm reach of 40".
 - 11. Electrically driven by min 2 hp 208-230V drive motor. Coordinate electrical power with facility electrical.
 - 12. Min full-rise time of 60s.
 - 13. Columns shall have seismic rated baseplates.
- D. Lift shall be 3rd party certified by ETL testing laboratory and labeled with the ETL/Automotive Lift Institute (ALI) label that affirms the lifts meet conformance to all applicable provisions of American National Standard ANSI/ALI ALCTV.
- E. Supply all motors with disconnect switches per the California Electrical Code and the California Building Code.
- F. Required Accessories:
 - 1. Air/Electric Utility Boxes with two 110V electric outlets and air connection for air tools used for the servicing of vehicles.
 - 2. Storage rack for common air-operated vehicle servicing tools.

PART 3 - EXECUTION

3.1 VEHICLE LIFT INSTALLATION

- A. Install vehicle lifts in strict accordance with manufacturer instructions and in proper relationship with adjacent construction. Test for proper operation and retest if necessary until satisfactory results are achieved.
- B. Coordinate with structural sections for anchoring coordination. The vehicle lifts shall be seismically anchored in accordance with the Quality Control section in accordance with the California Building Code. The Contractor shall supply seismic anchoring designs and calculations sealed by a Professional Engineer licensed in the State of California for review and approval.
- C. Touch-up, repair or replace damaged products before Substantial Completion.

3.2 LABELING AND OPERATIONAL SIGNAGE

- A. Affix signs as close as practicable to the intended equipment. Affix designation labels on the front face of equipment in a manner to be easily identifiable but not covering other labeling or features.
- B. All signs, labels, and tags shall be affixed in a permanent manner.
- C. All emergency signs shall be unobstructed and easily readable from as wide an area as possible.

3.3 TRAINING

- A. A factory representative shall be required for instruction on the maintenance and operation of the systems, when the system commences operation.
- B. Schedule training with Facility Manager at least 14 days in advance of training date.

3.4 COMMISSIONING

- A. The contractor shall commission the vehicle lift including all testing, start-up, adjustments and documentation. At the conclusion of the commissioning, the facility shall be ready for the owner and tenants to conduct unrestricted operations and use lifts to their full intended and designed capacity.
- B. The contractor shall submit a system commissioning plan to the owner and engineer for approval at least 30 days prior to commissioning the system. The plan, at a minimum shall include health and safety, testing, calibration, startup, and operational testing procedures for all operation and safety procedures. The plan shall also include all testing and commissioning

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procedures specifically outlined in this section. The plan may be combined with commission plans for other vehicle service equipment systems.

- C. Commissioning of the system shall commence no less than 21 days prior to date of beneficial occupancy, and be completed prior to beneficial occupancy.
- D. Notify the engineer no less than 14 days prior to the completion of Commissioning. When Commissioning is completed, the contractor shall facilitate a final inspection by the engineer, and coordinate the attendance by the Facility Manager and all appropriate rental car industry representatives by making formal requests that include the final inspection schedule. The contractor shall have all necessary trade personnel on-site to operate equipment, open electrical enclosures and equipment during the engineer's final Commissioning inspection. That final inspection shall include, but not be limited to:
 - E. Operational test of all systems.
 - F. Operation test of all safety devices;
 - G. General review of the installation against plans, specs, and manufacturer requirements;
 - H. Review of all test reports and manufacturer start-up reports;
 - I. Closeout document requirements review; and
 - J. Confirmation that vehicle lift training has been completed.

END OF SECTION 144510

EXAMPLE

EXHIBIT A

FIVE YEAR EXTENDED PREVENTATIVE AND ROUTINE MAINTENANCE SERVICE AGREEMENT (SERVICE AGREEMENT) SPECIFICATIONS

FOR

**ELEVATORS, ESCALATORS, and MOVING
WALKS**

AT THE

LOS ANGELES INTERNATIONAL AIRPORT

IN

THE CITY OF LOS ANGELES,

CALIFORNIA

GENERAL CONDITIONS

GC-1. SCOPE OF WORK

- 1.1 The Contractor agrees to furnish all labor, materials and equipment in strict compliance with the Work requirements, conditions and specifications identified in the Contract Documents.
- 1.2 It is expressly understood and agreed that the Contractor shall perform all incidental work required to fulfill the requirements of the Contract Documents. All such incidental work shall not be considered Change or Extra Work for which additional compensation can be claimed by the Contractor.

GC-2. NOT USED AUTHORIZED REPRESENTATIVE OF THE CITY The Engineer and/or Director of Maintenance, represents LAWA, the City, the Board and the Executive Director within the limits of the City Charter and the administrative requirements of both the City on all matters relating to this Service Agreement.

- 3.01 The Engineer and/or Director of Maintenance or designated representative has the final authority in all matters affecting the Work and the authority to enforce compliance with the Service Agreement. The Contractor shall promptly comply with the instructions of The Engineer and/or Director of Maintenance or its authorized representative.

GC-4. INSURANCE

- 4.1 Contractor shall procure at its expense, and keep in effect at all times during the term of this Service Agreement the following types and amounts of insurance:

COVERAGE TYPE	POLICY LIMITS
A. Worker's Compensation	<u>Statutory</u>
B. Automobile Liability including	<u>\$10 Million Combined Single Limit ("CSL")</u>
i. Any Auto	
ii. Hired Autos	
iii. Non-owned Autos)	
C. Aviation/Airport Liability	<u>\$10 Million CSL</u>
OR	
Commercial General Liability	<u>\$10 Million CSL</u>
(including the following coverages:	
i. Premises and Operations	
ii. Contractual Liability (Blanket/Schedule)	
iii. Independent Contractors	
iv. Personal Injury	
v. Products/Completed Operations)	

- vi. Explosion, Collapse & Underground
- vii. Broad Form Property Damage

- D. Professional Liability \$1 Million CSL
- E. Employer's Liability \$1 Million CSL

- 4.2 The specified insurance (except for Workers' Compensation, Employers' Liability and Professional Liability) shall also, either by provisions in the policies, by City's own endorsement form or by other endorsement attached to such policies, include and insure City, its Department of Airport, the Board, and all of its officers, employees and agents, their successors and assigns, as insureds, against the areas of risk described in Section 4.01 hereof as respects Contractor's acts or omissions arising out of the performance of this Agreement, Contractor's acts or omissions in its operations, use and occupancy of the premises hereunder or other related functions performed by or on behalf of Contractor at the Airport.
- 4.3 Waiver of Subrogation. For commercial general liability insurance, workers' compensation insurance, and employer's liability insurance, the insurer shall agree to waive all rights of subrogation against City for Losses arising from activities and operations of Contractor insured in the performance of Services under this Service Agreement.
- 4.4 Sub-Contractors. Contractor shall include all of its Sub-Contractors as insureds under its policies or shall furnish separate certificates and endorsements for each Sub-Contractor. All coverages for Sub-Contractors shall be subject to all of the requirements stated herein unless otherwise agreed to in writing by Executive Director and approved as to form by the City Attorney.
- 4.5 Each specified insurance policy (other than Workers' Compensation and Employers' Liability and Professional Liability) shall contain a Severability of Interest (Cross Liability) clause which states, "It is agreed that the insurance afforded by this policy shall apply separately to each insured against whom claim is made, or suit is brought, except with respect to the limits of the company's liability." Additionally, Contractor's Commercial General Liability policy ("Policy") shall provide Contractual Liability Coverage, and such insurance as is afforded by the Policy shall also apply to the tort liability of the City of Los Angeles assumed by the Contractor under this Service Agreement.
- 4.6 All such insurance shall be primary and noncontributing with any other insurance held by City's Department of Airports where liability arises out of, or results from, the acts or omissions of Contractor, its agents, employees, officers, invitees, assigns, or any person or entity acting for, or on behalf of, Contractor.
- 4.7 Such policies may provide for reasonable deductibles and/or retentions acceptable to the Executive Director, based upon the nature of Contractor's operations and the type of insurance involved.
- 4.8 City shall have no liability for any premiums charged for such coverage(s). The inclusion of City,

its Department of Airports, its Board, and all of its officers, employees and agents, and their

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agents and assigns, as additional insureds, is not intended to, and shall not; make them, or any of them, a partner or joint venturer of Contractor in its operations at the Airport.

- 4.9 In the event Contractor fails to furnish City evidence of insurance, or to maintain the insurance as required under this Section, City, upon ten (10) days' prior written notice to Contractor of its intention to do so, shall have the right to secure the required insurance at the cost and expense of Contractor, and Contractor agrees to promptly reimburse City for the cost thereof, plus fifteen percent (15%) for administrative overhead.
- 4.10 At least thirty (30) days prior to the expiration date of any of the above policies, documentation showing that the insurance coverage has been renewed or extended shall be filed with the City. If file with City evidence that the required insurance has been reinstated, or is being provided through another insurance company or companies.
- 4.11 Contractor shall provide proof of all specified insurance and related requirements to City either by production of the actual insurance policy(ies), by use of City's own endorsement form(s), by broker's letter acceptable to Executive Director in both form and content in the case of foreign insurance syndicates, or by other written evidence of insurance acceptable to Executive Director. The documents evidencing all specified coverages shall be filed with City prior to the Contractor performing the services hereunder. Such documents shall contain the applicable policy number(s), the inclusive dates of policy coverage(s), the insurance carrier's name(s), and they shall bear an original or electronic signature of an authorized representative of said carrier(s). Such insurance shall not be subject to cancellation, reduction in coverage or non-renewal, except after the carrier(s) and the Contractor provide written notice (by Certified Mail) to the City Attorney of the City of Los Angeles at least thirty (30) days prior to the effective date thereof.
- 4.12 City and Contractor agree that the insurance policy limits specified in this Section shall be reviewed for adequacy annually throughout the term of this Service Agreement by the Executive Director, who may thereafter require Contractor to adjust the amount(s) of insurance coverage(s) to whatever amount(s) Executive Director deems to be adequate. City reserves the right to have submitted to it, upon request, all pertinent information about the agent(s) and carrier(s) providing such insurance.

GC-5. CITY HELD HARMLESS

5.1 To the fullest extent permitted by law, Contractor shall defend, indemnify and hold harmless City and any and all of City's Boards, officers, agents, employees, assigns and successors in interest from and against any and all suits, claims, causes of action, liability, losses, damages, demands or expenses (including, but not limited to, attorney's fees and costs of litigation), claimed by anyone (including Contractor and/or Contractor's agents or employees) by reason of injury to, or death of, any person(s) (including Contractor and/or Contractor's agents or employees), or for damage to, or destruction of, any property (including property of Contractor and/or Contractor's agents or employees) or for any and all other losses alleged to arise out of, pertain to, or relate to the Contractor's and/or Sub-Contractor's performance of

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the Service Agreement, whether or not contributed to by any act or omission of City, or of any of City's Boards, officers, agents or employees; Provided, however, that where such suits, claims, causes of action, liability, losses, damages, demands or expenses arise from or relate to Contractor's performance of a "Construction Contract" as defined by California Civil Code section 2783, this paragraph shall not be construed to require Contractor to indemnify or hold City harmless to the extent such suits, causes of action, claims, losses, demands and expenses are caused by the City's sole negligence, willful misconduct or active negligence.

- 5.2 In addition, Contractor agrees to protect, defend, indemnify, keep and hold harmless City, including its Boards, Departments and City's officers, agents, servants and employees, from and against any and all claims, damages, liabilities, losses and expenses arising out of any threatened, alleged or actual claim that the end product provided to LAWA by Contractor violates any patent, copyright, trade secret, proprietary right, intellectual property right, moral right, privacy, or similar right, or any other rights of any third party anywhere in the world. Contractor agrees to, and shall, pay all damages, settlements, expenses and costs, including costs of investigation, court costs and attorney's fees, and all other costs and damages sustained or incurred by City arising out of, or relating to, the matters set forth above in this paragraph of the City's "Hold Harmless" agreement.
- 5.3 any such coverage is cancelled or reduced, Contractor shall, within ten (10) days of such cancellation or reduction of coverage,
- 5.4 In Contractor's defense of the City under this Section, negotiation, compromise, and settlement of any action, the City shall retain discretion in and control of the litigation, negotiation, compromise, settlement, and appeals there from, as required by the Los Angeles City Charter, particularly Article II, Sections 271, 272 and 273 thereof.
- 5.5 Survival of Indemnities. The provisions of this GC-5 shall survive the termination of this Agreement.

GC-6. STANDARD OF CARE

- 6.01 Contractor's professional services rendered in the performance of this Service Agreement shall conform to the highest professional standards for said designated professional fields in the State of California.

GC-7. NOT USED

GC-8. CONTRACT BONDS

- 8.1 All provisions of Vertical Transportation General Provisions, Section 14 20 00 shall apply.

8.2 The Faithful Performance Bond and the Payment Bond shall each be for one hundred percent (100%) of the Service Agreement price. The Contractor shall submit both the Faithful Performance Bond and Payment Bond no less than thirty days prior to the expiration of the Warranty Period, with receipt and approval by LAWA and the City Attorney a condition of Final Acceptance of the Procurement and Installation Contract. Both bonds shall be

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maintained by the Contractor in full force and effect until the Service Agreement term is complete, and until all claims for materials and labor are paid, and shall otherwise comply with Section 3248 of the Civil Code.

- 8.3 Should any bond become insufficient, the Contractor shall renew the bond within 10 days after receiving notice from The Engineer and/or Director of Maintenance.
- 8.4 The mutually agreed optional second 5-year Extended Preventative and Routine Maintenance (EPRM) Service Agreement period shall maintain all bond requirements set forth herein.

GC-9. NOT USED

GC-10. ASSIGNMENT OR TRANSFER PROHIBITED

- 10.1 Contractor shall not, in any manner, directly or indirectly, by operation of law or otherwise, hypothecate, assign, transfer or encumber this Service Agreement, or any portion thereof or any interest therein, in whole or in part, without the prior written consent of the Executive Director. The names of Subcontractors or others whom Contractor intends to employ to perform services as part of the Work shall be submitted to Executive Director for prior approval.
- 10.2 For purposes of this Service Agreement, the terms "transfer" and "assign" shall include, but not be limited to, the following: (i) if Contractor is a partnership or limited liability company, the transfer of fifty percent (50%) or more of the partnership interest or membership or the dissolution of the Contractor; and, (ii) if Contractor is a corporation, any cumulative or aggregate sale, transfer, assignment, or hypothecation of fifty percent (50%) or more of the voting shares of Contractor.

GC-11. NOT USED

GC-12. NOT USED

GC-13. NOT USED

GC-14. NOT USED

GC-15. NOT USED

GC-16. NOT USED

GC-17. NOT USED

GC-18. NOT USED

GC-19. WAIVER

- 19.01 The waiver by City of any breach of any term, covenant, or condition herein contained shall not be deemed to be a waiver of any other term, covenant, or condition, or of any subsequent breach

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of the same term, covenant, or condition.

GC-20. NOT USED

GC-21. NOT USED

GC-22. TERMINATION

- 22.1 If, at any time, City, for any reason, decides to terminate the Service Agreement, or any part thereof, City may: 1) require Contractor to terminate the performance of all, or a portion, of its services; and/or 2) terminate this Service Agreement, or any part thereof, upon giving Contractor a thirty (30) day written notice prior to the effective date of such termination, which date shall be specified in such notice.
- 22.2 In the event this Service Agreement, or any portion hereof, is terminated by the City, City shall pay Contractor as set forth in Section GC-22.03 the amount due to the Contractor for Basic Services as set forth in the Service Agreement.
- 22.3 City shall not be liable for the cost of work performed or expenses incurred subsequent to the date specified by City in the thirty (30) day written notice to terminate, and in no event shall any payments to be paid by City to Contractor, exceed the amount(s) specified, without the prior approval of the City, and unless this Service Agreement is first amended in writing. Any such payments shall be made by City within a reasonable time following receipt of Contractor's invoice(s) therefor.
- 22.4 City may, at any time, upon written order to Contractor, require Contractor to stop all, or any part, of the services called for by this Service Agreement for a period of thirty (30) days. Said thirty (30) day period shall commence on the day the written order is delivered to Contractor, and shall extend for any further period to which the parties may agree. Any such order shall be specifically identified as a "Stop Work Order" issued pursuant to this clause. Upon receipt of such an Order, Contractor shall forthwith comply with its terms. Within a period of thirty (30) days after a Stop Work Order is delivered to Contractor, or within any extension of that period to which the parties have agreed, City shall either:
- a. Cancel the Stop Work Order; or
 - b. Terminate the services as provided in the Service Agreement. If a Stop Work Order issued under this Section is canceled or expires, or the period of any extension thereof is canceled or expires, Contractor shall resume work. An equitable adjustment will thereafter be made in Contractor's time of performance, Contractor's compensation, or both, consistent with the provisions of this Service Agreement, if:
 1. The Stop Work Order results in an increase in the time required for, or in Contractor's cost properly allocable to, the performance of services pursuant to this Service Agreement; and
 2. Contractor asserts a claim for such adjustment within thirty (30) days after the end

of the period of work stoppage; provided, however, that City may investigate any facts relating to such claim.

If a Stop Work Order is not canceled, and the services covered by such order are terminated for the convenience of City, the reasonable costs resulting from said Stop Work Order shall be allowed.

- 22.5 It is understood and agreed that should City decide that any portion of Service Agreement, and/or Contractor's services, shall be suspended or terminated, this Service Agreement shall continue to apply to that portion or those portions not suspended or terminated, and that such suspension or termination of a portion of Service Agreement or services shall in no way make void or invalid this Service Agreement.
- 22.6 At the termination of this Service Agreement, the Contractor shall deliver to LAWA all records and documentation, including, but not limited to manuals, operations manuals, service records, drawings, computer programs (including applicable software source codes), procedures, and records which the Contractor has used to maintain the equipment. All such records and documents shall remain the sole property of LAWA. The system shall be returned to LAWA in the same or better condition as it was delivered to the Contractor with the exception of reasonable wear and tear.

GC-23. PROTECTION AND RESTORATION OF EXISTING IMPROVEMENTS

- 23.01 The Contractor shall conduct the operations in a manner that avoids injury or damage to adjacent property and improvements. If damaged or removed due to the Contractor's operations, they shall be restored or replaced in as nearly the original condition and location as is reasonably possible. When ordered by LAWA, the Contractor shall provide and install suitable safeguards to protect any object from injury or damage.

GC-24. PUBLIC CONVENIENCE AND SAFETY

- 24.1 All provisions of the Contract Documents shall apply.
- 24.2 The Contractor shall be liable for any damage caused to such premises. The Contractor shall restore areas used for operations or for storage, and all areas adjacent to the construction to their original condition.

GC-25. RESPONSIBILITIES OF THE CONTRACTOR

- 25.1 All provisions of the General Provisions shall apply.
- 25.2 The Contractor's employees shall be restricted to immediate work areas at the Site, and shall not go beyond work limits or access routes, except as otherwise approved by LAWA.
- 25.3 All employees must have a LAWA security badge with a Customs Seal and insurance as required for unescorted access to the Airport's Security Identification Display Area (SIDA).
- 25.4 The Contractor shall be responsible for providing and maintaining all tools and all necessary vehicles, including, but not limited to scissor lifts, fork-lift trucks, golf carts, etc. that will be used

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under this Service Agreement. There will be no additional costs to LAWA for these items, and shall be included as part of Contractor's rates.

- 25.5 Before starting work, the Contractor shall designate in writing a representative who shall have complete authority to act on the Contractor's behalf.
- 25.6 LAWA reserves the right to:
- a. Disapprove any candidate named as the Contractor's representative or alternate who fails to meet the provisions set forth herein.
 - b. Remove, without any right to work on the work site, either the Contractor's representative or alternate, who in the sole opinion of LAWA has demonstrated incompetence, lack of ability, or other unsuitability to perform supervision of the Work; and that individual shall not, without permission of LAWA, be re-employed on this Service Agreement.
- 25.7 If the Contractor's representative or alternate leaves the employment of the Contractor, the Contractor will be required to replace the individual(s) within fifteen (15) days.
- 25.8 The Contractor shall be responsible for obtaining, at its own expense, all necessary licenses and permits. The Contractor shall be responsible for all damages to persons or property that occur as a result of the Contractor's negligence and shall take proper safety and health precautions to protect the work, workers, the public and the property of others.

GC-26. RESPONSIBILITIES OF LAWA

- 26.1 LAWA will designate its representative whom the Contractor shall coordinate all operational requirements and activities, concerning, but not limited to rules and regulations, safety, enforcements, notifications to stakeholders and airlines.
- 26.2 LAWA shall pay the reasonable cost of utilities (electric, gas, etc.) used in the course of performing the Service Agreement activities. LAWA will be the exclusive judge of the reasonableness of claimed utility charges.
- 26.3 LAWA shall reimburse the Contractor for approved work performed on the units that is required due to damage caused to the units by others. The Contractor will be reimbursed in accordance with the agreed upon rate for such work.

GC-27. INTERFACE

- 27.1 The Contractor shall conduct all operations in a manner that will cause no interference with airplane traffic, passenger flow or normal operation of the Airport. In all operations, the Contractor shall be governed by the regulations and rules of LAWA and shall cooperate fully with LAWA.
- 27.2 Contractor shall also comply with all applicable laws and regulations and shall hold all necessary

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consultations and conferences with personnel of any and all City, County, State, or Federal agencies, including, but not limited to the City of Los Angeles, FAA, DHS, TSA, USCBP, LAXTEC, which may have jurisdiction.

GC-28. SAFETY

- 28.1 During the term of this Service Agreement, The Contractor shall provide all materials, resources, training and any and all services required to ensure that the systems can be safely operated and maintained in conformance with LAWA and the approved documents developed by the elevator/escalator OEM in conformance with industry standards.
- 28.2 Contractor shall at all times conduct all operations under the Service Agreement in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. Contractor shall promptly take all precautions which are necessary and adequate against any conditions which involve a risk of bodily harm to persons or a risk of damage to any property. Contractor shall continuously inspect all Work, materials and equipment to discover and determine any such conditions and shall be solely responsible for discovery, determination and correction of any such conditions.
- 28.3 Contractor shall submit their written Safety Program, with detail commensurate with the Work to be performed, for LAWA's review within 30 days of expiration of the 1-year warranty period. Such review and approval shall not relieve Contractor of its responsibility for safety, nor shall such review be construed as limiting in any manner Contractor's obligation to undertake any action which may be necessary or required to establish and maintain safe working conditions at the facility.
- 28.4 Contractor shall maintain accurate accident and injury reports and shall furnish LAWA a monthly summary of injuries and man hours lost due to injuries as well as a statement of total man hours worked.
- 28.5 Material usage by the Contractor shall be accomplished with strict adherence to California Division of Industrial Safety requirements and all manufacturer warnings and application instructions listed on the material Safety Data Sheet and on the product container label.
- 28.6 The Contractor shall notify LAWA if a specified product cannot be used under safe conditions.
- 28.7 Worker Protection: In all cases involving exposure of personnel to toxic/hazardous materials and/or elements, the City of Los Angeles Personnel, Occupational Safety Office, shall have field review authority over the Contractor's operations.

GC-29. ADVERTISING

- 29.1 No use of information related to the Work is permitted without the written approval of LAWA.
- 29.2 All signage, logos, placards, displays, etc. are subject to written approval by LAWA.

GC-30. AUDITS AND RECORDS

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30.01 LAWA shall have access to all records and documents of the Contractor directly relating to labor and materials used for the performance of the work in this Service Agreement.

GC-31. PAYMENT

31.1 It is agreed that, regardless of any other provision of this Service Agreement, unless amended, the total amount to be paid to Contractor by City shall not exceed the amount indicated in the Contractor's proposal.

31.2 Each month, during the term of this Service Agreement, Contractor shall submit a Request For Payment for 1/60 of the amount specified in 31.01.

31.3 Each Request For Payment shall contain documentation acceptable to LAWA that include applicable employee and subcontractor time sheets, identification of the scope of work completed, billing by job classifications and the applicable approved billing rates. Each Request For Payment shall also contain a cumulative total of all monthly billings, and balances. Subject to the provisions of this Service Agreement, LAWA shall pay Contractor based on Contractor's monthly payment requests. Payment will be withheld for any Work not completed in the billing period.

GC-32. NOT USED

GC-33. CONTRACTOR STAFFING

33.01 If LAWA at its sole discretion is dissatisfied with the performance of any of Contractor's personnel, including personnel of Contractor's sub-Contractors, assigned to the Work, and so notifies Contractor, in writing, Contractor shall replace the person(s) to whom objection has been made within five (5) working days of the written notice. City, in exercising its rights may also, in its sole discretion direct Contractor to terminate one or more its sub-consulting agreements.

SPECIAL CONDITIONS

SC-1. INTRODUCTION

1.1 The general scope of work is to provide complete Extended Preventative and Routine Maintenance (EPRM), services for the elevators, escalators and moving walks (equipment) installed as part of this Procurement and Installation Contract at LAX. Services include repairs, adjusting, cleaning and lubrication of equipment.

1.2 Any other incidental services that the Contractor determines to be required to assume complete responsibility for EPRM of the new equipment that are not described herein shall be included as part of the Service Agreement costs.

1.3 The Contractor shall have contractual agreements with each of its sub-contractors whose services the Contractor may secure to perform work under this Service Agreement and is in compliance with all of the terms of this Service Agreement. In the event that the Contractor subcontracts certain portions of the work, the term "employee" as used herein shall be deemed to include such

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subcontractors and their employees.

SC-2. SITE SPECIFIC WORK PROCEDURES AND PROGRAMS

- 2.1 The Contractor is solely responsible for obtaining any procedures from LAWA prior to commencement of Work and hereby releases LAWA from any and all claims based upon its failure to either become familiar with the governing procedures and programs or its failure to comply with them.
- 2.2 Contractor is responsible for obtaining copies of any and all approved O&M manuals, drawings, updates, and other documents required to perform all services to the referenced systems called for in this Service Agreement.
- 2.3 Contractor shall have hardcopy prints of all manuals, drawings, etc. at all times, and update as needed to reflect operation of new or modified systems.
- 2.4 Any document referenced in this Service Agreement shall become part of the Service Agreement documents.

SC-3. SUBMITTALS

- 3.1 Contractor shall submit the following documentation at the time specified during the term of the Service Agreement and in accordance with the following submittal deadlines. Prepare all documents in the English language.
 - a. Contractor's Safety Plan and Drug Policy – Prior to start of any work.
 - b. Problem Reports - On a monthly basis
 - c. Maintenance Reports - On a monthly basis
 - d. Invoices – No later than 10 days from the first day of each following calendar month

SC-4. TERM OF SERVICE AGREEMENT

- 4.01 The term of this Service Agreement shall be for the five year period commencing immediately upon expiration of the 1-year Warranty for each unit.

SC-5. WORKING HOURS

- 5.1 Unless restricted elsewhere in the Service Agreement Documents, or directed by LAWA in writing, the normal working hours for services performed while the units remain in service are 8 a.m. to 4:30 p.m., 7 days a week for the term of the Service Agreement.
- 5.2 Normal working hours for services requiring the units to be taken out of service are 10:30 p.m. to 6:30 a.m., 7 days a week for the term of the Service Agreement. All units shall be returned to service and opened to the public by 6:30 a.m. following the maintenance or repair services. It is anticipated that 85% of the mandated PM hours will fall during this time period.

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SC-6. SERVICE CALLS

- 6.1 The Contractor shall have staff to respond to and provide emergency services twenty-four (24) hours a day, seven (7) days a week. The Contractor shall respond within 30 minutes when the emergency call includes equipment failure, personal injury, entrapment, or potential for personal injury.
- 6.2 The Contractor shall also maintain an Emergency Service Call Log containing the following:
- Name and telephone number of caller.
 - Description of problem and location within the Terminal where problem exists.
 - Time and date call was received.
 - Description of action taken to resolve the problem and time and date action was taken.

SC-7. WORK RESPONSE TIME

- 7.1 Response time for work requirements is dependent upon work priority and shall be in accordance with the standards noted below. Any non-compliance with the specified standards and requirements may result in the Contractor being issued a written notification by LAWA.
- 7.2 Emergency Work: The Contractor shall have available personnel to take action at the emergency location within thirty (30) minutes following notification by LAWA or other designated official.
- a. Emergency Work is defined as any mechanical, electrical or controls issue that cannot be resolved within ten (10) minutes or any mechanical problem in which the vertical transportation device is not usable by LAWA. It also includes breakdown, stoppage or loss of critical system or equipment which, if not repaired, could endanger life, safety or health of personnel or might result in the damage to LAWA property, or any condition that they may exist which LAWA determines requires immediate response.

SC-8. NOT USED

SC-9. OPERATION OF VEHICLES

- 9.1 Contractor's ability to park at Terminals is controlled by LAWA. LAWA shall permit the Contractor and its personnel, during the effective period of Service Agreement to purchase parking pass cards to park motor vehicles used by it exclusively in its operations hereunder in the designated parking lots. The Contractor shall comply with such existing rules, regulations and procedures as are now in force and such reasonable future rules, regulations and procedures as may hereafter be adopted by the LAWA for the safety and convenience of persons who park automotive vehicles in any parking area at the airport or for the safety and proper identification of such vehicles, and the Contractor shall also comply with any and all directions pertaining to such parking which may be given from time to time and at any time by the Airport Manager. LAWA shall have no responsibility of any kind whatsoever, including, without limitation thereto, the loss, theft, destruction or damage to said vehicle or any contents therein, in connection with the

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permission granted to the Contractor to park its motor vehicles. No other rights or privileges in connection with parking of motor vehicles at the Airport are or shall be deemed to be granted to the Contractor under Service Agreement.

- 9.2 Each vehicle or unit of equipment that travels, operates or delivers materials in any restricted area of the Airport shall comply with the regulation set forth in Appendices B, C and D.

SC-10. UNIFORMS

- 10.01 The Contractor shall provide its personnel with all necessary distinctive uniforms and identification badges and woven identification insignia of a type and style which shall be subject to the prior and continuing approval of C&M. Contractor's employees shall wear these uniforms and identification badges or insignias at all times while performing the operations hereunder. The Contractors' employee shall be neat, clean, and professional in appearance.

SC-11. WORKMANSHIP AND MATERIALS

- 11.1 All repair and replacement materials, parts, and equipment furnished by the Contractor in the Work shall be new, high grade, of the same manufacture and type as material and items being replaced and free from defects. Materials and work quality not conforming to the requirements of the Specifications shall be considered defective and will be subject to rejection. Defective work or material, whether in place or not, shall be removed immediately from the site by the Contractor, at its expense, when so directed by LAWA.
- 11.2 If the Contractor fails to replace any defective or damaged work or material within 10 days after reasonable notice, LAWA may cause such work or materials to be replaced. The replacement expense shall be deducted from the amount to be paid to the Contractor.

SC-12. OWNER-FURNISHED MATERIALS AND EQUIPMENT

- 12.1 The Contractor shall maintain all required Spare Parts at all times with, at a minimum, quantities of spare parts equal to or greater than that which are present at the start of the Service Agreement, and as specified by the OEM O&M Manual, or as directed by LAWA. The cost of all Non-Warranty Spare Parts replacement shall be invoiced back to LAWA in accordance with General Provisions.
- 12.2 The Contractor shall be responsible to accurately record spare parts purchases and inventory at all times.
- 12.3 At time of acceptance of materials from LAWA, Contractor shall sign a receipt. Signing of such receipt without reservation therein shall preclude any subsequent claim by the Contractor that any such items were received from LAWA in a damaged condition and with shortages. If at any time after acceptance of any such item from LAWA any such item is damaged, lost, stolen or destroyed, such item shall be repaired or replaced at the expense of the Contractor.
- 12.4 Upon completion of the 5-year Service Agreement, Contractor shall, at its expense, return all surplus and unused materials and parts to LAWA.

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SC-13. CONTRACTOR SUPPLIES

13.01 The Contractor shall furnish all incidental supplies, materials, tools, and equipment necessary for the performance of the work in the Service Agreement, unless otherwise specified. The costs for these incidentals shall be inclusive of this Service Agreement.

SC-14. FACILITIES USED BY THE CONTRACTOR

14.1 General

- a. Limited facilities such as storage and workshop space may be furnished by LAWA. The Contractor shall be fully responsible and liable for the facilities made available to it, to include security, loss or damage thereto. This responsibility includes the observance of safety, security and sanitary directives. Facilities built or installed by Contractor must be removed at termination of the Service Agreement, unless the Contractor and LAWA agree to their presence. The Contractor may not use any LAWA facilities other than those specifically provided. In case of break-ins, the Contractor shall notify Airport Police immediately upon discovery and assist in determining loss. Notwithstanding this paragraph, in no instance is the Contractor made liable for loss or damage of LAWA furnished facilities when the loss or damage was not caused by Contractor's negligence.
- b. Access to Premises: The Contractor shall not permit any unauthorized access to individuals to the work area, and shall enforce all applicable LAWA orders, rules, regulations, and instructions. These requirements shall also be applicable to all individuals with regard to access, removal, and/or possession of classified data, materials, supplies, equipment and all LAWA owned property at the locations designated in Service Agreement. Access to FIS areas is controlled by the Federal Agencies and subject to their rules and restrictions. Contractors' employees working in the FIS areas are subject to extensive background checks by these Agencies.
- c. Equipment and materials located on the Airport, but not being used, shall be left at locations to be designated by LAWA. All other operations of the Contractor shall be confined to the areas authorized or approved by LAWA. Areas adjacent to the work will be made available for temporary use by the Contractor, without cost, whenever such use will not interfere with other purposes. The Contractor shall be liable for any damage caused to such premises. The Contractor shall restore areas used for operations or for storage, and all areas adjacent to the work, to their original conditions.

14.2 Cleaning of Site: The Contractor shall be responsible for keeping the work site clean and neat. As necessary, debris shall be removed to an approved disposal location. Areas used by the Contractor during its work shall be cleaned daily before leaving the job site. Items saturated with combustible fluids shall be stored in tightly sealed metal containers and removed from the Work location. Paints and thinners shall not be poured into Terminal drains, lines or sewers. Paint, dirt and other stains on surfaces of Terminals, which are caused by the Contractor's work, shall be carefully removed and the surfaces cleaned. All areas used by the Contractor shall be left in a

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clean and neat condition.

SC-15. NOT USED

SC-16. NOT USED

SC-17. NOT USED

SC-18. BASIC MAINTENANCE REQUIREMENTS

18.1 General

- a. The Contractor shall facilitate proactive preventive maintenance, maximize equipment life and maximize beneficial usage of the vertical transportation equipment covered by this Agreement. Contractor expressly acknowledges that City is relying on CONTRACTOR'S professional expertise and knowledge of covered equipment in the performance of Services to achieve desired results.
- b. The Contractor shall provide the EPRM of the vertical transportation systems installed in this Service Agreement in conformance with the LAWA approved O&M Manuals. Services shall strictly comply with all services necessary to maintain the equipment in proper working order for use at a major international airport, and in coordination with LAWA.
- c. The Contractor shall be responsible to provide (employ) Senior / Supervising Maintenance Technicians that are licensed elevator mechanics. The Contractor must also possess a valid C-11 Contractor's License. The Contractor shall be responsible for all labor, personnel and employee costs.
- d. The Contractor shall be capable of operation, maintenance, trouble-shooting, updating and repairing the equipment computer systems and software.
- e. The Contractor shall be responsible for the procurement of all tools and equipment required to perform preventative maintenance and repair functions. Any tools that are required to perform specific maintenance tasks on OEM supplied equipment will be supplied by the OEM as part of the equipment supply and installation. The Contractor shall be responsible for all contracted goods and services.
- f. The Contractor shall be responsible to coordinate and cooperate in all respects with LAWA, the user airline, and/or their representatives in the performance of the Contractor's work. EPRM and non-scheduled maintenance tasks shall be coordinated with and scheduled in concurrence with LAWA. The Contractor shall be required to submit a preventative maintenance schedule to LAWA for review.
- g. The Contractor shall be responsible for ensuring that the Contractor's personnel follow Customs and Border Protection (CBP) rules and requirements when working in

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Customs areas.

- h. The Contractor shall be responsible for all sundries and components, lubricants, supply and inventory costs.
- i. The Contractor shall be responsible for all safety equipment costs.
- j. The Contractor shall be responsible for all license fees and expenses.
- k. The Contractor shall be responsible for all office supplies, equipment and expenses.
- l. The Contractor shall be responsible for all computers, printing, photographs, records, documents and report expenses.
- m. The Contractor shall be responsible for all telephone, radio and communication expenses.
- n. The Contractor shall be responsible for all Contractor facility and utility expenses.
- o. The Contractor shall be responsible for all vehicle expenses.
- p. The Contractor shall be responsible for all travel time and travel related expenses.
- q. The Contractor shall be responsible for all excise taxes and fuel surcharges.
- r. The Contractor shall be responsible for any and all other payments, costs and expenses associated with the Contractor's complete fulfillment of the requirements and obligations as set forth in this Agreement.

18.2 Basic Maintenance Requirements

- a. Service Agreement tasks include, but are not limited to:
 - 1. Inspection of completed installation and Periodic testing, as defined by ASME A17.1 and at ASME A17.1-1996 intervals, to maintain each Moving Walk/Elevator/Escalator ("Unit(s)") in completely operable, like new condition.
 - 2. Provide preventative maintenance on each elevator at least monthly for a minimum of four (4) hours. (Total On-Site Time). Provide monthly documentation of the same to LAWA.
 - 3. Provide preventative maintenance on each escalator and moving walkway at least a minimum of four (4) hours each two weeks. (Total On-Site Time). Provide monthly documentation of the same to LAWA. An external review of comb plates and skirt/step clearances will be performed weekly.
 - 4. Periodic lubrication of parts and equipment components as per OEM's

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- recommendation. Charts are to be provided for each Unit indicating when services are provided.
5. Perform work without removing Units from service during peak traffic periods determined by LAWA as 7:00 a.m. to 10:30 p.m. daily.
 6. Unlimited regular time callbacks are included with a required response time of one (1) hour. Regular time will be Monday through Friday, 8:00am to 4:30pm, exclusive of holidays. Overtime\Premium time call backs originating from an operational error related to the performance requirements of the equipment shall be borne by the Contractor.
 7. Annual clean down of the Units, drip pans, pits, hoistways, pallets, hydraulic pumps and components, and all interior parts is required. Make necessary arrangements with LAWA in order to minimize any inconvenience.
 8. Annual tests and confirmations that the Controllers and control systems are functioning properly for each Unit.
 9. Reporting: Detailed monthly records of tasks performed including names of individuals performing the tasks, date and time performed, and other pertinent data. Contractor is required to conform to the requirements of LAWA's maintenance system.
 10. Five-year, full load, full speed tests of buffers ,governors and safeties.
 11. Five year pressure tests on hydraulic elevators.
 12. Monthly Testing of Phase I and Phase II Firefighter's Service.
- b. Routine Maintenance - Activities such as routine inspections and tests designed to identify any unusual or abnormal equipment condition.
 - c. Preventative Maintenance ("PM") - Activities required to keep the Units operating at the prescribed levels of safety, efficiency and reliability as defined in the O&M Manuals and installation specifications, which are performed on a regular basis at specified intervals. Preventative measures shall also include cleaning the surrounding area as required to keep Units free from any trash, dirt and/or debris.
 - d. Non-Scheduled Maintenance - Any corrective measure or repair necessitated by an inspection, a failure, or unusual circumstances adversely affecting the normal equipment operation. Non-scheduled maintenance may be required as a result of unsatisfactory conditions discovered during an inspection.
 - e. Ordinary Wear - Any corrective measure or repair that may be required because of ordinary wear.
 - f. Other Maintenance - Maintaining updated maintenance manuals, maintenance of testing equipment and tools, maintaining wiring diagrams, cleaning of equipment and equipment areas.

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- g. Hours Available for Maintenance Functions – shall be as stated in SC-5 and SC-18, or as approved by LAWA.
- h. Repair and Replacement of Damaged Parts, Components or Materials
 - 1. Contractor shall promptly repair and/or replace damaged parts, components or materials, regardless of the cause of such damage. Any and all replacement parts must be new and unused. LAWA will reimburse the Contractor for the cost of such repairs and replacements, in accordance with GP, where the need for the repairs did not result from:
 - i. The routine operation and maintenance of the system.
 - ii. The careless or negligent acts or omissions of the equipment OEM, Contractor's employees, suppliers, agents or subcontractors. There shall be no separate reimbursement for repairs or replacements for items covered by the warranties or guarantees provided by the OEM.
 - iii. Normal wear and tear.
 - iv. Contractors negligence.
 - 2. LAWA requires the Contractor to provide sufficient resources to promptly repair the systems at all times.
 - 3. Any additional costs not associated with this Service Agreement must be approved in advance by LAWA.
- i. Replacement of Materials
 - 1. If it is necessary for the Contractor to replace any materials, parts or components under this Service Agreement and LAWA is responsible for the cost, the Contractor shall first submit to LAWA, for approval, the name of the item, identifying number and quantity required, name of the proposed supplier and the proposed cost, and the amount that the Contractor intends to bill LAWA. LAWA's written approval is required before the purchase of any parts, components or material shall commence unless, if in the Contractor's opinion, it is needed to keep the Units in operation or is required to comply with any LAWA, city, or national safety requirements. Cost submittal shall be provided within 24 hours of equipment shutdown.
- j. Testing Required By Applicable Codes and Agreement Documents:
 - 1. The Contractor shall act as the City's agent for conducting or assisting in the conducting of all Authority Having Jurisdiction and Consultant tests and inspections required for vertical transportation equipment as part of this Agreement. Testing hours shall be at the sole cost and expense of Contractor.
 - i. Periodic tests:
 - (a) Contractor shall perform periodic tests as required by the ASME

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A17.1-2007 Safety Code for Elevators and Escalators at intervals dictated by ASME A17.1-1996, including compliance with the ASME A17.2.1 2007 Inspectors' Manual.

- (b) Conduct monthly inspection and testing of the firefighters' service. Maintain test log in each machine/control room. Conduct semi-annual testing of emergency and standby power operation.
 - (c) When testing is required during working (See SC-18) hours, CONTRACTOR shall coordinate with the City and Code authorities as to minimize disruptions of service to the Airport. City retains the right to have testing performed during non-operating hours when possible.
 - (d) When required by Local Code Authority or LAWA's Representative, assist in Routine and Periodic inspections and audits of equipment at no additional cost to City.
 - (e) Provide Routine and Periodic inspections of escalators and moving walks per ASME A17.1, Sections 8.6.8 and 8.11.4. Frequencies shall be as described in ASME A17.1-1996.
- 2. Complete all repairs found to be necessary as a result of the above examinations, inspections and tests.
 - 3. Inspection and Approvals: The Services shall be subject to inspection and approval by City or City's Representative and all applicable governmental authorities; provided, however, in no event shall any such inspection and/or approval by City or Representative of the City constitute an assumption of Contractor's duties and obligations or a waiver or release of liability or a release of any other obligations whatsoever of Contractor with respect to the Services performed by Contractor pursuant to this Agreement.

SC-19. REPORTS

19.1 Unless specified elsewhere in the Service Agreement, the following are minimum reports to be submitted to LAWA monthly:

- 1. Completed PM tasks
- 2. Preventative Maintenance Inspection Sheets and Maintenance Logs
- 3. Emergency Service Call Log
- 4. All records of maintenance, repair, testing, alteration, callback, etc., required by this Agreement, shall be kept in a computerized maintenance management system that can be accessed by City at any time during the Agreement. Hard copies of documents shall be made available within 48 hours of City's request.
- 5. Conduct monthly operational examinations and provide a written report thereof with a copy to the City.

SC-20. QUALITY CONTROL

20.1 The Contractor shall establish and maintain a complete QC program that is acceptable to LAWA and assures the requirements of Service Agreement are provided as specified. The QC Program shall be implemented on Service Agreement start date. A copy of the Contractor's QC Program

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shall be submitted to LAWA prior to start of work.

20.2 The Contractor's QC Program shall include the following:

- a. An inspection system covering all the tasks and services to be provided by the Contractor. It shall specify areas to be inspected on a scheduled or unscheduled basis, the manner in which inspections are to be conducted and the individual who will do the inspection.
- b. A method of identifying deficiencies in the quality of services performed before the level of service becomes unacceptable.
- c. A file of all inspections or tests conducted by the Contractor, to include any corrective actions taken. This file shall be subject to LAWA review at all times during the performance of Service Agreement. The file shall be property of LAWA and shall be turned over to LAWA upon completion or termination of Service Agreement.
- d. QC program shall be in compliance with Contractors, LAWA approved, Maintenance Control Program. The Code required Maintenance Control Program shall be posted in each machine/control room.
- e. Codes and Ordinances:
 1. All the work covered by these specifications is to be done in full accord with the state and local Codes, and ordinances as are in effect at the time of the execution of the contract and the ASME A17.1-2007 elevator safety orders. All of the elevator/escalator/moving walk related requirements of the local Building Department are to be fulfilled by the Contractor except for inspection fees.
 2. The Contractor shall also provide maintenance and/or repairs to comply with any violation of the Governing Agencies and recommendations of casualty companies on due notice from the City, provided that such violations or recommendations did not exist prior to the date of the Agreement or after issuance by either party of any 30 or 90 day cancellation notice. Upon award of this Agreement any pre-existing condition falling within the scope of this Agreement will be covered. The requirement of any new attachments or parts on an elevator, escalator or moving walk, in addition to those on the now existing equipment, shall be the responsibility of the City.
- f. Certificate of Inspection/Permit To Operate:
 1. State or City inspection fees shall be paid by the City. Fees for re-inspection due to failure to eliminate deficiencies covered by this maintenance Agreement will be paid by the Contractor.

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g. City's Right To Inspect and Require Work:

1. City reserves the right to make such inspections and tests whenever necessary to ascertain that the requirements of this AGREEMENT are being fulfilled. Deficiencies noted shall be promptly corrected at Contractor's expense. In no instance shall CITY be liable for the frequency or sufficiency of such inspections or tests.
2. If Contractor fails to perform the work required by the terms of this Agreement in a diligent and satisfactory manner, City may, after ten (10) days' written notice to Contractor, perform or cause to be performed all or any part of the work required hereunder. Contractor agrees that it will reimburse City for any expense incurred therefore, and CITY at its election may deduct the amount from any sum owing Contractor. The waiver by City of a breach of any provision of this Agreement by Contractor shall not operate or be construed as a waiver of any subsequent breach by Contractor. If the City so desires, a qualified Elevator Consultant reasonably acceptable to both parties may be retained by City to mediate any disputes.

h. Labor Laws:

1. The Contractor performing work under this Agreement shall comply with applicable provisions of all federal, state and local labor laws, and Union Labor Agreements.
2. Contractor hereby indemnifies and saves City and/or City's Representative from and against any and all costs, liabilities, and actions arising out of the violation or alleged violation of, or the non-compliance with or alleged non-compliance with, any Labor Laws and or Union Labor Agreements.

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MAINTENANCE AGREEMENT
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