

FIRE STATION 54

PROJECT 10914

designs have been reviewed by Architect.

- C. Design mixes (psi strengths) to provide normal weight concrete are called out on the Structural Drawings.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2 - 3 inch slump concrete.
 - 2. All other concrete: Not more than 6 inches.
- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F.
- C. Use high-range water-reducing admixture in pumped concrete.
- D. Use air-entraining admixture in all concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content of 4% with a tolerance of plus-or-minus 1-1/2%.
- E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

- A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.
 - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to batch will not be permitted.

PART 3 - EXECUTION

3.1 GENERAL

CAST-IN-PLACE CONCRETE

033000 - 7

FIRE STATION 54

PROJECT 10914

- A. Coordinate the installation of joint materials, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

- A. General: Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

1. All foundation sides are to be formed, unless otherwise directed in the field by the Architect.

- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.

- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

- F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades, all as indicated on structural drawings. Additional openings will not be permitted without written approval by Architect. Accurately place and securely support items built into forms.

- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 VAPOR BARRIER INSTALLATION

CAST-IN-PLACE CONCRETE

033000 - 8

CAM 17-0531
EXHIBIT 1B
Page 2 of 600

FIRE STATION 54

PROJECT 10914

- A. General: Place vapor barrier sheeting in position with longest dimension parallel with direction of pour.
- B. Lap joints 6 inches and seal with manufacturer's recommended mastic or pressure-sensitive tape.

3.4 PLACING REINFORCEMENT

- A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
 - 1. Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
 - 1. Minimum concrete cover to be as follows: (per ACI 318, 7.7.1).

<u>Location</u>	<u>Minimum coverage in inches.</u>
Cast against and permanently exposed to earth . . .	3"
Exposed to earth or weather:	
#6 through #18 bars	2"
#5 bar, W31 or D31 wire, and smaller	1-1/2"
Not exposed to weather or in contact with ground:	
Slabs, walls, joists:	
#14 and #18 bars.	1-1/2"
#11 bar and smaller	3/4"
Beams, columns:	
Primary reinforcement ties, stirrups, spirals .	1-1/2"
Shells, folded plate members:	
#6 bar and larger	3/4"
#5 bar, W31 or D31 wire, and smaller	1/2"

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

CAST-IN-PLACE CONCRETE

033000 - 9

FIRE STATION 54

PROJECT 10914

laps in either direction.

3.5 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.
- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."
- F. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depth or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.
 - 1. Form contraction joints by inserting premolded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
 - 2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
 - 3. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.6 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Install reglets to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Install dovetail anchor slots in concrete structures as indicated on drawings.
- D. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

CAST-IN-PLACE CONCRETE

033000 - 10

CAM 17-0531
EXHIBIT 1B
Page 4 of 600

FIRE STATION 54

PROJECT 10914

3.7 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.8 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
 - 1. Delete references for allowing additional water to be added to batch for material with insufficient slump. Addition of water to batch will not be permitted.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.
- E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 - 1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 - 2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or

CAST-IN-PLACE CONCRETE

033000 - 11

FIRE STATION 54

PROJECT 10914

darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

3. Maintain reinforcing in proper position on chairs during concrete placement.

F. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F. Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

C. Grout-Cleaned Finish: Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.

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

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

CAST-IN-PLACE CONCRETE

033000 - 12

CAM 17-0531
EXHIBIT 1B
Page 6 of 600

FIRE STATION 54

PROJECT 10914

3.10 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
1. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
1. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F_F 20 (floor flatness) and F_L 17 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.
- C. Trowel Finish: Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
1. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F_F 30 (floor flatness) and F_L 25 (floor levelness) measured according to ASTM E 1155. Grind smooth surface defects that would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish: Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other

CAST-IN-PLACE CONCRETE

033000 - 13

FIRE STATION 54

PROJECT 10914

trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp, and trowel-finish concrete surfaces.

3.12 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
- D. Provide moisture curing by the following methods:
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4 inch lap over adjacent absorptive covers.
- E. Provide moisture-retaining cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- F. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
 - 1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

CAST-IN-PLACE CONCRETE

033000 - 14

FIRE STATION 54

PROJECT 10914

2. Use membrane-curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
 1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.13 SHORES AND SUPPORTS

- A. General: Comply with ACI 347 for shoring and reshoring in multistory construction, and as specified.
- B. Extend shoring from ground to roof for structures four stories or less, unless otherwise permitted.
- C. Remove shores and reshore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate reshoring to support work without excessive stress or deflection.
- D. Keep reshores in place a minimum of 15 days after placing upper tier, or longer, if required, until concrete has attained its required 28-day strength and heavy loads due to construction operations have been removed.

3.14 REMOVING FORMS

- A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.
- B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.
 1. Do not place any loads on unsupported concrete members until they have attained 100% of design minimum compressive strength at 28 days.
- C. Form-facing material may be removed 4 days after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

CAST-IN-PLACE CONCRETE

033000 - 15

CAM 17-0531
EXHIBIT 1B
Page 9 of 600

FIRE STATION 54

PROJECT 10914

3.15 REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.
- B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.16 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 - 1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
 - 1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.

CAST-IN-PLACE CONCRETE

033000 - 16

CAM 17-0531
EXHIBIT 1B
Page 10 of 600

FIRE STATION 54

PROJECT 10914

2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
 4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.
- F. Repair methods not specified above may be used, subject to acceptance of Architect.

3.17 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Contractor shall employ a testing agency, approved by the Owner and Architect, to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 - a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - b. Air Content: ASTM C 173, volumetric method for normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below, when 80 deg F and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of 5 standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yds. plus additional sets for each 50 cu. yds. more than the first 25 cu. yds. of each concrete class placed in any one day; 1 specimen tested at 7 days, 1 specimen tested at 14 days, 2 specimens tested at 28 days, and 1 specimen retained in reserve for later testing if required.
 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

CAST-IN-PLACE CONCRETE

033000 - 17

CAM 17-0531
EXHIBIT 1B
Page 11 of 600

FIRE STATION 54

PROJECT 10914

3. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 4. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to Architect, Structural Engineer, ready-mix producer, and Contractor within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- E. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 033000

FIRE STATION 54

PROJECT 10914

**SECTION 035216
LIGHTWEIGHT INSULATING CONCRETE**

PART 1 - GENERAL**1.1 SUMMARY**

A. Section Includes:

1. Cast-in-place perlite aggregate lightweight insulating concrete.
2. Cast-in-place vermiculite aggregate lightweight insulating concrete.
3. Cast-in-place cellular foam lightweight insulating concrete.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for requirements for normal-weight and structural lightweight concrete, including formwork, reinforcement, and concrete materials and mixes.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings: For lightweight insulating concrete.

1. Include plans, sections, and details showing roof slopes, thicknesses, and embedded insulation board.
2. Indicate locations of penetrations, perimeter terminations and curbs, control and expansion joints, and drains.

- C. Design Mixtures: For each lightweight insulating concrete mixture.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: For the following:

1. Cementitious materials.
2. Lightweight aggregates.
3. Foaming agents.
4. Admixtures.

LIGHTWEIGHT INSULATING CONCRETE

035216-0531
EXHIBIT 1B
Page 13 of 600

FIRE STATION 54

PROJECT 10914

5. Molded-polystyrene insulation board.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.6 FIELD CONDITIONS

A. Do not place lightweight insulating concrete unless ambient temperature is at least 40 deg F and rising.

1. When air temperature has fallen or is expected to fall below 40 deg F, heat water to a maximum 120 deg F before mixing so lightweight insulating concrete, at point of placement, reaches a temperature of 50 deg F minimum and 80 deg F maximum.

B. Do not place lightweight insulating concrete during rain or snow or on surfaces covered with standing water, snow, or ice.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

A. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.

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

2.2 AGGREGATE LIGHTWEIGHT INSULATING CONCRETE

A. Produce aggregate lightweight insulating concrete using the minimum amount of water necessary to produce a workable mix.

1. Do not exceed maximum air content recommended by aggregate manufacturer.

B. Perlite Aggregate Mix: Lightweight insulating concrete produced from cementitious materials, water, air-entraining admixture, and perlite mineral aggregates complying with ASTM C 332, Group I.

FIRE STATION 54

PROJECT 10914

1. As-Cast Unit Weight: 38 to 44 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
 2. Oven-Dry Unit Weight: 24 to 30 lb/cu. ft., when tested according to ASTM C 495.
 3. Compressive Strength: Minimum 125 psi, when tested according to ASTM C 495.
 4. Cement-to-Aggregate Ratio, by Volume: 1:6.
- C. Vermiculite Aggregate Mix: Lightweight insulating concrete produced from cementitious materials, water, air-entraining admixture, and vermiculite mineral aggregates complying with ASTM C 332, Group I.
1. Asbestos Content: No detectable asbestos as determined by method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
 2. As-Cast Unit Weight: 45 to 49 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
 3. Oven-Dry Unit Weight: 23 to 26 lb/cu. ft., when tested according to ASTM C 495.
 4. Compressive Strength: Minimum 140 psi, when tested according to ASTM C 495.
 5. Cement-to-Aggregate Ratio, by Volume: 1:6.

2.3 CELLULAR LIGHTWEIGHT INSULATING CONCRETE

- A. Produce cellular lightweight insulating concrete with the following minimum physical properties using cementitious materials, air-producing liquid-foaming agents complying with ASTM C 869/C 869M, and the minimum amount of water necessary to produce a workable mix:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Celcore Incorporated.
 - b. Elastizell Corporation of America.
 2. As-Cast Unit Weight: 34 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
 3. Oven-Dry Unit Weight: 26 to 32 lb/cu. ft., when tested according to ASTM C 495.
 4. Compressive Strength: Minimum 190 psi, when tested according to ASTM C 495.
 5. As-Cast Unit Weight: 40 to 48 lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.
 6. Oven-Dry Unit Weight: 32 to 40 lb/cu. ft., when tested according to ASTM C 495.
 7. Compressive Strength: Minimum 250 psi, when tested according to ASTM C 495.

2.4 MATERIALS

- A. Cementitious Material: Portland cement, ASTM C 150/C 150M, Type I.
- B. Water: Clean, potable.
- C. Joint Filler: ASTM C 612, Class 2, glass-fiber type; compressing to one-half thickness under a load of 25 psi.

FIRE STATION 54

PROJECT 10914

- D. Molded-Polystyrene Insulation Board: ASTM C 578, Type I, 0.90-lb/cu. ft. minimum density.
1. Provide units with manufacturer's standard keying slots or holes of 3 to 4 percent of board's gross surface area.

2.5 DESIGN MIXTURES

- A. Prepare design mixtures for each type and strength of lightweight insulating concrete by laboratory trial batch method or by field-test data method. For trial batch method, use a qualified independent testing agency for preparing and reporting proposed mixture designs.
1. Limit use of fly ash to not exceed 25 percent of portland cement by weight.
- B. Limit water-soluble chloride ions to the maximum percentage by weight of cement or cementitious material permitted by ACI 301.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Control Joints: Install control joints at perimeter of roof deck and at junctures with vertical surfaces, including curbs, walls, and vents, for full depth of lightweight insulating concrete. Fill control joints with joint filler.
1. Provide 1-inch-wide control joints for roof dimensions up to 100 feet in length; 1-1/2-inch-wide control joints for roof dimensions exceeding 100 feet.

3.2 MIXING AND PLACING

- A. Mix and place lightweight insulating concrete according to manufacturer's written instructions, using equipment and procedures to avoid segregation of mixture and loss of air content.
- B. Install insulation board according to lightweight insulating concrete manufacturer's written instructions. Place insulation board in wet, lightweight insulating concrete slurry poured a minimum of 1/8 inch over the structural substrate. Ensure full contact of insulation board with slurry. Stagger joints and tightly butt insulation boards. Allow slurry coat to set prior to placing remaining thickness of lightweight insulating concrete.
1. Install insulation board in a stair-step configuration with a maximum step-down of 1 inch.
- C. Deposit and screed lightweight insulating concrete in a continuous operation until an entire panel or section of roof area is completed. Do not vibrate or work mix except for screeding or floating. Place to depths and slopes indicated.

FIRE STATION 54

PROJECT 10914

- D. Finish top surface smooth, free of ridges and depressions, and maintain surface in condition to receive subsequent roofing system.
- E. Begin curing operations immediately after placement, and air cure for not less than three days, according to manufacturer's written instructions.
- F. If ambient temperature falls below 32 deg F, protect lightweight insulating concrete from freezing and maintain temperature recommended by manufacturer for 72 hours after placement.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to sample materials and perform tests and inspections.
- B. Testing of samples of lightweight insulating concrete obtained according to ASTM C 172/C 172M, except as modified by ASTM C 495, shall be performed according to the following requirements:
 - 1. Determine as-cast unit weight during each hour of placement, according to ASTM C 138/C 138M.
 - 2. Determine oven-dry unit weight and compressive strength according to ASTM C 495. Make a set of at least six molds for each day's placement, but not less than one set of molds for each 5000 sq. ft. of roof area.
 - 3. Perform additional tests when test results indicate that as-cast unit weight, oven-dry unit weight, compressive strength, or other requirements have not been met.
 - a. Retest cast-in-place lightweight insulating concrete for oven-dry unit weight and compressive strength.
- C. Prepare test and inspection reports.

END OF SECTION 035216

FIRE STATION 54

PROJECT 10914

**SECTION 042300
UNIT MASONRY****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General, Special, and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Concrete unit masonry.
2. Brick unit masonry.
3. Reinforced unit masonry.
4. Masonry waste disposal.

- B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 7 Section "Joint Sealants" for sealing joint in mockup.
2. Division 8 Section "Aluminum Framed Entrances and Storefronts" for window in mockup.

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

1. Dovetail slots for masonry anchors installed under Division 3 Section "Cast-in-Place Concrete."

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

1. Steel shelf angles for unit masonry specified in Division 5 Section "Metal Fabrications."
2. Wood nailers and blocking built into unit masonry specified in Division 6 Section "Miscellaneous Carpentry."
3. Hollow metal frames in unit masonry openings specified in Division 8 Section "Hollow Metal Doors and Frames."

UNIT MASONRY

042300 - 1

CAM 17-0531
EXHIBIT 1B
Page 18 of 600

FIRE STATION 54

PROJECT 10914

1.3 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops the following installed compressive strengths (f'_m) at 28 days.
1. For Concrete Unit Masonry: As follows, based on net area:
 - a. $f'_m = 2500$ psi.
 2. For Brick Unit Masonry: As follows, based on gross area:
 - a. $f'_m = 2500$ psi.
 3. It is recognized that the specific brick, block, and mortar materials specified in this Section may well result in a higher installed compressive strength than that indicated above.

1.4 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each different masonry unit, accessory, and other manufactured product specified.
- C. Shop drawings for reinforcing detailing fabrication, bending, and placement of unit masonry reinforcing bars. Comply with ACI 315 "Details and Detailing of Concrete Reinforcement" showing bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of masonry reinforcement.
- D. Samples for verification of the following:
1. Full-size units for each different exposed masonry unit required showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
 - a. Include size-variation data for Type FBS brick, verifying that actual range of sizes for brick falls within ASTM C 216 dimension tolerances.
 2. Accessories embedded in the masonry.
- E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to specifically identify exact materials used. Include mix proportions for mortar and grout and source of aggregates.
1. Submittal is for information only. Neither receipt of list nor acceptance of mockup constitutes approval of deviations from Contract Documents unless such deviations

UNIT MASONRY

042300 - 2

FIRE STATION 54

PROJECT 10914

are specifically brought to the attention of the Architect and approved in writing.

- F. Material certificates for the following, signed by manufacturer and Contractor, certifying that each material complies with requirements.
 - 1. Each different cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
 - 2. Each material and grade indicated for reinforcing bars.
 - 3. Each type and size of joint reinforcement.
 - 4. Each type and size of anchors, ties, and metal accessories.
- G. Material test reports from a qualified independent testing agency, employed and paid by Contractor or manufacturer, indicating and interpreting test results relative to compliance of the following proposed masonry materials with requirements indicated:
 - 1. Grout mixes. Include description of type and proportions of grout ingredients.
 - 2. Masonry units.
- H. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- B. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.
 - 1. Blocks used in rated assemblies shall be classified by UL as meeting the D-2 (2 hour) Classification.
 - a. Wall assemblies shall meet the following UL fire resistance rating designs as indicated:
 - 1) 2 Hour - UL Design U905
- C. Single-Source Responsibility for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from one source and by a single manufacturer for each different product required.

FIRE STATION 54

PROJECT 10914

- D. Single-Source Responsibility for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Mockup: Prior to installing unit masonry, construct sample wall panels to verify selections made under sample submittals and to demonstrate aesthetic effects as well as other qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
1. Locate mockups on site in the locations indicated or, if not indicated, as directed by Architect.
 2. Build mockups for the following types of masonry in sizes approximately 48 inches long by 48 inches high by full thickness, including face and back-up wythes as well as accessories.
 - a. Each type of exposed unit masonry construction.
 - b. Typical exterior face brick wall with lower corner of window opening at upper corner of mockup. Make opening approximately 12 inches wide by 16 inches high.
 - c. Typical exterior face brick wall with through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
 - d. Typical exterior brick-veneer wall complete with veneer ties, flashing, and weep holes.
 3. Clean exposed faces of mockups with masonry cleaner indicated.
 4. Notify Architect one week in advance of the dates and times when mockups will be constructed.
 5. Protect accepted mockups from the elements with weather-resistant membrane.
 6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Acceptance of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - b. Acceptance of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.
 - c. Accepted mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.
- F. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of **Division 1 Section "Project Meetings."**

FIRE STATION 54

PROJECT 10914

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not install until they are in an air-dried condition.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During erection, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt on completed masonry.
- D. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F and above.

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Concrete Masonry Units:
 - a. Rinker Materials Corp.
 - b. Tarmac Florida, Inc.
 2. Brick:
 - a. Richtex Brick, Columbia, South Carolina, or other as acceptable to Architect.
 3. Portland Cement, Masonry Cement, and Lime:
 - a. Essroc Materials, Inc.
 - b. Glen-Gery Corporation.
 - c. Lafarge Corporation.
 - d. Lehigh Portland Cement Co.
 - e. Riverton Corporation (The).
 4. Joint Reinforcement, Ties, and Anchors:
 - a. Dur-O-Wal, Inc.
 - b. Heckman Building Products, Inc.
 - c. Hohmann & Barnard, Inc.
 - d. Masonry Reinforcing Corp. of America.
 - e. National Wire Products Industries.
 - f. Southern Construction Products.

2.2 CONCRETE MASONRY UNITS

- A. General: Provide shapes indicated and as follows for each form of concrete masonry unit required.
1. Provide special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners.
- B. Concrete Masonry Units: ASTM C 90 and as follows:
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength indicated below:
 - a. Not less than the unit compressive strengths required to produce concrete unit

UNIT MASONRY

042300 - 6

FIRE STATION 54

PROJECT 10914

masonry construction of compressive strength indicated.

2. Weight Classification: Normal weight.
3. Aggregates: Do not use aggregates made from pumice, scoria, or tuff.
4. Provide Type II, non-moisture-controlled units.
5. Size: Manufactured to the actual dimensions listed below (within tolerances specified in the applicable referenced ASTM specification) for the corresponding nominal sizes indicated on Drawings:
 - a. 6 inch nominal: 5-5/8 inch actual.
 - b. 8 inch nominal: 7-5/8 inch actual.
 - c. 12 inch nominal: 11-5/8 inch actual.
6. Exposed Faces: Manufacturer's standard color and texture, unless otherwise indicated.

2.3 BRICK

- A. General: Provide shapes indicated and as follows for each form of brick required.
 1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.
- B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick: ASTM C 216 and as follows:
 1. Grade and Unit Compressive Strength: Provide units with grade and minimum average gross-area compressive strength indicated below:
 - a. Grade: SW.
 - b. Not less than the unit compressive strengths required to produce clay masonry construction of compressive strength indicated.
 2. Type: FBS.
 3. Size: Bricks manufactured to the following actual dimensions within tolerances specified in ASTM C 216:
 - a. Utility: 3-1/2 inches thick by 3-5/8 inches high by 11-5/8 inches long.
 4. Application: Use where brick is exposed.

UNIT MASONRY

042300 - 7

FIRE STATION 54

PROJECT 10914

5. Color/Style: 50/50 blend, #724 blended with #223 face set with no fully flashed black units.
6. Products: Subject to compliance with requirements, provide the following:
 - a. 50/50 blend indicated above, Richtex Brick Co.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Masonry Cement: ASTM C 91.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.
 1. White-Mortar Aggregates: Natural white sand or ground white stone.
- F. Aggregate for Grout: ASTM C 404.
- G. Water: Potable.

2.5 REINFORCING STEEL

- A. Steel Reinforcing Bars: Material and grade as follows:
 1. Billet steel complying with ASTM A 615.
 - a. Grade 60.
- B. Deformed Reinforcing Wire: ASTM A 496, with ASTM A 153, Class B-2 zinc coating.

2.6 JOINT REINFORCEMENT

- A. General: Provide joint reinforcement formed from the following:
 - 1 Galvanized carbon-steel wire, coating class as follows:
 - a. ASTM A 153, Class B-2, for both interior and exterior walls.
- B. Description: Welded-wire units prefabricated with deformed continuous side rods and plain

UNIT MASONRY

042300 - 8

FIRE STATION 54

PROJECT 10914

cross rods into straight lengths of not less than 10 feet, with prefabricated corner and tee units, and complying with requirements indicated below:

1. Wire Diameter for Side Rods: 0.1483 inch.
2. Wire Diameter for Cross Rods: 0.1483 inch.

C. For single-wythe masonry, provide type as follows with single pair of side rods:

1. Ladder design with perpendicular cross rods spaced not more than 16 inches o.c.

D. For multi-wythe masonry, provide type as follows:

1. Ladder design with perpendicular cross rods spaced not more than 16 inches o.c., and with double-eye and pintle; Dur-O-Wall, Inc., D/A 360 Ladur-Eye, or other as acceptable to Architect.

2.7 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors specified in subsequent articles that comply with requirements for metal and size of this Article, unless otherwise indicated.

B. Wire: As follows:

1. Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
2. Wire Diameter: 0.1875 inch.

2.8 ADJUSTABLE ANCHORS FOR CONNECTING TO STRUCTURAL FRAME

A. General: Provide 2-piece assemblies as described below, allowing vertical or horizontal differential movement between wall and frame parallel to plane of wall but resisting tension and compression forces perpendicular to it.

1. For anchorage to concrete, provide manufacturer's standard anchors with dovetail anchor section formed from sheet metal and triangular-shaped wire tie section sized to extend within 1 inch of masonry face and as follows:
 - a. Wire Diameter: 0.1875 inch.

FIRE STATION 54

PROJECT 10914

2.9 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length indicated and in the following configurations:
1. Headed bolts.
 2. Nonheaded bolts, straight.
 3. Nonheaded bolts, bent in manner indicated.

2.10 EMBEDDED FLASHING MATERIALS

- A. Laminated Flashing: Manufacturer's standard laminated flashing of type indicated below:
1. Copper-Fabric Laminate: Copper sheet of weight indicated below, bonded with asphalt between 2 layers of glass-fiber cloth.
 - a. Weight: 3 oz./sq. ft
 2. Application: Use where flashing is fully concealed in masonry.
- B. Adhesive for Flashings: Of type recommended by manufacturer of flashing material for use indicated.
- C. Products: Subject to compliance with requirements, provide one of the following:
1. Copper-Fabric Laminate Flashing:
 - a. Copper Fabric; AFCO Products, Inc.
 - b. Type FCC-Fabric Covered Copper; Phoenix Building Products.
 - c. Copper Fabric Flashing; Sandell Manufacturing Co., Inc.
 - d. York Copper Fabric Flashing; York Manufacturing, Inc.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

- A. Weep Holes: Provide the following:
1. Wicking Material: Material as indicated below, in length required to produce 2-inch exposure on exterior and 18 inches in cavity between wythes:
 - a. Cotton sash cord.

FIRE STATION 54

PROJECT 10914

2. Vinyl Weep Hole/Vent: One-piece, offset, T-shaped units formed to fit in a vertical mortar joint by injection molding of flexible polyvinyl chloride and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and top flap; in color approved by Architect to match that of mortar.
3. Available Products: Subject to compliance with requirements, weep hole/ventilators that may be incorporated in the Work include, but are not limited to, the following:

- a. Vinyl Weep Hole/Vent:

1. Williams-Goodco Brick Vent; Williams Products, Inc.

- B. Cavity Drainage Material: 1-inch- thick, reticulated, nonabsorbent mesh, made from polyethylene strands and shaped to maintain drainage at weep holes without being clogged by mortar droppings.

1. Product: Subject to compliance with requirements, provide "Mortar Net" by Mortar Net USA, Ltd.

2.12 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup dry measure tetrasodium polyphosphate and 1/2-cup dry measure laundry detergent dissolved in 1 gallon of water.

2.13 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, or other admixtures, unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:

1. Limit cementitious materials in mortar for exterior use to Portland cement and lime.
2. For all masonry, use Type S mortar.

- C. Grout for Unit Masonry: Comply with ASTM C 476. Use grout of consistency indicated or, if not otherwise indicated, of consistency (fine or coarse) at time of placement that will completely fill spaces intended to receive grout.

1. Use fine grout in grout spaces less than 2 inches in horizontal dimension, unless otherwise indicated.
2. Use coarse grout in grout spaces 2 inches or more in least horizontal dimension, unless otherwise indicated.

FIRE STATION 54

PROJECT 10914

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of unit masonry. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.
- B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of thickness indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections of the Specifications.
- C. Leave openings for equipment to be installed before completion of masonry. After installing equipment, complete masonry to match construction immediately adjacent to the opening.
- D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting, where possible. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Mix units for exposed unit masonry from several pallets or cubes as they are placed to produce uniform blend of colors and textures.
- F. Wetting of Brick: Wet brick prior to laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb the water so they are damp but not wet at the time of laying.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces of columns, walls, and arrises, do not exceed 1/4 inch in 10 feet, nor 3/8 inch in 20 feet, nor 1/2 inch in 40 feet or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor

1/2 inch in 40 feet or more. For vertical alignment of head joints, do not exceed plus or

UNIT MASONRY

042300 - 12

FIRE STATION 54

PROJECT 10914

minus 1/4 inch in 10 feet, nor 1/2 inch maximum.

- B. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet, nor 1/2 inch in 40 feet or more. For top surface of bearing walls, do not exceed 1/8 inch in 10 feet, nor 1/16 inch within width of a single unit.
- C. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls, and partitions, do not exceed 1/2 inch in 20 feet, nor 3/4 inch in 40 feet or more.
- D. Variation in Cross-Sectional Dimensions: For columns and thickness of walls, from dimensions shown, do not exceed minus 1/4 inch nor plus 1/2 inch.
- E. Variation in Mortar-Joint Thickness: Do not vary from bed-joint thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch. Do not vary bed-joint thickness from bed-joint thickness of adjacent course by more than 1/8 inch. Do not vary from head-joint thickness indicated by more than plus or minus 1/8 inch. Do not vary head-joint thickness from adjacent head-joint thickness by more than 1/8 inch. Do not vary from collar-joint thickness indicated by more than minus 1/4 inch or plus 3/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.
- B. Lay walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.
- C. Bond Pattern for Exposed Masonry: Lay exposed masonry in the following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
 - 1. One-half running bond with vertical joint in each course centered on units in courses above and below.
 - a. Provide at concrete block construction.
 - 2. One-third running bond.
 - a. Provide at brick construction.
- D. Lay concealed masonry with all units in a wythe in running bond. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

FIRE STATION 54

PROJECT 10914

- E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar prior to laying fresh masonry.
- F. Built-in Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- G. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
- H. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- I. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- J. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above and as follows:
 - 1. Install compressible filler in joint between top of partition and underside of structure above.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow concrete masonry units as follows:
 - 1. With full mortar coverage on horizontal and vertical face shells.
 - 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
 - 3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.
 - 4. Maintain joint widths indicated, except for minor variations required to maintain bond alignment. If not indicated, lay walls with 3/8-inch joints.
- B. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not furrow bed joints or slush head joints.
 - 2. At cavity walls, slope beds toward cavity to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against cavity face of brick.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- D. Cut joints flush for masonry walls that are to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

FIRE STATION 54

PROJECT 10914

3.6 STRUCTURAL BONDING OF MULTI-WYTHE MASONRY

- A. Use continuous horizontal-joint reinforcement installed in horizontal mortar joints for bond tie between wythes.
- B. Corners: Provide interlocking masonry unit bond in each course at corners, unless otherwise shown.
 - 1. Provide continuity with horizontal-joint reinforcement at corners by using prefabricated "L" units in addition to masonry bonding.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, provide same type of bonding specified for structural bonding between wythes and space as follows:
 - 2. Provide continuity with horizontal-joint reinforcement by using prefabricated "T" units.

3.7 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
 - 1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
- B. Tie exterior wythe to back-up with continuous horizontal-joint reinforcing.

3.8 HORIZONTAL-JOINT REINFORCEMENT

- A. General: Provide continuous horizontal-joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcing a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in parapet walls.
 - 3. Provide reinforcement in mortar joint 1 block course above and below wall openings and extending 12 inches beyond opening.
 - a. Reinforcement above is in addition to continuous reinforcement.
- B. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

FIRE STATION 54

PROJECT 10914

3.9 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
1. Provide an open space not less than 1" (25 mm) in width between masonry and steel structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
 2. Anchor masonry with flexible tie sections embedded in masonry and attached to steel structural member.
- B. Anchor masonry to concrete structural members with dovetail anchors embedded in masonry joints. Dovetail slots to be furnished to concrete forms installer prior to pouring concrete structural members.
1. Dovetail anchor system not required in walls where blockwork is in place prior to pouring integral concrete columns. (Blockwork acts as forms for two sides of columns).

3.10 ANCHORING MASONRY VENEERS

- A. Anchor veneer to concrete back-up with dovetail anchors. Dovetail slots to be furnished to concrete forms installer for installation in forms prior to pouring concrete members.
1. Space anchors as indicated but not more than 16" o.c. vertically and 32" o.c. horizontally. Install additional anchors within 1'-0" of openings and at intervals around perimeter not exceeding 8".

3.11 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joints in unit masonry where indicated. Build-in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form expansion joints in brick made from clay or shale as follows:
1. Form open joint of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants." Maintain joint free and clear of mortar.
- C. Build-in horizontal pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 7 Section "Joint Sealants."
2. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

UNIT MASONRY

042300 - 16

FIRE STATION 54

PROJECT 10914

3.12 LINTELS

- A. Install steel lintels where indicated.
- B. Provide masonry lintels where shown and where openings of more than 12 inches for brick size units and 24 inches for block size units are shown without structural steel or other supporting lintels.
 - 1. Provide precast lintels made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcement bars indicated or required to support loads indicated. Cure precast lintels by same method as CMU.
 - 2. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.
 - 3. Provide either of above at Contractor's option or provide precast or formed-in-place concrete lintels complying with requirements of Division 3 Section "Cast-in-Place Concrete."
- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.13 FLASHING, WEEP HOLES, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer before covering with mortar.
- C. Install flashing as follows:
 - 1. At composite masonry walls, including cavity walls, extend flashing from exterior face of outer wythe of masonry, through the outer wythe, turned up a minimum of 4 inches, and through the inner wythe to within 1/2 inch of the interior face of the wall in exposed masonry. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.
 - 2. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. At heads and sills, extend flashing 4 inches at ends and turn up not less than 2 inches to form a pan.
 - 3. Cut off flashing flush with face of wall after masonry wall construction is completed.
- D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:

FIRE STATION 54

PROJECT 10914

1. Form weep holes with product specified in Part 2 of this Section.
 2. Form weep holes by keeping head joints free and clear of mortar.
 3. Space weep holes 48 inches o.c.
 4. In cavities, place pea gravel to a height equal to height of first course, but not less than 2 inches, immediately above top of flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
 5. Place cavity drainage material immediately above flashing in cavities.
- E. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.
- F. Install vents in vertical head joints at the top of each continuous cavity. Space vents and close off cavities vertically and horizontally with blocking in manner indicated.
1. Install through-wall flashing and weep holes above horizontal blocking.
- G. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

3.14 INSTALLATION OF REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
1. Do not exceed the following pour heights for fine grout:
 - a. For minimum widths of grout spaces of 3/4 inch or for minimum grout space of hollow unit cells of 1-1/2 by 2 inches, pour height of 12 inches.
 - b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2 by 3 inches, pour height of 60 inches.
 - c. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 12 feet.
 - d. For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 24 feet.
 2. Do not exceed the following pour heights for coarse grout:
 - a. For minimum widths of grout spaces of 1-1/2 inches or for minimum grout space of hollow unit cells of 1-1/2 by 3 inches, pour height of 12 inches.

UNIT MASONRY

042300 - 18

FIRE STATION 54

PROJECT 10914

- b. For minimum widths of grout spaces of 2 inches or for minimum grout space of hollow unit cells of 2-1/2 by 3 inches, pour height of 60 inches.
 - c. For minimum widths of grout spaces of 2-1/2 inches or for minimum grout space of hollow unit cells of 3 by 3 inches, pour height of 12 feet.
 - d. For minimum widths of grout spaces of 3 inches or for minimum grout space of hollow unit cells of 3 by 4 inches, pour height of 24 feet.
3. Provide cleanout holes at least 3 inches in least dimension for grout pours over 60 inches in height.
- a. Provide cleanout holes at each vertical reinforcing bar.
 - b. At solid grouted masonry, provide cleanout holes at not more than 32 inches o.c.

3.15 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units; install in fresh mortar or grout, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point-up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for application of sealants.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears prior to tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - 4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
 - 5. Clean brick by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised, using the following masonry cleaner:
 - a. Job-mixed detergent solution
 - 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2 applicable to type of stain present on exposed surfaces.
 - 7. Bag rub all concrete unit masonry joints after tooling in spaces to receive no finish or a finish through which joints will show.

UNIT MASONRY

042300 - 19

FIRE STATION 54

PROJECT 10914

8. At exterior surfaces of concrete unit masonry where cotton weeps occur, leave excess lengths of cotton rope in place for later trimming by others, after stucco and or painting is completed.

E. Protection: Provide final protection and maintain conditions that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

3.16 MASONRY WASTE DISPOSAL

A. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.

B. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in greatest dimension.

2. Mix masonry waste with at least 2 parts specified fill material for each part masonry waste. Fill material is specified in Division 2 Section "Earthwork."

3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste and legally dispose of off Owner's property.

END OF SECTION 042300

UNIT MASONRY

042300 - 20

FIRE STATION 54

PROJECT 10914

SECTION 051200 STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.

1. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
2. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.
3. Refer to Division 3 for anchor bolt installation in concrete, Division 4 for anchor bolt installation in masonry.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 2. High-strength bolts (each type), including nuts and washers.
 - a. Include Direct Tension Indicators if used.
 3. Structural steel primer paint.
 4. Shrinkage-resistant grout.
- C. Shop drawings prepared under supervision of a licensed Structural Engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
 1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.

FIRE STATION 54

PROJECT 10914

- D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.
- E. Certified copies of each survey conducted by a licensed Land Surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations for major members. Indicate discrepancies between actual installation and contract documents.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following, except as otherwise indicated:
 - 1. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."
 - a. Paragraph 4.2.1 of the above code is hereby modified by deletion of the following sentence:
 - 1) "This approval constitutes the owner's acceptance of all responsibility for the design adequacy of any detail configuration of connections developed by the fabricator as a part of his preparation of these shop drawings."
 - 2. AISC "Specifications for Structural Steel Buildings," including "Commentary."
 - 3. "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts" approved by the Research Council on Structural Connections.
 - 4. American Welding Society (AWS) D1.1 "Structural Welding Code - Steel."
 - 5. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
- B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
 - 1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests.
 - 2. If re-certification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Anchor bolts, anchorage device, and any other attachments, which require setting in concrete by another trade, shall be furnished to the General Contractor for his placing and handling. The fabricators shop drawings shall include accurately dimensioned plans for placement of these items. These items shall be delivered in ample time in order to not delay the work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and re-lubricate before use.
 - 1. Do not store materials on structure in a manner that might cause distortion or

FIRE STATION 54

PROJECT 10914

damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.
- B. Structural Steel Shapes, Plates, and Bars: All wide flange shapes to be A572, $F_y = 50$ ksi material. All other angles, plates, bars, and channels to be ASTM A 36.
- C. Cold-Formed Steel Tubing: ASTM A 500, Grade B.
- D. Hot-Formed Steel Tubing: ASTM A 501.
- E. Steel Pipe: ASTM A 53, Type E or S, Grade B; or ASTM A 501.
 - 1. Finish: Black, except where indicated to be galvanized.
- F. Steel Castings: ASTM A 27, Grade 65-35, medium-strength carbon steel.
- G. Headed Stud-Type Shear Connectors: ASTM A 108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.
- H. Anchor Bolts: ASTM A 307, nonheaded type unless otherwise indicated.
- I. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide hexagonal heads and nuts for all connections.
- J. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A 325.
 - a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.
- K. Direct Tension Indicators: ASTM F 959, type as required.
 - 1. Use on all A325 & A490 bolts on connectors that are slip critical (SC) and as noted on drawings.

FIRE STATION 54

PROJECT 10914

- L. Electrodes for Welding: Comply with AWS Code.
- M. Structural Steel Primer Paint: Fabricator's standard rust- inhibiting primer. Verify primer use if spray fire protection is required.
- N. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sure Grip Grout; Dayton Superior.
 - b. Euco N.S.; Euclid Chemical Co.
 - c. Crystex; L & M Construction Chemicals, Inc.
 - d. Masterflow 713; Master Builders.
 - e. Five Star Grout; U.S. Grout Corp.

2.2 FABRICATION

- A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members where indicated.
 - 1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
 - 2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Connections: Weld or bolt shop connections, as indicated.
- C. Bolt field connections, except where welded connections or other connections are indicated.
 - 1. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
- D. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts."
- E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- F. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- G. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld shear connectors in field, spaced as shown, to beams and girders in composite construction. Use automatic end welding of headed stud shear connectors in accordance with manufacturer's printed instructions.

FIRE STATION 54

PROJECT 10914

- H. Steel Wall Framing: Select members that are true and straight for fabrication of steel wall framing. Straighten as required to provide uniform, square, and true members in completed wall framing.
- I. Build up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld steel bar stops to frames, except where shown removable. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches o.c., unless otherwise indicated.
- J. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.
- K. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.
- L. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.
- M. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.

2.3 SHOP PAINTING

- A. General: Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
 - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 - 2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
 - 3. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
 - 1. SP-2 "Hand-Tool Cleaning."
 - 2. SP-3 "Power-Tool Cleaning."
 - 3. SP-6 "Commercial Blast Cleaning."
 - 4. SP-7 "Brush-Off Blast Cleaning."
- C. Painting: Provide a one-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

- A. General: Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.

FIRE STATION 54

PROJECT 10914

1. Promptly remove and replace materials or fabricated components that do not comply.
- B. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 1. Promptly notify Architect/Engineer whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

- A. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect/Engineer. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Architect/Engineer.
- B. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.
- C. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- D. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
 1. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 2. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 3. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 4. For proprietary grout materials, comply with manufacturer's instructions.
- E. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
- F. Level and plumb individual members of structure within specified AISC tolerances.
- G. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

FIRE STATION 54

PROJECT 10914

- H. Splice members only where indicated and accepted on shop drawings.
- I. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 - 1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- J. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
- K. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

3.2 QUALITY CONTROL

- A. Owner will engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
- B. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations thereof..
- C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- D. Testing agency may inspect structural steel at plant before shipment.
- E. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.
- F. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.
 - 1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.
- G. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of welds as follows. Inspection procedures listed are to be used at

FIRE STATION 54

PROJECT 10914

Contractor's option.

- a. Liquid Penetrant Inspection: ASTM E 165.
- b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
- c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
- d. Ultrasonic Inspection: ASTM E 164.

H. Field-Bolted Connections: Inspect in accordance with AISC specifications.

1. For Direct Tension Indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.

I. Field Welding: Inspect and test during erection of structural steel as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.
3. Perform tests of welds as follows:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E 164.

END OF SECTION 051200

FIRE STATION 54

PROJECT 10914

**SECTION 053100
STEEL DECK****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. This Section includes steel deck units for roof applications.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
1. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories.
 - a. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.
 2. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:
1. American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members."
 2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."
 3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."
- B. Qualification of Field Welding: Use qualified welding processes and welding operators in accordance with "Welder Qualification" procedures of AWS.
1. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be unsatisfactory. Remove work found to be defective and replace with new acceptable work.

STEEL DECK

053100
EXHIBIT 1B
Page 46 of 600

FIRE STATION 54

PROJECT 10914

- C. Underwriters' Label: Provide metal floor deck units listed in Underwriters' Laboratories "Fire Resistance Directory", with each deck unit bearing the UL label and marking for specific system detailed.
- D. FM Listing: Provide steel roof deck units that have been evaluated by Factory Mutual System and are listed in "Factory Mutual Approval Guide" for "Class I" fire-rated construction.

1.5 STORAGE AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Anchor bolts, anchorage device, and any other attachments which require setting in concrete by another trade, shall be furnished to the General Contractor for his placing and handling. The fabricators shop drawings shall include accurately dimensioned plans for placement of these items. These items shall be delivered in ample time in order to not delay the work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.
 - 1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 - 1. United Steel Deck, Inc.
 - 2. Vulcraft Div., Nucor Corp.
 - 3. Wheeling Corrugating Co.
 - 4. Granco

2.2 MATERIALS

- A. Steel for Galvanized Metal Deck Units: ASTM A446, Grade A, with positive zinc coating of 1.25 oz. per square foot "Commercial" class conforming to ASTM A525.
- B. Miscellaneous Steel Shapes: ASTM A 36.
- C. Sheet Metal Accessories: ASTM A 526, commercial quality, galvanized.
- D. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

FIRE STATION 54

PROJECT 10914

- E. Acoustic Sound Barrier Closures: Manufacturer's standard mineral fiber closures.
- F. Steel Roof Deck: Galvanized Type B, intermediate rib deck, gage as indicated on drawings.
- G. Steel Floor Deck: Galvanized Type VLI composite floor deck, gage as indicated on drawings.
- H. Galvanized Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM 780 using high-zinc dust content paint.

2.3 FABRICATION

- A. General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.
- B. Roof Deck Units: Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck."
- C. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6 inches wide.
- D. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.
- E. Roof Sump Pans: Fabricate from single piece of 0.071-inch min. (14 gage) galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain. Provide sump pans of adequate size to receive roof drains and with bearing flanges not less than 3 inches wide. Recess pans not less than 1-1/2 inches below roof deck surface unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field by others.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
- C. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.

FIRE STATION 54

PROJECT 10914

- D. Place deck units flat and square, secured to adjacent framing without warp or deflection.
- E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.
- F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- G. Do not use floor deck units for storage or working platforms until permanently secured.
- H. Fastening Deck Units:
 - 1. Fasten roof deck units to steel supporting members by not less than 5/8-inch-diameter puddle welds or elongated welds of equal strength, spaced not more than 12 inches at every support, and at closer spacing where indicated. In addition, secure deck to each supporting member in ribs where side laps occur.
 - 2. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.
 - a. Use welding washers where recommended by deck manufacturer.
 - 3. Side joints shall be interlocked and welded to adjacent deck unit.
 - 4. Uplift Loading: Install and anchor roof deck units to comply with factory mutual requirements for location of project.
 - 5. Fasten accessories to deck by welding or by self-tapping NO. 10 or larger machine screws.
- I. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.
- J. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.
- K. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.
- L. Roof Sump Pans: Place over openings provided in roof decking and weld to top decking surface. Space welds not more than 12 inches o.c. with at least one weld at each corner.
- M. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Weld into position to provide a complete decking installation.
 - 1. Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.
- N. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.
 - 1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance

FIRE STATION 54

PROJECT 10914

- with manufacturer's instructions.
2. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.
- O. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

END OF SECTION 053100

STEEL DECK

FIRE STATION 54

PROJECT 10914

**SECTION 054000
COLD-FORMED METAL FRAMING**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

1.2 SUMMARY

- A. Types of cold-formed metal framing units include the following:
1. Load-bearing punched channell studs.
 2. C-shaped load-bearing steel studs.
 3. C-shaped steel joists.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
1. Product data and installation instructions for each item of cold-formed metal framing and accessories.
 2. Shop drawings for special components and installations not fully dimensioned or detailed in manufacturer's product data.
 - a. Include placing drawings for framing members showing size and gage designations, number, type, location, and spacing. Indicate supplemental strapping, bracing, splices, bridging, accessories, and details required for proper installation.

1.4 QUALITY ASSURANCE

- A. Component Design: Calculate structural properties of studs and joists in accordance with American Iron and Steel Institute (AISI) "Specification for Design of Cold-Formed Steel Structural Members."
- B. Welding: Use qualified welders and comply with American Welding Society (AWS) D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Rated Assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities that have jurisdiction.
- D. Pre-Installation Conference: Prior to start of installation of metal framing systems, meet at project site with installers of other work including door and window frames and mechanical and electrical work. Review areas of potential interference and conflicts, and coordinate layout and support provisions for interfacing work.

FIRE STATION 54

PROJECT 10914

1. Coordinate with provisions of Division 1 Section "Project Meetings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following:
 1. Clark Framing Systems.
 2. Dale/Incor
 3. Dietrich Industries, Inc.
 4. Wheeling Corrugating Co.

2.2 METAL FRAMING

- A. System Components: Manufacturers' standard load-bearing steel studs and joists of type, size, shape, and gage as indicated. With each type of metal framing required, provide manufacturer's standard, steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, and accessories for applications indicated, as needed to provide a complete metal framing system.
- B. Materials and Finishes:
 1. For 16-gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield point of 40,000 psi; ASTM A 446, A 570, or A 611.
 2. For 18-gage and lighter units, fabricate metal framing components of commercial quality steel sheet with a minimum yield point of 33,000 psi; ASTM A 446, A 570, or A 611.
 3. Provide galvanized finish to metal framing components complying with ASTM A 525 for minimum G 60 coating.
 - a. Finish of installation accessories to match that of main framing components, unless otherwise indicated.
 4. Fasteners: Provide nuts, bolts, washers, screws, and other fasteners with corrosion-resistant plated finish.
 5. Electrodes for Welding: Comply with AWS Code and as recommended by stud manufacturer.
 6. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A 780.

2.3 FABRICATION

- A. General: Framing components may be prefabricated into assemblies before erection. Fabricate panels plumb, square, true to line, and braced against racking with joints welded. Perform lifting of prefabricated units to prevent damage or distortion.
- B. Fabricate units in jig templates to hold members in proper alignment and position and to assure consistent component placement.
- C. Fastenings: Attach similar components by welding. Attach dissimilar components by welding, bolting, or screw fasteners, as standard with manufacturer.

COLD-FORMED METAL FRAMING

FIRE STATION 54

PROJECT 10914

- D. Wire tying of framing components is not permitted.
- E. Fabrication Tolerances: Fabricate units to a maximum allowable tolerance variation from plumb, level, and true to line of 1/8 inch in 10 feet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install metal framing systems in accordance with manufacturer's printed or written instructions and recommendations.
- B. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to layout at base and tops of studs. Secure tracks as recommended by stud manufacturer for type of construction involved, except do not exceed 24 inches O.C. spacing for nail or power-driven fasteners or 16 inches O.C. for other types of attachment. Provide fasteners at corners and ends of tracks.
- C. Installation of Wall Studs: Secure studs to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges.
- D. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- E. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
- F. Install supplementary framing, blocking, and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight or loading resulting from item supported.
- G. Frame wall openings larger than 2 feet square with double stud at each jamb of frame except where more than two are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.
- H. Frame both sides of expansion and control joints with separate studs; do not bridge the joint with components of stud system.
- I. Install horizontal stiffeners in stud system, spaced (vertical distance) at not more than 54 inches O.C. Weld at each intersection.
- J. Erection Tolerances: Bolt or weld wall panels (at both horizontal and vertical junctures) to produce flush, even, true-to-line joints.
 - 1. Maximum variation in plane and true position between prefabricated assemblies should not exceed 1/16 inch.

FIRE STATION 54

PROJECT 10914

- K. Installation of Joists: Install level, straight, and plumb, complete with bracing and reinforcing as indicated on drawings. Provide not less than 1-1/2-inch end bearing.
- L. Reinforce ends with end clips, steel hangers, steel angle clips, steel stud section, or as otherwise recommended by joist manufacturer.
- M. Where required, reinforce joists at interior supports with single short length of joist section located directly over interior support, snap-on shoe, 30 percent side-piece lapped reinforcement, or other method recommended by joist manufacturer.
- N. Secure joists to interior support systems to prevent lateral movement of bottom flange.
- O. Field Painting: Touch-up damaged shop-applied protective coatings. Use compatible primer for prime-coated surfaces; use galvanizing repair system for galvanized surfaces.

END OF SECTION 054000

FIRE STATION 54

PROJECT 10914

**SECTION 055000
METAL FABRICATIONS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General, Special, and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following metal fabrications:

1. Rough hardware.
2. Steel Ladders (including elevator pit ladders).
3. Shelf and relieving angles.
4. Miscellaneous framing and supports for the following:
 - a. Elevator hoisting machines and sheaves.
 - b. Elevator door sills.
 - c. Welded steel brackets for support of track-mounted lighting.
5. Pipe bollards.
6. Rectangular slab-type manhole frames with solid lids.
7. TV wall mounted yoke brackets with mounting plates.

- B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 5 Section "Structural Steel" for structural steel framing system components.
2. Division 5 Section "Metal Stairs" for metal framed stairs with metal pan treads.
3. Division 5 Section "Pipe and Tube Railings" for metal pipe and tube handrails and railing systems.
4. Division 11 Section "Track-Mounted Surgical Quality Lighting" for items to be supported.

1.3 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for non-slip aggregates and non-slip aggregate surface finishes, paint products, and grout.
- C. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

METAL FABRICATIONS

055000 - 1

FIRE STATION 54

PROJECT 10914

- D. Samples representative of materials and finished products as may be requested by Architect.
- E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.
- F. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include a list of completed projects with project name, addresses, names of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.
- B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone re-certification.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.1 FERROUS METALS

- A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Steel Tubing: Product type (manufacturing method) and as follows:
 - 1. Cold-Formed Steel Tubing: ASTM A 500.

METAL FABRICATIONS

055000 - 2

FIRE STATION 54

PROJECT 10914

- D. Steel Pipe: ASTM A 53, standard weight (schedule 40), unless otherwise indicated, or another weight required by structural loads.
 - 1. Black finish, unless otherwise indicated.
- E. Gray-Iron Castings: ASTM A 48, Class 30.
- F. Malleable-Iron Castings: ASTM A 47, Grade 32510.
- G. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153.
- H. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.2 PAINT

- A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements of FS TT-P-664, selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

2.3 FASTENERS

- A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A, with hex nuts, ASTM A 563, and, where indicated, flat washers.
- C. Machine Screws: ANSI B18.6.3.
- D. Lag Bolts: ANSI B18.2.1.
- E. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.
- F. Plain Washers: Round, carbon steel, ANSI B18.22.1.

METAL FABRICATIONS

055000 - 3

FIRE STATION 54

PROJECT 10914

- G. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
- I. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

2.4 GROUT

- A. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- B. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Non-shrink, Nonmetallic Grouts:
 - c. Euco N-S Grout; Euclid Chemical Co.
 - d. Five Star Grout; Five Star Products.
 - e. Vibropruf #11; Lambert Corp.
 - f. Masterflow 928 and 713; Master Builders Inc.
 - g. Sealtight 588 Grout; W. R. Meadows, Inc.
 - h. SonogROUT 14; Sonneborn Building Products - ChemRex Inc.

2.5 CONCRETE FILL

- A. Concrete Materials and Properties: Comply with requirements of Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless higher strengths are indicated.

2.6 FABRICATION, GENERAL

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- C. Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of installed metal

FIRE STATION 54

PROJECT 10914

assemblies to prevent buckling, opening up of joints, and overstressing of welds and fasteners. Base design calculations on actual surface temperatures of metals due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 100 deg F.
- D. Shear and punch metals cleanly and accurately. Remove burrs.
 - E. Ease exposed edges to a radius of approximately 1/32 inch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - F. Remove sharp or rough areas on exposed traffic surfaces.
 - G. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.
 - H. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.
 - I. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - J. Shop Assembly: Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
 - K. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
 - L. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- 2.7 ROUGH HARDWARE
- A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.
 - B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron

METAL FABRICATIONS

055000 - 5

CAM 17-0531
EXHIBIT 1B
Page 59 of 600

FIRE STATION 54

PROJECT 10914

washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.8 STEEL LADDERS

- A. General: Fabricate ladders for the locations shown, with dimensions, spacing, details, and anchorages as indicated. Comply with requirements of ANSI A14.3.
- B. Side rails: Continuous, steel, 1/2-by-2-1/2-inch flat bars, with eased edges, spaced 18 inches apart.
- C. Bar Rungs: 3/4-inch- diameter steel bars, spaced 12 inches O.C.
- D. Fit rungs in centerline of side rails, plug weld and grind smooth on outer rail faces.
- E. Support each ladder at top and bottom and at intermediate points spaced not more than 60 inches O.C. with welded or bolted steel brackets.
 - 1. Size brackets to support design dead and live loads indicated and to hold centerline of ladder rungs clear of the wall surface by not less than 7 inches.
 - 2. Extend side rails 42 inches above top rung, and return rails to wall or structure unless other secure handholds are provided. If the adjacent structure does not extend above the top rung, goose-neck the extended rails back to the structure to provide secure ladder access.
- F. Provide non-slip surfaces on top of each rung, by coating the rung with aluminum-oxide granules set in epoxy-resin adhesive.

2.9 SHELF AND RELIEVING ANGLES

- A. Fabricate shelf and relieving angles from steel angles of sizes indicated and for attachment to concrete framing. Provide slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and not more than 24 inches O.C., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support shelf/relieving angles from back-up masonry and concrete. Align expansion joints in angles with indicated control and expansion joints in cavity wall exterior wythe.
- C. Galvanize shelf angles to be installed on exterior concrete framing.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports for applications indicated that are not a part of structural steel framework as required to complete the Work.
- B. Fabricate units to sizes, shapes, and profiles indicated and required to receive other adjacent construction retained by framing and supports. Fabricate from structural steel

METAL FABRICATIONS

055000 - 6

FIRE STATION 54

PROJECT 10914

shapes, plates, and steel bars of welded construction using mitered joints for field connection. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Equip units with integrally welded anchors for casting into concrete or building into masonry. Furnish inserts if units must be installed after concrete is placed.
 - a. Except as otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

2.11 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 80 steel pipe. Bollards to have 1/4-inch minimum steel plate welded to bottom.
 1. Provide pipe with 4 inch outside diameter; height above grade to be 4 feet.
- B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- thick steel plate welded to bottom of sleeve.

2.12 RECTANGULAR SLAB-TYPE MANHOLE FRAMES WITH SOLID LIDS

- A. Provide steel slab-type manhole frames of cast iron with solid lids, light duty, not hinged, as manufactured by Neenah Foundry Company, or other as approved by Architect.
 1. Provide R-1880 Series in sizes and details as indicated on drawings.

2.13 TV WALL MOUNTED YOKE BRACKETS WITH MOUNTING PLATES

- A. Wall mounted yokes, brackets and in-wall mounting plates to be by Peerless Sales Company, 1980 Hawthorne Ave., Melrose Park, IL 60160, (708) 856-8870, or other as acceptable to Architect.
 1. In-the-wall mounting plate to be manufacturer's Model No. WSP 414 in 11 gage steel in standard 14-1/2" wide by 13" high plate with a 1-1/2" return and a black fused epoxy finish. Mounting plate shall have a pre-drilled hole pattern to match up with all Peerless wall brackets and provision for up to three single gang electrical boxes for power, antenna, and remote control.
 2. Wall mount to be manufacturer's Model No. WMY 234 and shall consist of a wall plate arm assembly that has a 6" by 12" steel wall mounting plate with a gusset and a 1-1/2" by 2" by 20" long rectangular tubular arm welded in a horizontal plane. The arm shall extend at right angles to the wall and support an adjustable yoke bracket which shall be fastened securely to the bottom of the monitor.
 3. The steel yoke bracket, Model No. WMY 234 shall be constructed so that both height and width can be adjusted, and shall include a universal three piece perforated tray to facilitate attachment of the TV or monitor. The bracket, when properly installed, shall be capable of carrying a load of 215 pounds.

FIRE STATION 54

PROJECT 10914

4. The entire bracket assembly shall be finished in satin black fused epoxy. All hardware necessary for assembly of the bracket shall be included.

B. The installation contractor must supply the fasteners needed to attach the bracket to the wall.

C. Submit shop drawings indicating mounting heights and other pertinent data.

2.14 FINISHES, GENERAL

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.

B. Finish metal fabrications after assembly.

2.15 STEEL AND IRON FINISHES

A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:

1. ASTM A 153 for galvanizing iron and steel hardware.
2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch thick or thicker.

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 "Commercial Blast Cleaning."
2. Interiors (SSPC Zone 1A): SSPC-SP 3 "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with requirements of SSPC-PA 1 "Paint Application Specification No. 1" for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

METAL FABRICATIONS

055000 - 8

FIRE STATION 54

PROJECT 10914

3.2 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

3.3 INSTALLING PIPE BOLLARDS

- A. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.
- B. Fill bollards solidly with concrete, mounding top surface.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a 2.0-mil minimum dry film thickness.
- B. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

FIRE STATION 54

PROJECT 10914

**SECTION 061053
MISCELLANEOUS ROUGH CARPENTRY**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Framing with dimension lumber.
 2. Rooftop equipment bases and support curbs.
 3. Wood blocking, cants, and nailers.
 4. Wood furring and grounds.
 5. Wood sleepers.
 6. Utility shelving.
 7. Plywood backing panels.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

MISCELLANEOUS ROUGH CARPENTRY

061053-0531
EXHIBIT 1B
Page 64 of 600

FIRE STATION 54

PROJECT 10914

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 1. Preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Power-driven fasteners.
 4. Post-installed anchors.
 5. Metal framing anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS**2.1 WOOD PRODUCTS, GENERAL**

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish omit grade stamp and provide certificates of grade compliance issued by grading agency.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2.

FIRE STATION 54

PROJECT 10914

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency].
- D. Application: Treat items indicated on Drawings, and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

FIRE STATION 54

PROJECT 10914

- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- E. Application: Treat all miscellaneous carpentry unless otherwise indicated, items indicated on Drawings, and the following:
 - 1. Framing for raised platforms.
 - 2. Concealed blocking.
 - 3. Roof framing and blocking.
 - 4. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
 - 5. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
 - 7. Utility shelving.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any of the following species:
 - 1. Mixed southern pine or southern pine; SPIB.
 - 2. Spruce-pine-fir; NLGA.
 - 3. Hem-fir; WCLIB or WWPA.
 - 4. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 - 5. Western woods; WCLIB or WWPA.
 - 6. Eastern softwoods; NeLMA.
- C. Utility Shelving: Lumber with 19 percent maximum moisture content of any of the following species and grades:
 - 1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 - 2. Mixed southern pine or southern pine No. 2 grade; SPIB.
 - 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. Concealed Boards: 19 percent maximum moisture content of any of the following species and grades:

FIRE STATION 54

PROJECT 10914

1. Mixed southern pine or southern pine, No. 3 grade; SPIB.
 2. Spruce-pine-fir (south) or spruce-pine-fir, Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Screws for Fastening to Metal Framing: ASTM C 1002 ASTM C 954, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

FIRE STATION 54

PROJECT 10914

2.7 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cleveland Steel Specialty Co.
 2. KC Metals Products, Inc.
 3. Phoenix Metal Products, Inc.
 4. Simpson Strong-Tie Co., Inc.
 5. USP Structural Connectors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
1. Use for interior locations unless otherwise indicated.
- C. Stainless-Steel Sheet: ASTM A 666 Type 316.
1. Use for exterior locations and where indicated.

2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION**3.1 INSTALLATION, GENERAL**

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

FIRE STATION 54

PROJECT 10914

- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
- H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

FIRE STATION 54

PROJECT 10914

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

3.4 PROTECTION

- A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

FIRE STATION 54

PROJECT 10914

**SECTION 061600
SHEATHING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Wall sheathing.
 2. Roof sheathing.
 3. Parapet sheathing.
 4. Composite nail base insulated roof sheathing.
 5. Subflooring.
 6. Underlayment.
 7. Sheathing joint and penetration treatment.
- B. Related Requirements:
1. Section 061053 "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
 4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated plywood.
 2. Fire-retardant-treated plywood.

FIRE STATION 54

PROJECT 10914

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

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

2.2 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

SHEATHING

FIRE STATION 54

PROJECT 10914

2.4 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application Treat plywood indicated on Drawings, and the following:
 - 1. Roof sheathing.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. For sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
 - 2. For sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
 - 1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
- G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of

FIRE STATION 54

PROJECT 10914

sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- D. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 CEMENTITIOUS BACKER UNIT INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

END OF SECTION 061600

FIRE STATION 54

PROJECT 10914

SECTION 064023
INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Interior standing and running trim.
 2. Closet and utility shelving.
 3. Interior frames and jambs.
 4. Interior stairs and railings.
 5. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
 6. Shop priming of interior architectural woodwork.
 7. Shop finishing of interior architectural woodwork.
- B. Related Requirements:
1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.
 2. Section 062023 "Interior Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Wood-Preservative Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material and manufacturer's written warranty.

INTERIOR ARCHITECTURAL WOODWORK

064023-0531
EXHIBIT 1B
Page 76 of 600

FIRE STATION 54

PROJECT 10914

2. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 3. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Shop Drawings: For interior architectural woodwork.
1. Include plans, elevations, sections, and attachment details.
 2. Show large-scale details.
 3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
- C. Samples: For each exposed product and for each color and finish specified, in manufacturer's or fabricator's standard size.
1. Lumber for Transparent Finish: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
 2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished interior architectural woodwork.
 3. Lumber and Panel Products with Shop-Applied Opaque Finish: 5 inches wide by 12 inches long for lumber and 12 by 12 inches for panels, for each finish system and color.
 - a. Finish entire exposed surface.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer fabricator.
- B. Product Certificates: For the following:
1. Composite wood and agrifiber products.
 2. Adhesives.
- C. Evaluation Reports: For preservative-treated and fire-retardant-treated wood materials, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockups of typical interior architectural woodwork as shown on Drawings.

FIRE STATION 54

PROJECT 10914

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS**2.1 INTERIOR ARCHITECTURAL WOODWORK, GENERAL**

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Economy.
- B. For trim items wider than available lumber, use veneered construction. Do not glue for width.
 - 1. For veneered base, use hardwood lumber core, glued for width.

2.3 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Economy.

FIRE STATION 54

PROJECT 10914

- B. Wood Species: Any closed-grain hardwood.

2.4 CLOSET AND UTILITY SHELVING

- A. Grade: Economy.
- B. Shelf Material: 3/4-inch veneer-faced panel product with solid-lumber edge.
- C. Cleats: 3/4-inch solid lumber.
- D. Wood Species: Any closed-grain hardwood.
- E. Closet Rods: 1-1/2-inch-diameter, [red oak] [hardwood] [Douglas fir or southern pine] <Insert species>.
- F. Closet Rods: 1-5/16-inch-diameter, [aluminum] [chrome-plated-steel] [color-coated-steel] [stainless-steel] tubes complying with BHMA A156.16, L03131.

2.5 INTERIOR FRAMES AND JAMBS FOR TRANSPARENT FINISH

- A. Grade: Economy.
- B. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.
- C. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard or fire-retardant MDF with veneered exposed surfaces and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Fire Rating: 20 minutes.

2.6 INTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- A. Grade: Economy.
- B. Wood Species: Any closed-grain hardwood.
- C. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard with veneered exposed surfaces or fire-retardant MDF and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
 - 1. Fire Rating: 20 minutes.

FIRE STATION 54

PROJECT 10914

2.7 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.
1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
 2. Wood Moisture Content: 8 to 13 percent.

2.8 PRESERVATIVE-TREATED-WOOD MATERIALS

- A. Preservative-Treated-Wood Materials: Provide with water-repellent preservative treatment complying with AWPA N1 (dip, spray, flood, or vacuum-pressure treatment).
1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC).
 2. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- B. Extent of Preservative-Treated Wood Materials: Treat interior architectural woodwork in contact with concrete or masonry.
1. Items fabricated from the following wood species need not be treated:
 - a. Redwood.
 - b. Western red cedar.
 - c. White oak.
 - d. African mahogany.
 - e. Honduras mahogany.
 - f. Ipe.
 - g. Dark red meranti.
 - h. Teak.

2.9 FIRE-RETARDANT-TREATED WOOD MATERIALS

- A. Fire-Retardant-Treated Wood Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant

progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. For items indicated to receive a stained, transparent, or natural finish, use organic resin chemical formulation.
3. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.

2.10 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Nailers: kiln-dried to less than 15 percent moisture content.
 1. Preservative Treatment: Provide softwood lumber treated by pressure process, AWPA U1; Use Category UC3b.
 - a. Provide where in contact with concrete or masonry.
 - b. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - c. Preservative Chemicals: Acceptable to authorities having jurisdiction.
 - d. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.
 2. Fire-Retardant Treatment: Complying with requirements; provide where indicated.
- B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.11 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 1. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
 2. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.

FIRE STATION 54

PROJECT 10914

3. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that parts fit as intended and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.12 SHOP PRIMING

- A. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 099123 "Interior Painting."
- B. Interior Architectural Woodwork for Transparent Finish: Shop seal with stain (if required), other required pretreatments, and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing."
- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork.

2.13 SHOP FINISHING

- A. General: Finish interior architectural woodwork [**with transparent finish**] [**indicated on Drawings**] at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.
- C. Opaque Finish:
 1. Grade: Same as item to be finished.
 2. Finish: System - conversion varnish.
 3. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to average prevailing humidity conditions in installation areas.

FIRE STATION 54

PROJECT 10914

- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.
- F. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed fastening, countersunk and filled flush with interior architectural woodwork.
 - 1. For shop-finished items, use filler matching finish of items being installed.
- H. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches long except where shorter single-length pieces are necessary.
 - 1. Scarf running joints and stagger in adjacent and related members.
 - 2. Fill gaps, if any, between top of base and wall with latex sealant, painted to match wall.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- I. Touch up finishing work specified in this Section after installation of interior architectural woodwork. Fill nail holes with matching filler where exposed.
 - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.
- J. See Section 099123 "Interior Painting" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

FIRE STATION 54

PROJECT 10914

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects. Where not possible to repair, replace interior architectural woodwork. Adjust joinery for uniform appearance.
- B. Clean interior architectural woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

FIRE STATION 54

PROJECT 10914

**SECTION 071416
COLD FLUID-APPLIED WATERPROOFING**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section, for elevator pits, as indicated on the Drawings, and as specified in this section.

1.2 SUMMARY

- A. Section Includes:
1. Single-component polyurethane waterproofing.
 2. Molded-sheet drainage panels.
 3. Insulation.
- B. Related Section:
1. Division 07 Section "Joint Sealants" for joint-sealant materials and installation.
 2. Division 03 Section "Cast-In-Place Concrete".
 3. Division 14 Section "Hydraulic Elevators".

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
- C. Samples: For the following products:
1. Flashing sheet, 10 by 8 inches.
 2. Membrane-reinforcing fabric, 10 by 8 inches.
 3. Insulation, 10 by 8 inches.
 4. Drainage panel, 4 by 4 inches.
- D. Qualification Data: For Installer.

COLD FLUID-APPLIED WATERPROOFING

CAM 071416 - 1
EXHIBIT 1B
Page 85 of 600

FIRE STATION 54

PROJECT 10914

- E. Product Test Reports: For waterproofing, based on evaluation of comprehensive tests performed by a qualified testing agency.
- F. Field quality-control reports.
- G. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.
- B. Source Limitations: Obtain waterproofing materials, protection course molded-sheet drainage panels from single source from single manufacturer.
- C. Mockups: Before beginning installation, install waterproofing to 100 sq. ft. of floor and wall to demonstrate surface preparation, crack and joint treatment, corner treatment, thickness, texture, and execution quality.
 - 1. If Architect determines mockups do not comply with requirements, reapply waterproofing and reinstall overlaying construction until mockups are approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Protect stored materials from direct sunlight.

FIRE STATION 54

PROJECT 10914

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F above dew point.
 - 1. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials.

1.7 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer and Installer agree to repair or replace waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate that exceed 1/16 inch in width.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Installer's Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of five years.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS**2.1 SINGLE-COMPONENT POLYURETHANE WATERPROOFING**

- A. Single-Component, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Permaquik Inc.; PQ 6800.
 - b. Anti-Hydro International, Inc.; A-H Seamless Membrane.
 - c. Carlisle Coatings & Waterproofing Inc.; CCW-525.
 - d. Karnak Corporation; One-Kote System.
 - e. Meadows, W.R., Inc.; Sealtight Meadow-Pruf Seamless
 - f. Mer-Kote Products, Inc.; Mer-Thane 320.
 - g. Neogard, Div. of Jones-Blair; Neogard 7401.
- B. Single-Component, Reinforced, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.

FIRE STATION 54

PROJECT 10914

1. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW-525-H.
 - b. Or product that is equal.

2.2 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials recommended by manufacturer to be compatible with one another and with waterproofing, as demonstrated by waterproofing manufacturer, based on testing and field experience.
- B. Primer: Manufacturer's standard, factory-formulated polyurethane or epoxy primer.
- C. Sheet Flashing: 50-mil-minimum, nonstaining, uncured sheet neoprene.
 1. Adhesive: Manufacturer's recommended contact adhesive.
- D. Membrane-Reinforcing Fabric: Nonwoven, needle-punched white polyester fabric, 6-oz./sq. yd. and or manufacturer's standard weight.
- E. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
- F. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing, complying with ASTM C 920 Type M, Class 25; Grade NS for sloping and vertical applications or Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.
 1. Backer Rod: Closed-cell polyethylene foam.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.

FIRE STATION 54

PROJECT 10914

- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- D. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
 - 1. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
- E. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

3.3 PREPARATION AT TERMINATIONS AND PENETRATIONS

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C 898 ASTM C 1471 and manufacturer's written instructions.
- B. Prime substrate unless otherwise instructed by waterproofing manufacturer.
- C. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.
 - 1. Provide sealant cants around penetrations and at inside corners of deck-to-wall butt joints when recommended by waterproofing manufacturer.

3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 898 ASTM C 1471 and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks, complying with ASTM D 4258, before coating surfaces.
 - 1. Comply with ASTM C 1193 for joint-sealant installation.
 - 2. Apply bond breaker between sealant and preparation strip.
 - 3. Prime substrate and apply a single thickness of preparation strip extending a minimum of 3 inches along each side of joint. Apply waterproofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.
- B. Install sheet flashing and bond to deck and wall substrates where indicated or required according to waterproofing manufacturer's written instructions.
 - 1. Extend sheet flashings onto perpendicular surfaces and other work penetrating substrate according to ASTM C 898.

FIRE STATION 54

PROJECT 10914

3.5 WATERPROOFING APPLICATION

- A. Apply waterproofing according to ASTM C 898 ASTM C 1471 and manufacturer's written instructions.
- B. Start installing waterproofing in presence of manufacturer's technical representative.
- C. Apply primer over prepared substrate.
- D. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
 - 1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases, with an average dry film thickness of 60 mils and a minimum dry film thickness of 50 mils at any point.
 - 2. Apply waterproofing to prepared wall terminations and vertical surfaces.
 - 3. Verify wet film thickness of waterproofing every 100 sq. ft..

3.6 INSULATION INSTALLATION

- A. Install one or more layers of board insulation to achieve required thickness over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.
- B. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use type of adhesive recommended in writing by insulation manufacturer.
- C. On horizontal surfaces, place insulation units unadhered according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.7 FIELD QUALITY CONTROL

- A. Engage a full time site representative qualified by the waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, and application of the membrane, flashings, protection, and drainage components; and to furnish daily reports to Architect.
- B. Flood Testing: Flood test elevator pit for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - 1. Flood to an average depth of 2-1/2 inches with a minimum depth of 1 inch and not exceeding a depth of 4 inches. Maintain 2 inches of clearance from top of sheet flashings.
 - 2. Flood each area for 48 hours.
 - 3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
- C. Engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing. Contractor to coordinate inspections for flood tests.

FIRE STATION 54

PROJECT 10914

3.8 CURING, PROTECTION, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
 - 1. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed insulation drainage panels from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Immediately after installation, provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071416

FIRE STATION 54

PROJECT 10914

**SECTION 071700
BENTONITE WATERPROOFING**

PART 1 - GENERAL**1.1 SUMMARY**

- A. Section Includes:
 - 1. Bentonite waterproofing to be applied at the exterior side of the elevator pits.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for interface with other work.
- C. Material certificates.
- D. Product test reports.
- E. Sample warranty.
- F. Letter from waterproofing manufacturer confirming installer is a manufacturer's approved certified installer.

1.3 QUALITY ASSURANCE

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

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree(s) to repair or replace components of Bentonite waterproofing system that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS**2.1 COMPOSITE HDPE/BENTONITE MEMBRANE**

- A. Composite Saline/Alkaline HDPE/Bentonite Membrane: Minimum 150-mil- (3.8-mm-) thick membrane consisting of a 60-mil- (1.5-mm-) thick, HDPE geomembrane liner bonded to a layer of Bentonite clay granules.
 - 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. Tremco Commercial Sealants & Waterproofing, an RPM company; Saltwater Paraseal.
 - b. Carlisle Coating & Waterproofing
 - 2. Puncture Resistance: 169 lbf (752 N) according to ASTM E 154.
 - 3. Vapor Permeance: 0.03 perms according to ASTM E 96.

2.2 INSTALLATION ACCESSORIES

- A. General: Manufacturer's standard accessories recommended for intended use and compatible with Bentonite waterproofing.
- B. Protection Course: ASTM D 6506, semi-rigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners, and as follows:
 - 1. Thickness: 1/8 inch (3 mm), nominal.
- C. Geotextile Protection Course: As recommended by waterproofing manufacturer.

PART 3 - EXECUTION**3.1 INSTALLATION, GENERAL**

- A. Prepare substrates to be waterproofed, install waterproofing and accessories, and protect waterproofing from damage and wetting according to manufacturer's written instructions and warrantable details.
- B. Install protection course before backfilling or placing overburden when recommended by waterproofing manufacturer.

FIRE STATION 54

PROJECT 10914

3.2 COMPOSITE HDPE/BENTONITE MEMBRANE INSTALLATION

- A. Install a continuous layer of waterproofing membrane with ends and edges lapped a minimum of 3 inches (75 mm). Stagger end joints between membranes or manufacturer's minimum required lap if greater. Seal joints with permanent seam tape.

END OF SECTION 071700

FIRE STATION 54

PROJECT 10914

**SECTION 072100
THERMAL INSULATION**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

A. Section Includes:

1. Foam-plastic board insulation.
2. Spray polyurethane foam insulation.
3. Vapor retarders.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for insulation installed in cavity walls and masonry cells.
2. Division 06 Section "Sheathing" for foam-plastic board sheathing over wood or steel framing.
3. Division 07 Section "Thermoplastic Sheet Waterproofing" for insulated drainage panels installed with waterproofing.
4. Division 07 Section(s) "Thermoplastic Polyolefin (TPO) Roofing" for insulation specified as part of roofing construction.
5. Division 07 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
6. Division 09 Section(s) "Gypsum Board Shaft Wall Assemblies" for installation in wood- and metal-framed assemblies of insulation specified by referencing this Section.

1.3 SUBMITTALS

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

B. Sustainable Design Submittals:

1. Product Data for products having low VOCs and recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

- D. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

FIRE STATION 54

PROJECT 10914

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - d. Pactiv Building Products.
 2. Type VII, 60 psi.

2.2 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CertainTeed Corporation.
 2. Guardian Building Products, Inc.
 3. Johns Manville.
 4. Knauf Insulation.
 5. Owens Corning.

THERMAL INSULATION

CAM 17-0501 - 2
EXHIBIT 1B
Page 96 of 600

FIRE STATION 54

PROJECT 10914

- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
- C. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- D. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.3 SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following: (R-13 min. required)
 - a. BASF Corporation.
 - b. BaySystems NorthAmerica, LLC.
 - c. Dow Chemical Company (The).
 - d. Gaco Western Inc.
 - e. NCFI; Division of Barnhardt Mfg. Co.
 - 2. Minimum density of 1.5 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 10 mils thick, with maximum permeance rating of 0.13 perm.
- B. Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0507 perm.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Raven Industries Inc.; DURA-SKRIM 6WW.
 - b. Reef Industries, Inc.; Griffolyn T-65.
- C. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: Two outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nonwoven grid of nylon cord or polyester scrim and weighing not less than 22 lb/1000 sq. ft., with maximum permeance rating of 0.1317 perm and with flame-spread and smoke-developed indexes of not more than 5 and 60, respectively, per ASTM E 84.

FIRE STATION 54

PROJECT 10914

1. Products: Subject to compliance with requirements, provide the following:
 - a. Raven Industries Inc.; DURA-SKRIM 2FR.
 - b. Reef Industries, Inc.; Griffolyn T-55 FR.
- D. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- E. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- F. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- G. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

2.5 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Gemco; Spindle Type.
 2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Gemco; 90-Degree Insulation Hangers.
 - b. Or equal product.
 2. Angle: Formed from 0.030-inch-thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. AGM Industries, Inc.; RC150 or SC150.

FIRE STATION 54

PROJECT 10914

- b. Gemco; Dome-Cap R-150 or S-150.
 - c. Or equal product.
- 2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Crawl spaces.
 - b. Ceiling plenums.
 - c. Attic spaces.
 - d. Where indicated.
- D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Gemco; Clutch Clip.
 - b. Or equal product.
- E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

FIRE STATION 54

PROJECT 10914

3.3 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
 - 1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry."
- B. Cellular-Glass Board Insulation: Install with closely fitting joints using adhesive pad or serrated trowel attachment method according to manufacturer's written instructions.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
- C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 - 6. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
 - b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
 - 7. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

FIRE STATION 54

PROJECT 10914

- a. Exterior Walls: Set units with facing placed toward exterior of construction and interior of construction.
 - b. Interior Walls: Set units with facing placed toward areas of high humidity.
- D. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
- 1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
- E. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
- F. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
- 1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
 - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.5 INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION

- A. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install blanket insulation over entire ceiling area in thicknesses indicated. Extend insulation 48 inches up either side of partitions.

3.6 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

- A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

FIRE STATION 54

PROJECT 10914

3.7 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 - 1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
 - 2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 - 3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.8 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

3.9 INSULATION SCHEDULE

- A. Insulation Type (ROOF): extruded-polystyrene board insulation, R-20 min. (as shown in drawings).
- B. Insulation Type (EXTERIOR WALLS): extruded-polystyrene board insulation, R-10 min. (as shown in drawings).
- C. Insulation Type (INTERIOR WALLS): Unfaced flexible glass-fiber Batt insulation, use for sound and fire rated walls. Batt thickness to match stud width. (as shown in drawings).
- D. Insulation Type (EXTERIOR WALLS): Used at concrete masonry units: Cellulosic-fiber loose-fill insulation or Spray in cell foam insulation. (Where shown on drawings).

END OF SECTION 072100

FIRE STATION 54

PROJECT 10914

**SECTION 075400
THERMOPLASTIC MEMBRANE ROOFING**

PART 1 GENERAL**1.01 SUMMARY**

- A. Section Includes
1. Thermoplastic Polyolefin Single-Ply Roofing Membrane
 2. Thermoplastic Polyolefin Flashings
 3. Thermoplastic Polyolefin Accessories
- B. Related Sections
1. Section 06100: Rough Carpentry
 2. Section 07620: Sheet Metal Flashing and Trim
 3. Section 15430: Plumbing Specialties

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM) - *Annual Book of ASTM Standards*
1. ASTM D-751 – Standard Test Methods for Coated Fabrics
 2. ASTM D-2137 - Standard Test Methods for Rubber Property—Brittleness Point of Flexible Polymers and Coated Fabrics
 3. ASTM E-96 - Standard Test Methods for Water Vapor Transmission of Materials
 4. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheet or Film at Elevated Temperature
 5. ASTM D-471 - Standard Test Method for Rubber Property—Effect of Liquids
 6. ASTM D-1149 - Standard Test Methods for Rubber Deterioration—Cracking in an Ozone Controlled Environment
 7. ASTM C-1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
 8. ASTM C-1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
 9. ASTM E 903 – Standard Test Method for Solar Absorptance, Reflectance, and Transmission of Materials Using Integrating Spheres
 10. ASTM G155 - Standard Practice For Operating Xenon Arc Light Apparatus For Exposure Of Non-Metallic Materials
 11. ASTM D573 - Standard Test Method For Rubber - Deterioration In An Air Oven
- B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - *Architectural Sheet Metal Manual*
- C. National Roofing Contractors Association (NRCA)
- D. American Society of Civil Engineers (ASCE)
- E. U.S. Green Building Council (USGBC)

THERMOPLASTIC MEMBRANE ROOFING

075400 -10

FIRE STATION 54

PROJECT 10914

1. Leadership in Energy and Environmental Design (LEED)

- F. Factory Mutual (FM Global) - *Approval Guide*
- G. Underwriters Laboratories (UL) - *Roofing Systems and Materials Guide* (TGFU R1306)
- H. California Title 24 Energy Efficient Standards
- I. ENERGY STAR
- J. Cool Roofing Rating Council (CRRC)
- K. Miami-Dade County

1.03 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D1079 and the glossary of the National Roofing Contractors Association (NRCA) *Roofing and Waterproofing Manual* for definitions of roofing terms related to this section.

1.04 SUBMITTALS

- A. Product Data: Provide product data sheets for each type of product indicated in this section.
- B. Shop Drawings: Provide manufacturers standard details and approved shop drawings for the roof system specified.
- C. Samples: Provide samples of insulations, fasteners, membrane materials and accessories for verification of quality.
- D. Certificates: Installer shall provide written documentation from the manufacturer of their authorization to install the roof system, and eligibility to obtain the warranty specified in this section.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer shall provide a roofing system that meets or exceeds all criteria listed in this section.
- B. Installer's Qualifications:
 - 1. Installer shall be certified by Manufacturer.
- C. Source Limitations: All components listed in this section shall be provided by a single manufacturer or approved by the primary roofing manufacturer.
- D. Final Inspection
Manufacturer's representative shall provide a comprehensive final inspection after completion of the roof system. All application errors must be addressed and final punch list completed.

FIRE STATION 54

PROJECT 10914

1.06 PRE-INSTALLATION CONFERENCE

- A. Prior to scheduled commencement of the roofing installation and associated work, conduct a meeting at the project site with the installer, architect, owner, Manufacturer's representative and any other persons directly involved with the performance of the work. The installer shall record conference discussions to include decisions and agreements reached (or disagreements), and furnish copies of recorded discussions to each attending party. The main purpose of this meeting is to review foreseeable methods and procedures related to roofing work.

1.07 PERFORMANCE REQUIREMENTS

- A. Provide an installed roofing membrane and base flashing system that does not permit the passage of water, and will withstand the design pressures calculated in accordance with the most current revision of ASCE 7.
- B. Manufacturer shall provide all primary roofing materials that are physically and chemically compatible when installed in accordance with manufacturers current application requirements.

1.08 REGULATORY REQUIREMENTS

- A. All work shall be performed in a safe, professional manner, conforming to all federal, state and local codes.

1.09 DELIVERY, STORAGE AND HANDLING

- A. Deliver all roofing materials to the site in original containers, with factory seals intact. All products are to carry a Manufacturer's label.
- B. Store all pail goods in their original undamaged containers in a clean, dry location within their specified temperature range.
- C. Do not expose materials to moisture in any form before, during, or after delivery to the site. Reject delivery of materials that show evidence of contact with moisture.
- D. Remove manufacturer supplied plastic covers from materials provided with such. Use "breathable" type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Cover and protect materials at the end of each work day. Do not remove any protective tarpaulins until immediately before the material will be installed.
- E. Materials shall be stored above 55°F a minimum of 24 hours prior to application.

1.10 PROJECT CONDITIONS

- A. Weather
1. Proceed with roofing only when existing and forecasted weather conditions permit.
 2. Ambient temperatures must be above 45°F when applying hot asphalt or water based adhesives.

FIRE STATION 54

PROJECT 10914

1.11 WARRANTY

- A. Provide Manufacturers standard Guarantee with single source coverage and no monetary limitation where the manufacturer agrees to repair or replace components in the roofing system, which cause a leak due to a failure in materials or workmanship.
1. Duration: Twenty (20) years from the date of completion.

PART 2 PRODUCTS**2.01 ACCEPTABLE MANUFACTURER**

- a. Carlisle SynTec Incorporated.
- b. Firestone Building Products Company.
- c. GAF Materials Corporation.
- d. Johns Manville International, Inc.

2.02 MEMBRANE MATERIALS

- A. A fleece-backed, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. Each full roll contains approximately 1000 sq.ft. of roofing material, 10' X 100', weighing 350 lbs. Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 175 lbs.

2.03 FLASHING MATERIALS

- A. A smooth type, polyester scrim reinforced thermoplastic polyolefin membrane with a nominal 0.060 inch (60 mil) thickness, for use as a single ply roofing membrane. Meets or exceeds the minimum requirements of ASTM D-6878. UL Listed, FM Approved, Dade County Product Approval, Florida Building Code Approved. White membrane is Energy Star Listed, CRRC Listed and Title 24 Compliant. Each full roll contains approximately 1000 sq.ft. of roofing material, 10' X 100', weighing 322 lbs. Each half sheet roll contains approximately 500 sq.ft. of roofing material, 5' X 100', weighing 162 lbs. Half sheet roll required for roof perimeter use in mechanically attached systems.

2.04 ADHESIVES, SEALANTS and PRIMERS

- A. Solvent-based Bonding Adhesive: Solvent based rubberized adhesive for use with TPO membranes.
- B. Solvent based liquid, required to protect field cut edges of TPO membranes. Applied directly from a squeeze bottle.
- C. Solvent based primer for preparing surfaces to receive butyl based adhesive tapes.
- D. Solvent based seam cleaner used to clean exposed or contaminated seam prior to heat welding.

FIRE STATION 54

PROJECT 10914

- E. Solvent based, trowel grade synthetic elastomeric sealant. Durable and UV resistant suitable for use where caulk is typically used.
- F. Commercial grade roofing sealant suitable for sealing the upper lip of exposed termination bars and penetrations and around clamping rings and comes with a 20 yr ltd warranty against leaks caused by manufacturing defects. Meets the performance criteria of ASTM D412, ASTM D2196, ASTM D1475 and ASTM D1644.
- G. Low VOC solvent based primer for preparing surfaces to receive butyl based adhesive tapes.
- H. Low VOC TPO cleaner designed to clean exposed or contaminated seams prior to heat welding to remove any residual soap or revitalize aged membranes. Contains only 50 grams per liter of Volatile Organic Content and has been formulated using a blend of primarily VOC-exempt ingredients to be in compliance with air quality regulations for single ply roofing products.
- I. One part butyl based high viscosity sealant suitable for sealing between flashing membrane and substrate surface behind exposed termination bars and for sealing between roofing membrane and drain flange.
- J. 100% solids epoxy based two-part sealant suitable for filling sealant pans at irregularly-shaped penetrations. Epoxy is part A. Polyamide is part B.
- K. One-part, moisture-cure, self-leveling sealant designed for use in pitch pans on single ply roof systems.

2.05 ACCESSORIES**A. Mechanical Fasteners**

1. Heavy gauge alloy steel fastener with CR-10 coating with a .275" (6.9 mm) diameter thread. Factory Mutual Standard 4470 Approved, #3 Phillips truss head for use on heavy steel decks, O.S.B or aluminum roof decks.
2. Galvalume, 2" (52 mm) diameter, with a double barbed underside.

B. FLASHING ACCESSORIES

1. A smooth type, unreinforced thermoplastic polyolefin based membrane for use as an alternative flashing/reinforcing material for penetrations and corners. Required whenever preformed vent boots cannot be used.
2. An 8 inch (20 cm) wide smooth type, polyester scrim reinforced thermoplastic polyolefin membrane strip for use as a cover strip over coated metal and stripping-in coated metal flanges and general repairs: 0.045 inches (45 mils) nominal thickness.
3. Extruded aluminum termination bar with angled lip caulk receiver and lower leg bulb stiffener.

FIRE STATION 54

PROJECT 10914

4. A 6 inch (14 cm) wide, smooth type, heat-weldable polyester scrim reinforced thermoplastic polyolefin membrane strip. Designed for use as a cover strip over non-coated metal edges and flanges.
5. .045" reinforced TPO membrane with pressure sensitive adhesive, to be installed on horizontal surfaces using plates and fasteners as a base attachment in fully adhered systems.
6. 24 gauge steel with 0.025" thick TPO based film as required for fabrication into metal gravel stop and drip edge profiles, metal base and curb flashings, sealant pans, and scupper sleeves.

C. WALL & CURB ACCESSORIES

1. .045" thick reinforced TPO membrane fabricated corners. Available in four standard sizes to flash curbs. Four corners are required to flash the curb.
2. 0.045" thick molded TPO membrane outside corners of base and curb flashing. Hot-air welds directly to TPO membrane.
3. 0.055" molded TPO membrane inside corners of base and curb flashing. Hot-air welds directly to TPO membrane.
4. 8" diameter, nominal .050" vacuum formed unreinforced TPO membrane for use in flashing outside corners of base and curb flashings.

D. PENETRATION ACCESSORIES

1. 0.075" thick molded TPO membrane sized to accommodate most common pipe and conduits, (1" to 6" diameter pipes), including square tube. Hot-air welded directly to TPO membrane, supplied with stainless steel clamping rings.
2. 0.045" thick molded TPO membrane preformed boots split to accommodate most common pipes and conduits.
3. 0.045" thick molded TPO membrane preformed square boots split to accommodate most common square penetrations and conduits.
4. .070 thick molded penetration pocket to provide structure and foundation for the application of a pourable sealant for a variety of roof penetrations, weldable.

E. ROOF EDGE ACCESSORIES

1. Three piece fascia system with continuous galvanized steel spring cant, exterior decorative snap-on fascia.
2. Two piece fascia system with rigid terminator base plate and exterior decorative fascia cover.

FIRE STATION 54

PROJECT 10914

3. Two piece fascia system with rigid extruded terminator base plate and exterior decorative snap-on fascia cover.

F. FIELD OF ROOF ACCESSORIES

1. .055" thick smooth type, unreinforced thermoplastic polyolefin membrane designed for use as a conforming membrane seal over T-joints in 60 and 80 mil membrane applications.
2. 1/8" thick extruded and embossed TPO walkway roll, heat welds directly to roofing membrane. Herringbone traction surface.

PART 3 EXECUTION**3.01 EXAMINATION**

- A. Verify that the surfaces and site conditions are ready to receive work.
- B. Verify that the deck is supported and secured.
- C. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters.
- D. Verify that the deck surfaces are dry and free of ice or snow.
- E. Verify that all roof openings or penetrations through the roof are solidly set, and that all flashings are tapered.

3.02 SUBSTRATE PREPARATION

- A. Lightweight Insulating Concrete Deck
 1. Lightweight insulating concrete decks are required to have a minimum thickness of 2" (5.1 cm), a minimum compressive strength of 125 psi (87,000 kg/m²) and a minimum density of 22 pcf (352 kg/m³). Individual deck manufacturer's standards apply when their specifications exceed the minimum thickness, compressive strength, or density requirements.
 2. The lightweight insulating deck/fill must be installed by an applicator approved by the deck manufacturer.
 3. The roof system shall be installed immediately following deck curing to prevent damage from exposure to precipitation. The deck manufacturer determines the minimum curing time and maximum exposure limitations.
 4. LWIC should not be poured during rainy periods. Deck areas that have frozen before they have cured must be removed and replaced. Decks which receive precipitation prior to installation of the roof membrane must be checked for moisture content and dryness.
 5. The moisture content of existing LWIC must be under 20% when insulation is to be fastened directly to it. Where moisture content exceeds 20%, a layer of Stratavent Eliminator Venting Base Sheet must be installed prior to the insulation.

FIRE STATION 54

PROJECT 10914

6. Where the mean January temperature (Reference current ASHRAE Fundamentals Handbook) is below 40° F (4.4°C), lightweight insulating concrete decks must be poured and roofed between April 1st and October 31st.

3.03 INSTALLATION - GENERAL

- A. Install TPO roofing system according to all manufacturer's current application requirements in addition to those listed in this section.
- B. Start the application of membrane plies at the low point of the roof or at the drains, so that the flow of water is over or parallel to, but never against the laps.

3.04 MEMBRANE APPLICATION

- A. Mechanically Attached:
 1. Place membrane so that wrinkles and buckles are not formed. Any wrinkles or buckles must be removed from the sheet prior to permanent attachment. Roof membrane shall be mechanically fastened immediately after it is rolled out, followed by welding to adjacent sheets.
 2. Overlap roof membrane a minimum of 6" for side laps and 3" for end laps.
 3. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
 4. All exposed sheet corners shall be rounded a minimum of 1".
 5. Use full width rolls in the field of roof and half width rolls in the perimeter and corner region of the roof and mechanically fastened in the side lap area to the roof deck.
 6. Membrane laps shall be heat-welded together. All welds shall be continuous, without voids or partial welds. Welds shall be free of burns and scorch marks.
 7. Weld shall be a minimum of 1-1/2" in width for automatic machine welding and a minimum 2" in width for hand welding.
 8. All cut edges of reinforced membrane must be sealed with TPO cut edge sealant.
 9. The membrane shall be mechanically fastened in the side lap area to the roof deck with appropriate Drill-Tec™ fasteners and plates as required by roof system specification and/or Factory Mutual classification requirements.
 10. The metal plates must be placed within 1/4" to 1/2" of the membrane edge. Plates shall not be placed less than 1/4" from the membrane edge.
 11. In the corner regions, additional fasteners shall be installed through the perimeter membrane to form a grid pattern, with an 8" (40.5 cm) wide TPO reinforced membrane flashing-strip welded over the additional fasteners. Corners include both outside and inside corners that measure 75 - 105 angle degrees.
 12. Membrane attachment to the roof deck is required at locations of deck angle changes in excess of five (5) angle degrees (1" in 12").
 13. Supplemental membrane attachment is required at the base of all walls and curbs, and where the angle of the substrate changes by more than ten (10) degrees (1" in 12"). Roofing membrane shall be secured to the structural deck with screws and plates of the same type and spacing used for in-lap attachment. The screws and plates must be installed no less than 1/2" from the membrane edge. Alternatively, the roofing membrane may be turned up the vertical plane a minimum of 3" and secured with screws and termination bar. Fastener spacing is the same as is used for in-lap attachment. The

FIRE STATION 54

PROJECT 10914

- termination bar must be installed within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.
14. Supplemental membrane attachment to the structural deck is required at all penetrations. Roofing membrane shall be secured to the deck with appropriate screws and plates.
 15. Fasteners must be installed to achieve the proper embedment depth. Install fasteners without lean or tilt.
 16. Install fasteners so that the plate or termination bar is drawn down tightly to the membrane surface. Properly installed fasteners will not allow the plate or termination bar to move (underdriving), but will not cause wrinkling of the membrane (overdriving).

3.05 FLASHINGS

- A. All penetrations must be at least 24" (61 cm) from curbs, walls, and edges to provide adequate space for proper flashing.
- B. Flash all perimeter, curb, and penetration conditions with coated metal, membrane flashing, and flashing accessories as appropriate to the site condition.
- C. All coated metal and membrane flashing corners shall be reinforced with preformed corners or non-reinforced membrane.
- D. Hot-air weld all flashing membranes, accessories, and coated metal. A minimum 2" wide (hand welder) weld or minimum 1 - 1/2" automatic machine weld is required.
- E. Non-coated metal edge details must be installed in accordance with current roofing manufacturer's construction details and requirements.
- F. All cut edges of reinforced membrane must be sealed with TPO cut edge Sealant.
- G. Consult the manufacturer's Application and Specifications Manual or Contractor Services for more information on specific construction details.

3.06 TRAFFIC PROTECTION

- A. Install walkway rolls at all roof access locations and other designated locations including roof-mounted equipment work locations and areas of repeated rooftop traffic.
- B. Walkway pads must be spaced 2" apart to allow for drainage between the pads.
- C. Heat-weld walkway rolls to the roof membrane surface continuously around the perimeter of the roll.
- D. Walkway rolls may be installed with TPO primer and 3" seam tape.
 1. Roll or brush the TPO primer on the back of the TPO pad along the edges and down the middle length of the pad.
 2. Clean and prime the roof membrane where the pad will be installed.
 3. Install tape to the back of the cleaned area of the pad and roll in with a silicone hand roller.

FIRE STATION 54

PROJECT 10914

4. Remove release paper and install the tapes pads directly onto the roof membrane. Roll pads to secure in place

3.07 ROOF PROTECTION

- A. Protect all partially and fully completed roofing work from other trades until completion.
- B. Whenever possible, stage materials in such a manner that foot traffic is minimized over completed roof areas.
- C. When it is not possible to stage materials away from locations where partial or complete installation has taken place, temporary walkways and platforms shall be installed in order to protect all completed roof areas from traffic and point loading during the application process.
- D. Temporary tie-ins shall be installed at the end of each workday and removed prior to commencement of work the following day.

3.08 CLEAN-UP

- A. All work areas are to be kept clean, clear and free of debris at all times.
- B. Do not allow trash, waste, or debris to collect on the roof. These items shall be removed from the roof on a daily basis.
- C. All tools and unused materials must be collected at the end of each workday and stored properly off of the finished roof surface and protected from exposure to the elements.
- D. Dispose of or recycle all trash and excess material in a manner conforming to current EPA regulations and local laws.
- E. Properly clean the finished roof surface after completion, and make sure the drains and gutters are not clogged.
- F. Clean and restore all damaged surfaces to their original condition.

END OF SECTION 075400

THERMOPLASTIC MEMBRANE ROOFING

075400 -10

FIRE STATION 54

PROJECT 10914

SECTION 076200 SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following sheet metal flashing and trim:
1. Manufactured through-wall flashing.
 2. Manufactured reglets.
 3. Formed roof drainage system.
 4. Formed low-slope roof flashing and trim.
 5. Formed steep-slope roof flashing and trim.
 6. Formed wall flashing and trim.
 7. Formed equipment support flashing.
 8. Formed overhead-piping safety pans.
- B. Related Sections include the following:
1. Division 03 Section "Cast-in-Place Concrete" for installing reglets.
 2. Division 04 Section "Unit Masonry" for installing through-wall flashing, reglets, and other sheet metal flashing and trim.
 3. Division 05 Section "Expansion Control" for manufactured sheet metal expansion-joint covers.
 4. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
 5. Division 07 Section "Thermoplastic Membrane Roofing (TPO)" for installing sheet metal flashing and trim integral with roofing membrane.
 6. Division 07 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
 7. Division 07 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
1. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft.: 208-lbf/sq. ft. perimeter uplift force, 312-lbf/sq. ft. corner uplift force, and 104-lbf/sq. ft. outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

SHEET METAL FLASHING AND TRIM

CAM 17-0531 - 1
076200 - 1
EXHIBIT 1B
Page 113 of 600

FIRE STATION 54

PROJECT 10914

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

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. Shop Drawings: Show layouts of sheet metal flashing and trim, including plans and elevations. Distinguish between shop- and field-assembled work. Include the following:
1. Identify material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for fastening, joining, supporting, and anchoring sheet metal flashing and trim, including fasteners, clips, cleats, and attachments to adjoining work.
 4. Details of expansion-joint covers, including showing direction of expansion and contraction.
- C. Samples for Initial Selection: For each type of sheet metal flashing and trim indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Flashing: 12 inches long. Include fasteners, cleats, clips, closures, and other attachments.
 2. Trim: 12 inches long. Include fasteners and other exposed accessories.
 3. Accessories: Full-size Sample.

1.5 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
1. Copper Standard: Comply with CDA's "Copper in Architecture Handbook."
- B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical roof eave fascia trim apron flashing, approximately 48 inches long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
 2. Approval of mockups is for other material and construction qualities specifically approved by Architect in writing.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
1. Meet with City, Architect, City's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 2. Review methods and procedures related to sheet metal flashing and trim.

FIRE STATION 54

PROJECT 10914

3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sheet metal flashing materials and fabrications undamaged. Protect sheet metal flashing and trim materials and fabrications during transportation and handling.
- B. Unload, store, and install sheet metal flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack materials on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.

1.7 COORDINATION

- A. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Products: Subject to compliance with requirements, provide one of the products specified.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 SHEET METALS

- A. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:
 1. Mill Finish: Standard two-sides bright.
 2. Alclad Finish: Metallurgically bonded surfacing to both sides, forming a composite aluminum sheet with reflective luster.
 3. Factory Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil.
 4. Siliconized-Polyester Coating: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil for primer and 0.8 mil for topcoat.
 - a. Color: As selected by Architect from manufacturer's full range.

FIRE STATION 54

PROJECT 10914

5. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604 and 2605.
 - b. Fluoropolymer 3-Coat System: Manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil; complying with AAMA 2605.
 - 1) Color: As selected by Architect from manufacturer's full range.
6. Anodized Finish: Apply the following coil-anodized finish:
 - a. 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.
 - b. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - c. Class II, Color Anodic Finish: AA-M12C22A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
 - d. Class I, Color Anodic Finish: AA-M12C22A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1) Color: Light bronze
- B. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 1. Finish: No. 2B (bright, reflective) and or 3 (reflective, polished directional satin). Coordinate with Architect.
- C. Lead Sheet: ASTM B 749, Type L51121, copper-bearing lead sheet.

2.3 UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.
- B. Felts: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft..

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

FIRE STATION 54

PROJECT 10914

1. Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.
 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.
 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
 4. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- C. Solder for Lead-Coated Copper: ASTM B 32, Grade Sn60, 60 percent tin and 40 percent lead.
- D. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
- E. Solder for Zinc-Tin Alloy-Coated Stainless Steel: ASTM B 32, 100 percent tin.
- F. Solder for Lead: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
- G. Solder for Zinc: ASTM B 32, 60 percent lead and 40 percent tin with low antimony, as recommended by manufacturer.
- H. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polysulfide silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- I. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- J. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.
- 1)
 2. Stainless Steel: 0.0156 inch thick.
 - a. Products:
 - 1) Cheney Flashing Company, Inc.; Cheney Flashing (Dovetail).
 - 2) Cheney Flashing Company, Inc.; Cheney Flashing (Sawtooth).
 - 3) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
- B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated.
1. Available Manufacturers:
 - a. Cheney Flashing Company, Inc.
 - b. Fry Reglet Corporation.
 - c. Heckmann Building Products Inc.
 - d. Hickman, W. P. Company.
 - e. Keystone Flashing Company, Inc.
 - f. Sandell Manufacturing Company, Inc.
 2. Material: Stainless steel, 0.0187 inch thick.
 3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

FIRE STATION 54

PROJECT 10914

4. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
5. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
6. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
7. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
8. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.
- B. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
- C. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 1. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA recommendations.
- E. Expansion Provisions: Where lapped or bayonet-type expansion provisions in the Work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.
- F. Conceal fasteners and expansion provisions where possible on exposed-to-view sheet metal flashing and trim, unless otherwise indicated.
- G. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 1. Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

2.7 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch-long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
 1. Gutter Style: A or K (Architect shall determine and select).
 2. Expansion Joints: Lap type.
 3. Accessories: Wire ball downspout strainer Valley baffles.

FIRE STATION 54

PROJECT 10914

4. Gutters with Girth up to 15 Inches: Fabricate from the following material:
 - a. Stainless Steel: 0.0156 inch thick.
 5. Gutters with Girth 16 to 20 Inches: Fabricate from the following material:
 - a. Stainless Steel: 0.0187 inch thick.
 6. Gutters with Girth 21 to 25 Inches: Fabricate from the following material:
 - a. Stainless Steel: 0.0250 inch thick.
 7. Gutters with Girth 26 to 30 Inches: Fabricate from the following material:
 - a. Stainless Steel: 0.0312 inch thick.
 8. Gutters with Girth 31 to 35 Inches: Fabricate from the following material:
 - a. Stainless Steel: 0.0375 inch thick.
- B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Manufactured Hanger Style: strap or approved by Architect prior to installation.
 2. Fabricate downspouts from the following material:
 - a. Stainless Steel: 0.0156 inch thick.
- C. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch-wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
1. Fabricate parapet scuppers from the following material:
 - a.
 - b. Stainless Steel: 0.0187 inch thick.
 - c.
- D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows.
1. Fabricate conductor heads from the following material:
 - a.
 - b. Stainless Steel: 0.0156 inch thick.
 - c.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Roof Edge Flashing (Gravel Stop) and Fascia Caps: Fabricate in minimum 96-inch-long, but not exceeding 10-foot-long, sections. Furnish with 6-inch-wide joint cover plates.
1. Joint Style: Lap, 4 inches wide.
 2. Fabricate with scuppers spaced 10 feet apart, of dimensions required with 4-inch-wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 3. Fabricate scuppers from the following material:
 - a.
 - b. Stainless Steel: 0.0187 inch thick.
 - c.
- B. Copings: Fabricate in minimum 96-inch-long, but not exceeding 10-foot-long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
1. Joint Style: Butt, with 6-inch-wide exposed cover plates [
 2. Fabricate copings from the following material:
 - a. Stainless Steel: 0.0250 inch thick.
- C. Roof and Roof to Wall Transition Roof to Sheet Metal Roof Edging Transition Expansion-Joint Cover: Fabricate from the following material:

FIRE STATION 54

PROJECT 10914

- 1.
 2. Stainless Steel: 0.0250 inch thick.
- D. Base Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- E. Counterflashing: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- F. Flashing Receivers: Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.
- G. Roof-Penetration Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- H. Splash Pans: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- I. Roof-Drain Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.

2.9 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.
- B. Valley Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- C. Drip Edges: Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.
- D. Eave, Rake Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.
- E. Base Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- F. Counterflashing: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- G. Flashing Receivers: Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.
- H. Roof-Penetration Flashing: Fabricate from the following material:
1. Lead-Coated Copper: 17.2 oz./sq. ft..
 2. Stainless Steel: 0.0187 inch thick.
 3. Aluminum-Zinc Alloy-Coated Steel: 0.0276 inch thick.

2.10 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12 foot long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous

FIRE STATION 54

PROJECT 10914

lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch-high end dams. Fabricate from the following material:

1. Stainless Steel: 0.0156 inch thick.
- B. Openings Flashing in Frame Construction: Fabricate head, sill, jamb,] and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high end dams. Fabricate from the following material:
1. Stainless Steel: 0.0156 inch thick.
- C. Wall Expansion-Joint Cover: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.

2.11 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following material:
1. Stainless Steel: 0.0187 inch thick.
- B. Overhead-Piping Safety Pans: Fabricate from the following material:
1. Stainless Steel: 0.0250 inch thick.

2.12 FINISHES

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

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Torch cutting of sheet metal flashing and trim is not permitted.

FIRE STATION 54

PROJECT 10914

- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
1. Coat side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
 3. Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric /butyl sealant.
- E. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric/ butyl sealant concealed within joints.
- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
1. Galvanized or Prepainted, Metallic-Coated Steel: Use stainless-steel fasteners.
 2. Aluminum: Use aluminum or stainless-steel fasteners.
 3. Copper: Use copper, hardware bronze, or stainless-steel fasteners.
 4. Stainless Steel: Use stainless-steel fasteners.
- H. Seal joints with elastomeric /butyl sealant as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- I. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.
1. Do not solder prepainted, metallic-coated steel and aluminum sheet.
 2. Pretinning is not required for lead-coated copper zinc-tin alloy-coated stainless steel.
 3. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
 4. Copper Soldering: Tin uncoated copper surfaces at edges of sheets using solder recommended for copper work.
 5. Where surfaces to be soldered are lead coated, do not tin edges, but wire brush lead coating before soldering.
 6. Lead-Coated Copper Soldering: Wire brush edges of sheets before soldering.

FIRE STATION 54

PROJECT 10914

7. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.
- J. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with elastomeric/ butyl sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets/ straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 1. Fasten gutter spacers to front and back of gutter.
 2. Loosely lock straps to front gutter bead and anchor to roof deck.
 3. Anchor and loosely lock back edge of gutter to continuous cleat eave or apron flashing.
 4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
 5. Anchor gutter with spikes and ferrules spaced not more than 24 inches apart.
 6. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
 7. Install continuous gutter screens on gutters with noncorrosive fasteners, hinged to swing open for cleaning gutters.
- C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
 1. Provide elbows at base of downspout to direct water away from building.
 2. Connect downspouts to underground drainage system indicated.
- D. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
 2. Loosely lock front edge of scupper with conductor head.
 3. Seal or solder exterior wall scupper flanges into back of conductor head.
- E. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper gutter discharge.
- F. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches in direction of water flow.
- G. Splash Pans: Install where downspouts discharge on low-sloped roofs. Set in elastomeric sealant/ butyl sealant compatible with roofing membrane.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

FIRE STATION 54

PROJECT 10914

- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock bottom edge of roof edge flashing with continuous cleats anchored to substrate at 24-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - 1. Interlock exterior bottom edge of coping with continuous cleats anchored to substrate at 24-inch centers.
 - 2. Anchor interior leg of coping with screw fasteners and washers at 24-inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric/ butyl sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric/ butyl sealant.
 - 1. Secure in a waterproof manner by means of interlocking folded seam or blind rivets and sealant, anchor and washer at 36-inch centers.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 - 1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal with elastomeric/ butyl sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent piping.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of manufactured through-wall flashing is specified in Division 04 Section "Unit Masonry."
- C. Reglets: Installation of reglets is specified in Division 03 Section "Cast-in-Place Concrete 04 Section" Unit Masonry."
- D. Openings Flashing in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 MISCELLANEOUS FLASHING INSTALLATION

- A. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.
- B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric/ butyl sealant to equipment support member.

FIRE STATION 54

PROJECT 10914

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

FIRE STATION 54

PROJECT 10914

**SECTION 077200
ROOF ACCESSORIES**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

A. Section Includes:

1. Roof curbs.
2. Equipment supports.
3. Pipe supports.
4. Roof walkways.
5. Preformed flashing sleeves.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof.
2. Division 05 Section "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
3. Division 07 low-slope roofing Sections for roofing accessories.
4. Division 07 Section "Sheet Metal Roofing" for shop- and field-formed roof curbs and snow guards for sheet metal roofing.
5. Division 07 Section "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
6. Division 07 Section "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.
7. Division 07 Section "Manufactured Roof Expansion Joints" for manufactured roof expansion-joint covers.
8. Division 23 Section "HVAC Power Ventilators" for power roof-mounted ventilators.
9. Division 28 Section "Fire-Alarm System" interconnects to automatically operated heat and smoke vents.

1.3 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

FIRE STATION 54

PROJECT 10914

1.4 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.
- D. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:
 - 1. Size and location of roof accessories specified in this Section.
 - 2. Method of attaching roof accessories to roof or building structure.
 - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
 - 4. Required clearances.
- E. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.
- F. Warranty: Sample of special warranty.

1.5 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.6 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS**2.1 METAL MATERIALS**

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation and mill phosphatized for field painting where indicated.
1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
 3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 4. Baked-Enamel or Powder-Coat 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. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- B. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 coated.
1. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
 2. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 3. Baked-Enamel or Powder-Coat 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. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.

ROOF ACCESSORIES

CAM 17-0501 - 3
EXHIBIT 1B
Page 128 of 600

FIRE STATION 54

PROJECT 10914

- C. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
1. Mill Finish: As manufactured.
 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.
 3. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 4. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 5. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 6. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- D. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.
- E. Copper Sheet: ASTM B 370, manufacturer's standard temper.
- F. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- G. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- H. Steel Tube: ASTM A 500, round tube.
- I. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- J. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, manufacturer's standard, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).
- C. Polycarbonate Glazing: Thermoformable, monolithic polycarbonate sheets manufactured by extrusion process, burglar-resistance rated according to UL 972 with an average impact strength of 12 to 16 ft-lbf/in. of width when tested according to ASTM D 256, Method A (Izod).
- D. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, thickness as indicated.
- E. Glass-Fiber Board Insulation: ASTM C 726, thickness as indicated.
- F. Polyisocyanurate Board Insulation: ASTM C 1289, thickness as indicated.

ROOF ACCESSORIES

FIRE STATION 54

PROJECT 10914

- G. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWWA C2; not less than 1-1/2 inches thick.
- H. Security Grilles: 3/4-inch diameter, ASTM A 1011/A 1011M steel bars spaced 6 inches o.c. in one direction and 12 inches o.c. in the other; factory finished as follows:
1. Surface Preparation: Remove mill scale and rust, if any, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
 3. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer; selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats under prolonged exposure.
- I. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- J. Underlayment:
1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 2. Polyethylene Sheet: 6-mil-thick polyethylene sheet complying with ASTM D 4397.
 3. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.
- K. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 3. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
 4. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- L. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- M. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane/ silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- N. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- O. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

FIRE STATION 54

PROJECT 10914

2.3 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units with integral spring-type vibration isolators and capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, coordinated with manufacture's roof system requirements used in this project,] and integrally formed deck-mounting flange at perimeter bottom.
1. Manufacturers: Subject to compliance with requirements, 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:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. AES Industries, Inc.
 - b. Curbs Plus, Inc.
 - c. Custom Solution Roof and Metal Products.
 - d. Greenheck Fan Corporation.
 - e. LM Curbs.
 - f. Metallic Products Corp.
 - g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
 - h. Pate Company (The).
 - i. Roof Products, Inc.
 - j. Safe Air of Illinois.
 - k. Thybar Corporation.
 - l. Vent Products Co., Inc.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Loads: Shall be coordinated with equipment selected for this project and applied as required. In addition to meet all federal, State, and local codes (FBC 2010) including HV wind zones / Dade-County product approvals.
- D. Material: Stainless-steel sheet, 0.078 inch thick.
1. Finish: Manufacturer's standard.
- E. Construction:
1. Insulation: Factory insulated with 1-1/2-inch-thick cellulosic glass-fiber board insulation.
 2. Liner: Same material as curb, of manufacturer's standard thickness and finish.
 3. Factory-installed wood nailer at top of curb, continuous around curb perimeter.
 4. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
 5. Fabricate curbs to minimum height of 12 inches (Contractor shall verify required heights and coordinate with Architect and Consultants) unless otherwise indicated.
 6. Top Surface: Level around perimeter with roof slope accommodated by sloping the deck-mounting flange.

FIRE STATION 54

PROJECT 10914

7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate curb with perimeter curb height tapered to accommodate roof slope so that top surface of perimeter curb is level. Equip unit with water diverter or cricket on side that obstructs water flow.
8. Security Grille: Provide where indicated.

2.4 EQUIPMENT SUPPORTS

- A. Equipment Supports: Internally reinforced metal equipment supports capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings; with welded or mechanically fastened and sealed corner joints, integral metal cant, stepped integral metal cant raised the thickness of roof insulation, and integrally formed deck-mounting flange at perimeter bottom.
1. Manufacturers: Subject to compliance with requirements, 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:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. AES Industries, Inc.
 - b. Curbs Plus, Inc.
 - c. Custom Solution Roof and Metal Products.
 - d. Greenheck Fan Corporation.
 - e. LM Curbs.
 - f. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
 - g. Pate Company (The).
 - h. Roof Products, Inc.
 - i. Thybar Corporation.
 - j. Vent Products Co., Inc.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Loads: Shall be coordinated with equipment selected for this project and applied as required. In addition to meet all federal, State, and local codes (FBC 2010) including HV wind zones / Dade-County product approvals.
- D. Material: Stainless-steel sheet, 0.078 inch thick.
1. Finish: Manufacturer's standard.
- E. Construction:
1. Insulation: Factory insulated with 1-1/2-inch-thick cellulosic/ glass-fiber board insulation.
 2. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.
 3. Factory-installed continuous wood nailers 3-1/2 inches] 5-1/2 inches (Contractor to coordinate manufacturer's requirements) wide at tops of equipment supports.
 4. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.

FIRE STATION 54

PROJECT 10914

5. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
6. Fabricate equipment supports to minimum height of 12 inches unless otherwise indicated.
7. Sloping Roofs: Where roof slope exceeds 1:48, fabricate each support with height to accommodate roof slope so that tops of supports are level with each other. Equip supports with water diverters or crickets on sides that obstruct water flow.
8. Security Grille: Provide where indicated.

2.5 ROOF WALKWAYS

- A. Roof Walkway: Metal planking formed from multiple C-shaped channels with upper surface punched in serrated diamond or rectangular shapes to produce raised slip-resistant surface and drainage holes. Provide support framing, brackets, connectors, nosings, and other accessories and components needed for complete installation. Include step units or stairs of similar construction for changes in elevation. Equip with safety railings that are acceptable to authorities having jurisdiction, where height of walkway or stairs requires them.
1. Manufacturers: Subject to compliance with requirements, 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:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. GS Metals Corp.
 - b. Miro Industries, Inc.
 - c. PHP Systems/Design.
 - d. Unistrut Corporation.
 3. Plank Width: As indicated.
 4. Walkway Width: As indicated.
 5. Channel Depth: As indicated.
 6. Metal Material: 0.078-inch-thick stainless-steel sheet.
 7. Support Stands: Manufacturer's standard, with protective pads compatible with roofing material.
 8. Support Pads: Continuous wood isolation pads, pressure-preservative treated as specified in Division 06 Section "Miscellaneous Rough Carpentry" attach roof-walkway supports to pads so that supports are separated from roof membrane surface and walkway support loads are distributed evenly.
 9. Finish: Manufacturer's standard.

2.6 PREFORMED FLASHING SLEEVES

- A. Exhaust Vent Flashing: Double-walled metal flashing sleeve or boot, insulation filled, with integral deck flange, 12 inches high, with removable metal hood and slotted perforated metal collar.
1. Manufacturers: Subject to compliance with requirements, 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:

ROOF ACCESSORIES

FIRE STATION 54

PROJECT 10914

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Custom Solution Roof and Metal Products.
 - b. Thaler Metal USA Inc.
 3. Metal: Aluminum sheet, 0.063 inch thick.
 4. Diameter: As indicated.
 5. Finish: Manufacturer's standard.
- B. Vent Stack Flashing: Metal flashing sleeve, uninsulated, with integral deck flange.
1. Manufacturers: Subject to compliance with requirements, 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:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Custom Solution Roof and Metal Products.
 - b. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
 - c. Thaler Metal USA Inc.
 3. Metal: Aluminum sheet, 0.063 inch thick.
 4. Height: See drawing sheet for dimensions. As indicated
 5. Diameter: As indicated.
 6. Finish: Manufacturer's standard.

2.7 GENERAL FINISH REQUIREMENTS

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

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

FIRE STATION 54

PROJECT 10914

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
1. Coat concealed side of stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof Curb Installation: Install each roof curb so top surface is level.
- D. Equipment Support Installation: Install equipment supports so top surfaces are level with each other.
- E. Roof-Hatch Installation:
1. Install roof hatch so top surface of hatch curb is level.
 2. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 3. Attach safety railing system to roof-hatch curb.
 4. Attach ladder-assist post according to manufacturer's written instructions.
- F. Heat and Smoke Vent Installation:
1. Install heat and smoke vent so top perimeter surfaces are level.
 2. Install and test heat and smoke vents and their components for proper operation according to NFPA 204.
- G. Gravity Ventilator Installation: Verify that gravity ventilators operate properly and have unrestricted airflow. Clean, lubricate, and adjust operating mechanisms.
- H. Pipe Support Installation: Install pipe supports so top surfaces are in contact with and provide equally distributed support along length of supported item.
- I. Security Grilles: Weld bar intersections and, using tamper-resistant bolts, attach the ends of bars to structural frame or primary curb walls.

FIRE STATION 54

PROJECT 10914

- J. Roof Walkway Installation:
1. Verify that locations of access and servicing points for roof-mounted equipment are served by locations of roof walkways.
 2. Remove ballast from top surface of low-slope roofing at locations of contact with roof-walkway supports.
 3. Install roof walkway support pads prior to placement of roof walkway support stands onto low-slope roofing.
 4. Redistribute removed ballast after installation of support pads.
- K. Preformed Flashing-Sleeve Installation: Secure flashing sleeve to roof membrane according to flashing-sleeve manufacturer's written instructions.
- L. Seal joints with elastomeric / butyl sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 09 painting Sections.
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

FIRE STATION 54

PROJECT 10914

**SECTION 078413
PENETRATION FIRESTOPPING**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Penetrations in fire-resistance-rated walls.
 2. Penetrations in horizontal assemblies.
 3. Penetrations in smoke barriers.
- B. Related Sections:
1. Division 07 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittal:
1. Product Data: For penetration firestopping, including printed statement of VOC content and chemical components.
- C. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- D. Qualification Data: For qualified Installer.
- E. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

FIRE STATION 54

PROJECT 10914

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
 - 3) FM Global in its "Building Materials Approval Guide."
- D. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify City's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, 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. A/D Fire Protection Systems Inc.
 2. Grace Construction Products.
 3. Hilti, Inc.
 4. Johns Manville.
 5. Nelson Firestop Products.
 6. RectorSeal Corporation.
 7. Specified Technologies Inc.
 8. 3M Fire Protection Products.
 9. Tremco, Inc.; Tremco Fire Protection Systems Group.
 10. USG Corporation.

2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. Fire-resistance-rated walls include fire walls fire-barrier walls smoke-barrier walls and fire partitions.
 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. Horizontal assemblies include floors floor/ceiling assemblies.
 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
- E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

FIRE STATION 54

PROJECT 10914

- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- G. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

FIRE STATION 54

PROJECT 10914

- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION**3.1 EXAMINATION**

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

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

FIRE STATION 54

PROJECT 10914

- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. City will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

FIRE STATION 54

PROJECT 10914

- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."
- C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
- D. See Drawings for Firestopping details including the ones listed below;
- E. Firestopping for Telecomm Pipe, Conduit or Tubing through concrete:
 - 1. UL-Classified Systems: C-AJ-3141
- F. Firestopping for Telecomm Pipe, Conduit or Tubing through drywall partition:
 - 1. UL-Classified Systems: W-L-3212
- G. Firestopping for Electrical Cables:
 - 1. UL-Classified Systems: See MEP drawings for details.
- H. Firestopping for Insulated Pipes:
 - 1. UL-Classified Systems: See MEP drawings for details.
- I. Firestopping for Miscellaneous Electrical Penetrants:
 - 1. UL-Classified Systems: See MEP drawings for details.
- J. Firestopping for Miscellaneous Mechanical Penetrants:
 - 1. UL-Classified Systems: See MEP drawings for details.

END OF SECTION 078413

PENETRATION FIRESTOPPING

CAM 078413 - 7
EXHIBIT 1B
Page 143 of 600

FIRE STATION 54

PROJECT 10914

**SECTION 079200
JOINT SEALANTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Polysulfide joint sealants.
4. Latex joint sealants.
5. Preformed joint sealants.
6. Acoustical joint sealants.

- B. Related Sections:

1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Division 07 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
3. Division 08 Section "Glazing" for glazing sealants.
4. Division 09 Section "Gypsum Veneer Plastering" for sealing perimeter joints and penetrations.
5. Division 09 Section "Gypsum Board" for sealing perimeter joints.
6. Division 09 Section "Tiling" for sealing tile joints.
7. Division 09 Section "Acoustical Tile Ceilings" for sealing edge moldings at perimeters with acoustical sealant.
8. Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Use ASTM C 1087 manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 2. Submit not fewer than four pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

JOINT SEALANTS

CAM 170531 - 1
EXHIBIT 1B
Page 144 of 600

FIRE STATION 54

PROJECT 10914

4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Sustainable Design Submittal:
 1. Product Data for Credit: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

FIRE STATION 54

PROJECT 10914

- E. Joint-Sealant Schedule: Include the following information:
1. Joint-sealant application, joint location, and designation.
 2. Joint-sealant manufacturer and product name.
 3. Joint-sealant formulation.
 4. Joint-sealant color.
- F. Qualification Data: For qualified Installer and testing agency.
- G. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- H. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- J. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- K. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- L. Field-Adhesion Test Reports: For each sealant application tested.
- M. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

FIRE STATION 54

PROJECT 10914

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

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

JOINT SEALANTS

CAM 170531 - 4
EXHIBIT 1B
Page 147 of 600

FIRE STATION 54

PROJECT 10914

- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 790
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. Sika Corporation, Construction Products Division; SikaSil-C990.
 - d. Tremco Incorporated; Spectrem 1.
- B. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Omniseal 50.
 - b. Dow Corning Corporation; 756 SMS].
 - c. GE Advanced Materials - Silicones; SilGlaze II SCS2800.
 - d. May National Associates, Inc.; Bondaflex Sil 295.
 - e. Pecora Corporation; 864.

JOINT SEALANTS

FIRE STATION 54

PROJECT 10914

- f. Polymeric Systems, Inc.; PSI-641.
 - g. Sika Corporation, Construction Products Division; SikaSil-C995.
 - h. Tremco Incorporated; Spectrem 2.
- C. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 799.
 - b. GE Advanced Materials - Silicones; UltraGlaze SSG4000.
 - c. May National Associates, Inc.; Bondaflex Sil 200 GPN.
 - d. Polymeric Systems, Inc.; PSI-631.
 - e. Schnee-Morehead, Inc.; SM5731 Poly-Glaze Plus.
 - f. Tremco Incorporated; Proglaze SSG.
- D. Multicomponent, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Tremco Incorporated; Spectrem 4TS.
- E. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; 898.
- F. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Omniplus.
 - b. Dow Corning Corporation; 786 Mildew Resistant.
 - c. GE Advanced Materials - Silicones; Sanitary SCS1700.
 - d. May National Associates, Inc.; Bondaflex Sil 100 WF.
 - e. Tremco Incorporated; Tremsil 200 Sanitary.

FIRE STATION 54

PROJECT 10914

2.3 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sika Corporation, Construction Products Division; Sikaflex - 15LM.
 - b. Tremco Incorporated; Dymonic FC.
- B. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pacific Polymers International, Inc.; Elasto-Thane 230 LM Type II.
 - b. Polymeric Systems, Inc.; PSI-901.
- C. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolastic NP1.
 - b. Bostik, Inc.; Chem-Calk 900.
 - c. May National Associates, Inc.; Bondaflex PUR 25.
 - d. Pacific Polymers International, Inc.; Elasto-Thane 230 Type II.
 - e. Pecora Corporation; Dynatrol I-XL.
 - f. Polymeric Systems, Inc.; Flexiprene 1000.
 - g. Schnee-Morehead, Inc.; Permthane SM7100.
 - h. Sika Corporation, Construction Products Division; Sikaflex - 1a.
 - i. Tremco Incorporated; Dymonic.
- D. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pecora Corporation; Dynatrol II.
 - b. Polymeric Systems, Inc.; PSI-270.
 - c. Tremco Incorporated; Dymeric 240 FC.
- E. Immersible, Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Uses T and I.

FIRE STATION 54

PROJECT 10914

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Sika Corporation, Construction Products Division; Sikaflex - 1CSL.
 - b. Tremco Incorporated; Vulkem 45.
- F. Immersible Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Uses T and I.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolastic NP 2.
 - b. LymTal International, Inc.; Iso-Flex 885 SG.
 - c. May National Associates, Inc.; Bondaflex PUR 2 NS.
 - d. Pecora Corporation; Dynatred.
 - e. Tremco Incorporated; Vulkem 227.
- G. Immersible Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920. Type M, Grade P, Class 25, for Use T and I.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. LymTal International, Inc.; Iso-Flex 880 GB.
 - b. May National Associates, Inc.; Bondaflex PUR 2 SL.
 - c. Tremco Incorporated; Vulkem 245.

2.4 POLYSULFIDE JOINT SEALANTS

- A. Single-Component, Nonsag, Polysulfide Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pacific Polymers International, Inc.; Elastoseal 230 Type I.
 - b. W. R. Meadows, Inc.; Deck-O-Seal One Step.
- B. Multicomponent, Nonsag, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Building Systems; Sonolastic Polysulfide Sealant.
 - b. Pacific Polymers International, Inc.; Elasto-Seal 227 Type II.

JOINT SEALANTS

FIRE STATION 54

PROJECT 10914

- c. Pecora Corporation; Synthacalk GC-2+.
 - d. W. R. Meadows, Inc.; Deck-O-Seal Gun Grade.
- C. Multicomponent, Nonsag, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolastic Polysulfide Sealant.
 - b. Pecora Corporation; Synthacalk GC-2+.
- D. Multicomponent, Pourable, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pacific Polymers International, Inc.; Elastoseal 227 Type I.
 - b. W. R. Meadows, Inc.; Deck-O-Seal 150.
- E. Immersible, Multicomponent Nonsag, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T and Use I.
- 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. Pecora Corporation; Synthacalk GC-2+.
 - b. or approved equal manufacturer.

2.5 LATEX JOINT SEALANTS

- A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
- 1. Products: Subject to compliance with requirements, provide the following provide one of the following:
 - a. BASF Building Systems; Sonolac.
 - b. Bostik, Inc.; Chem-Calk 600.
 - c. Pecora Corporation; AC-20+.
 - d. Schnee-Morehead, Inc.; SM 8200.
 - e. Tremco Incorporated; Tremflex 834.

2.6 PREFORMED JOINT SEALANTS

- A. Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.
- 1. Products: Subject to compliance with requirements, provide the following provide one of the following:

FIRE STATION 54

PROJECT 10914

- a. Dow Corning Corporation; 123 Silicone Seal.
 - b. GE Advanced Materials - Silicones; UltraSpan US1100.
 - c. May National Associates, Inc.; Bondaflex Silbridge 300.
 - d. Pecora Corporation; Sil-Span.
 - e. Sealex, Inc.; ImmerSeal.
- B. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.
1. Products: Subject to compliance with requirements, provide the following provide one of the following:
 - a. Dayton Superior Specialty Chemicals; Polytite Standard.
 - b. EMSEAL Joint Systems, Ltd.; Emseal 25V.
 - c. Sandell Manufacturing Co., Inc.; Polyseal.

2.7 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, provide the following provide one of the following:
 - a. Pecora Corporation; AC-20 FTR.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.

2.8 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

FIRE STATION 54

PROJECT 10914

2.9 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.

JOINT SEALANTS

CA 17-0531 11
07-09-2017
EXHIBIT 1B
Page 154 of 600

FIRE STATION 54

PROJECT 10914

- b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

FIRE STATION 54

PROJECT 10914

3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

FIRE STATION 54

PROJECT 10914

- a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 1. Joint Locations:
 - a. Control and expansion joints in brick pavers.

JOINT SEALANTS

CA 17-0531 14
07-07-00
EXHIBIT 1B
Page 157 of 600

FIRE STATION 54

PROJECT 10914

- b. Isolation and contraction joints in cast-in-place concrete slabs.
 - c. Joints between plant-precaster architectural concrete paving units.
 - d. Joints in stone paving units, including steps.
 - e. Tile control and expansion joints.
 - f. Joints between different materials listed above.
 - g. Other joints as indicated.
2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing Single component, pourable, traffic grade, neutral curing.
 3. Urethane Joint Sealant: Single component, pourable, traffic grade Multicomponent, nonsag, traffic grade, Class 50.
 4. Polysulfide Joint Sealant: Multicomponent, nonsag, traffic grade.
 5. Preformed Joint Sealant: Preformed foam sealant.
 6. Joint Sealant: as per approved manufacturer
 7. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
1. Joint Locations:
 - a. Joints in pedestrian plazas.
 - b. Joints in swimming pool decks.
 - c. Other joints as indicated.
 2. Urethane Joint Sealant: Immersible, single component, pourable, traffic grade.
 3. Polysulfide Joint Sealant: Immersible, multicomponent, nonsag, traffic grade.
 4. Joint Sealant: as per approved manufacturer.
 5. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precaster architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in dimension stone cladding.
 - e. Joints in glass unit masonry assemblies.
 - f. Joints in exterior insulation and finish systems.
 - g. Joints between metal panels.
 - h. Joints between different materials listed above.
 - i. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - j. Control and expansion joints in ceilings and other overhead surfaces.
 - k. Other joints as indicated.
 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
 3. Urethane Joint Sealant: Single component, nonsag, Class 100/50.
 4. Polysulfide Joint Sealant: Single component, nonsag.
 5. Preformed Joint Sealant: Preformed silicone /Preformed foam.

FIRE STATION 54

PROJECT 10914

6. Joint Sealant: as per approved manufacturer
 7. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in stone flooring.
 - c. Control and expansion joints in brick flooring.
 - d. Control and expansion joints in tile flooring.
 - e. Other joints as indicated.
 2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
 3. Urethane Joint Sealant: Single component, nonsag, traffic grade.
 4. Polysulfide Joint Sealant: Multicomponent, nonsag, traffic grade.
 5. Preformed Joint Sealant: Preformed foam.
 6. Joint Sealant: as per approved manufacturer.
 7. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Tile control and expansion joints.
 - d. Vertical joints on exposed surfaces of interior unit masonry concrete walls and partitions.
 - e. Joints on underside of plant-precast structural concrete beams and planks.
 - f. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
 - g. Other joints as indicated.
 2. Joint Sealant: Latex Acrylic based Butyl rubber based.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated.
 2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.

FIRE STATION 54

PROJECT 10914

1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Other joints as indicated.
2. Joint Sealant: Acoustical.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 079200

FIRE STATION 54

PROJECT 10914

**SECTION 081113
HOLLOW METAL DOORS AND FRAMES**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Standard hollow metal doors and frames.
- B. Related Sections:
1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
 2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
 3. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
 4. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.
- C. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating and finishes. For exterior openings submit Miami-Dade County NOA for each product and Florida Building Code 2010.
- B. Shop Drawings: Include the following:
1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of each different wall opening condition.
 6. Details of anchorages, joints, field splices, and connections.

HOLLOW METAL DOORS AND FRAMES

CAM 17-0521 - 1
081113 - 1
EXHIBIT 1B
Page 161 of 600

FIRE STATION 54

PROJECT 10914

7. Details of accessories.
 8. Details of moldings, removable stops, and glazing.
 9. Details of conduit and preparations for power, signal, and control systems.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification:
1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches.
 2. For the following items, prepared on Samples about 12 by 12 inches to demonstrate compliance with requirements for quality of materials and construction:
 - a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.
- E. Other Action Submittals:
1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.
- F. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 UBC Standard 7-2 or UL 10B 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 above ambient after 30 minutes of standard fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9 UBC Standard 7-4. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784 UBC Standard 7-2.

FIRE STATION 54

PROJECT 10914

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-high wood blocking. Do not store in a manner that traps excess humidity.
 - 1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, 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. Amweld Building Products, LLC.
 - 2. Deansteel Manufacturing Company, Inc.
 - 3. Firedoor Corporation.
 - 4. Karpen Steel Custom Doors & Frames.
 - 5. Kewanee Corporation (The).
 - 6. Mesker Door Inc.
 - 7. Security Metal Products Corp.
 - 8. Steelcraft; an Ingersoll-Rand company.

FIRE STATION 54

PROJECT 10914

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 metallic coating.
- C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Glazing: Comply with requirements in Division 08 Section "Glazing."
- H. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Design: As indicated.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Fire Door Core: As required to provide fire-protection ratings indicated.
 - b. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - 1) Locations: Exterior doors and interior doors where indicated.
 - 3. Vertical Edges for Single-Acting Doors: Beveled edge.
 - a. Beveled Edge: 1/8 inch in 2 inches.
 - 4. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch radius.
 - 5. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
 - 6. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

FIRE STATION 54

PROJECT 10914

- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. All doors that are designated to be electrical shall be prepped and made ready for all electrical hardware per manufacture's requirements and standards.

2.4 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as face welded unless otherwise indicated.
 - 3. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
 - 1. Fabricate frames with mitered or coped corners.
 - 2. Fabricate frames as face welded unless otherwise indicated.
 - 3. Frames for Level 2 Steel Doors: 0.053-inch-thick steel sheet.
 - 4. Frames for Wood Doors: 0.053-inch-thick steel sheet.
 - 5. Frames for Borrowed Lights: 0.053-inch-thick steel sheet.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
- E. All doors that are designated to use electrical shall be prepared and made ready for all electrical hardware per manufacture's requirements and standards.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
 - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

FIRE STATION 54

PROJECT 10914

3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch thick, fabricated from same material as frames in which they are installed.

2.7 LOUVERS

- A. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
1. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.

2.8 ACCESSORIES

- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

2.9 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment. All exterior doors and frames shall meet NOAs and Florida Building Code 2010 requirements.

FIRE STATION 54

PROJECT 10914

- B. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
- C. Hollow Metal Doors:
1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 2. Glazed Lites: Factory cut openings in doors.
 3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - b.
 - 1) Three anchors per jamb from 60 to 90 inches high.
 - 2) Four anchors per jamb from 90 to 120 inches high.
 - c. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - d.
 - 1) Four anchors per jamb from 60 to 90 inches high.
 - 2) Five anchors per jamb from 90 to 96 inches high.
 - 3) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - e. Compression Type: Not less than two anchors in each jamb.
 - f. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
 7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.

F. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

FIRE STATION 54

PROJECT 10914

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
 5. All doors that are designated to be electrical shall be prepared and made ready for all electrical hardware per manufacture's requirements and standards.
- G. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 2. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 3. Provide loose stops and moldings on inside of hollow metal work.
 4. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.10 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- B. Factory-Applied Paint Finish: Manufacturer's standard, complying with ANSI/SDI A250.3 for performance and acceptance criteria.

2.11 Color and Gloss: As selected by Architect and indicated on the drawings.**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

FIRE STATION 54

PROJECT 10914

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch, measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-protection-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable glazing stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.
 - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

FIRE STATION 54

PROJECT 10914

5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 7. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 8. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.
- E. Electrical Hardware: All doors that are designated to use electrical shall be prepared and made ready for all electrical hardware per manufacture's requirements and standards.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.

FIRE STATION 54

PROJECT 10914

- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

FIRE STATION 54

PROJECT 10914

**SECTION 081416
FLUSH WOOD DOORS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Solid-core doors with wood-veneer faces.
- B. Related Sections:
1. Division 06 Section "Interior Architectural Woodwork" for wood door frames.
 2. Division 06 Section "Interior Architectural Woodwork" for requirements for veneers from the same flitches for both flush wood doors and wood paneling.
 3. Division 08 Section "Glazing" for glass view panels in flush wood doors.
 4. Division 09 Sections "Staining and Transparent Finishing" for field finishing doors.

1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.
- B. Sustainable Design Submittals:
1. Certificates for Credit: Chain-of-custody certificates certifying that flush wood doors comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - a. Include statement indicating costs for each certified wood product.
 2. Product Data for Credit: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
 2. Indicate dimensions and locations of cutouts.
 3. Indicate requirements for veneer matching.
 4. Indicate doors to be factory finished and finish requirements.
 5. Indicate fire-protection ratings for fire-rated doors.
- D. Samples for Initial Selection: For factory-finished doors.
- E. Samples for Verification:

FLUSH WOOD DOORS

CAM 081416 - 1
EXHIBIT 1B
Page 172 of 600

FIRE STATION 54

PROJECT 10914

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
 2. Plastic laminate, 6 inches square, for each color, texture, and pattern selected.
 3. Corner sections of doors, approximately 8 by 10 inches, 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 long, for each material and finish specified.
 5. Frames for light openings, 6 inches long, for each material, type, and finish required.
- F. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Source Limitations: Obtain flush wood doors and wood veneer from single manufacturer.
- C. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated." WDMA I.S.1-A, "Architectural Wood Flush Doors." WI's "Manual of Millwork."
 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
 2. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
 3. Provide WI-Certified Compliance Certificate for installation.
- D. Forest Certification: Provide doors made with cores veneers all wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- E. 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 according to NFPA 252 UBC Standard 7-2 or UL 10B 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: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
- F. Preinstallation Conference: Conduct conference at Project site.

FIRE STATION 54

PROJECT 10914

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT 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 the remainder of the 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 and relative humidity between 45 and 60 percent during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch 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: Five years from date of Substantial Completion.
 - 4. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Algoma Hardwoods, Inc.
 - 2. Ampco, Inc.
 - 3. Buell Door Company Inc.
 - 4. Chappell Door Co.
 - 5. Eagle Plywood & Door Manufacturing, Inc.
 - 6. Eggers Industries.
 - 7. Graham; an Assa Abloy Group company.
 - 8. Haley Brothers, Inc.

FLUSH WOOD DOORS

CAM 07-2531 - 3
081416
EXHIBIT 1B
Page 174 of 600

FIRE STATION 54

PROJECT 10914

9. Ideal Architectural Doors & Plywood.
10. Ipik Door Company.
11. Lambton Doors.
12. Marlite.
13. Marshfield Door Systems, Inc.
14. Mohawk Flush Doors, Inc.; a Masonite company.
15. Oshkosh Architectural Door Company.
16. Poncraft Door Company.
17. Vancouver Door Company.
18. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. WDMA I.S.1-A Performance Grade: Heavy Duty.
- C. Particleboard-Core Doors:
 1. Particleboard: ANSI A208.1, Grade LD-1, made with binder containing no urea-formaldehyde resin.
 2. Provide doors with glued-wood-stave structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- D. Structural-Composite-Lumber-Core Doors:
 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.
 - b. Screw Withdrawal, Edge: 400 lbf.
- E. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 1. Pairs: Provide formed-steel edges and astragals.
 2.
 - a. Finish steel edges and astragals to match door hardware (locksets or exit devices).
- F. 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.
 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.
- G. Electrical Hardware: All doors that are designated to use electrical shall be prepared and made ready for all electrical hardware per manufacture's requirements and standards.

FIRE STATION 54

PROJECT 10914

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Exterior Solid-Core Doors:
1. Grade: Premium, with Grade AA faces.
 2. Species: Select white birch.
 3. Cut: Plain sliced (flat sliced).
 4. Match between Veneer Leaves: Book match.
 5. Assembly of Veneer Leaves on Door Faces: Balance match.
 6. Pair and Set Match: Provide for doors hung in same opening.
 7. Exposed Vertical and Top Edges: Same species as faces.
 8. Core: Particleboard.
 9. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
 10. Adhesives: Type I per WDMA TM-6.
 11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- B. Interior Solid-Core Doors:
1. Grade: Premium, with Grade AA faces.
 2. Species: Select white birch.
 3. Cut: Plain sliced (flat sliced).
 4. Match between Veneer Leaves: Book match.
 5. Assembly of Veneer Leaves on Door Faces: Balance match.
 6. Pair and Set Match: Provide for doors hung in same opening.
 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 20 feet 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.
 10. Exposed Vertical and Top Edges: Same species as faces.
 11. Core: Particleboard.
 12. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
 13. Construction: Seven plies, either bonded or nonbonded construction.
 14. WDMA I.S.1-A Performance Grade: Heavy Duty.
 15. All doors that are designated to use electrical shall be prepared and made ready for all electrical hardware per manufacture's requirements and standards.

2.4 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 requirements in NFPA 80 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, DHI A115-W series standards, 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.

FLUSH WOOD DOORS

CAM 087-0531 - 5
081416
EXHIBIT 1B
Page 176 of 600

FIRE STATION 54

PROJECT 10914

- 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 meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Cut and trim openings through doors in factory.
 - 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 Division 08 Section "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).

2.5 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 09 Section "Exterior Painting" "Interior Painting". Seal all four edges, edges of cutouts, and mortises with primer.
- B. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section "Interior Painting Staining and Transparent Finishing." Seal all four edges, edges of cutouts, and mortises with first coat of finish.

2.6 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. Finish doors at factory.
- C. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.
- D. Finish doors at factory where indicated in schedules or on Drawings as factory finished.
- E. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI conversion varnish or catalyzed polyurethane system.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 - 5. Sheen: Satin.

FIRE STATION 54

PROJECT 10914

PART 3 - EXECUTION**3.1 EXAMINATION**

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

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- 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 at heads, jambs, and between pairs of doors. Provide 1/8 inch 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 from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches 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 081416

FLUSH WOOD DOORS

FIRE STATION 54

PROJECT 10914

**SECTION 083113
ACCESS DOORS AND FRAMES**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Access doors and frames for walls and ceilings.
 2. Floor access doors and frames.
 3. Contractor shall coordinate with drawings and Architect.
- B. Related Requirements:
- C.
1. Division 08 Section "Security Access Doors and Frames" for access doors and frames for security applications.
 2. Division 23 Section "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.3 ALLOWANCES

- A. Access doors and frames are part of an access door and frame allowance.
- B. Contractor shall provide all access doors for all locations that require maintenance access. This shall include and not limited to all mechanical, plumbing, and electrical.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, fire ratings, materials, individual components and profiles, and finishes.
- B. Shop Drawings:
1. Include plans, elevations, sections, details, and attachments to other work.
 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Samples: For each door face material, at least 3 by 5 inches in size, in specified finish.
- D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

FIRE STATION 54

PROJECT 10914

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 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
1. Access Panel Solutions.
 2. Babcock-Davis.
 3. Cendrex Inc.
 4. Karp Associates, Inc.
 5. Larsen's Manufacturing Company.
 6. Maxam Metal Products Limited.
 7. Metropolitan Door Industries Corp.
- C. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- D. Flush Access Doors with Concealed Flanges:
1. Basis-of-Design Product: Larsen's Manufacturing Company.
 2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board plaster beads for concealed flange installation.
 3. Locations: Wall and ceiling.
 4. Door Size: supply 18"x18" or as required by code for access
 5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
 - a. Finish: Factory prime & Factory finish.
 6. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage.
 - a. Finish: Factory prime Factory finish.
 7. Stainless-Steel Sheet for Door: Nominal 0.062 inch, 16 gage.
 - a. Finish: No. 4.
 8. Frame Material: Same material and thickness as door.
 9. Hinges: Manufacturer's standard.
 10. Hardware: Latch.
- E. Recessed Access Doors:
1. Basis-of-Design Product: Larsen's Manufacturing Company.
 2. Assembly Description: Fabricate door in the form of a pan recessed 1/2 inch for gypsum board plaster acoustical tile infill. Provide frame with gypsum board bead for concealed flange plaster bead for concealed flange no bead for acoustical tile installation.
 3. Locations: Wall and ceiling.

FIRE STATION 54

PROJECT 10914

4. Door Size: supply 18"x18" or as required by code for access
 5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage.
 - a. Finish: Factory prime Factory finish.
- F. Aluminum Flush Access Doors:
1. Basis-of-Design Product: Larsen's Manufacturing Company.
 2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 3. Locations: Wall and ceiling.
 4. Door Size: supply 18"x18" or as required by code for access
 5. Aluminum Sheet for Door: Nominal 0.045 inch.
 - a. Finish: Clear anodic.
 6. Frame Material: Same material, thickness, and finish as door.
 7. Hinges: Manufacturer's standard.
 8. Hardware: Latch.
- G. Lightweight Flush Access Doors:
1. Basis-of-Design Product: Larsen's Manufacturing Company.
 2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
 3. Locations: Wall and ceiling.
 4. Door Size: supply 18"x18" or as required by code for access
 5. Uncoated Steel Sheet for Door: Nominal 0.018 inch, 26 gage.
 - a. Finish: Factory prime Factory finish.
 6. Metallic-Coated Steel Sheet for Door: Nominal 0.022 inch, 26 gage.
 - a. Finish: Factory prime Factory finish.
 7. Frame Material: Aluminum, nominal 0.045 inch, mill finish.
 8. Hinges: Manufacturer's standard.
 9. Hardware: Latch.
- H. Exterior Flush Access Doors:
1. Basis-of-Design Product: Larsen's Manufacturing Company.
 2. Assembly Description: Fabricate door to be weatherproof and fit flush to frame. Provide manufacturer's standard 2-inch-thick fiberglass insulation and extruded door gaskets. Provide manufacturer's standard-width frame for surface mounting, proportional to door size.
 3. Locations: Wall.
 4. Door Size: as required by code for access
 5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage.
 - a. Finish: Factory prime Factory finish.
 6. Frame Material: Same material, thickness, and finish as door.
 7. Hinges: Manufacturer's standard.
 8. Hardware: Latch.
- I. Medium-Security Flush Access Doors:
1. Basis-of-Design Product: Larsen's Manufacturing Company.
 2. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 3. Locations: Wall and ceiling.
 4. Door Size: supply 18"x18" or as required by code for access
 5. Uncoated Steel Sheet for Door: Nominal 0.075 inch, 14 gage.
 - a. Finish: Factory prime.
 6. Metallic-Coated Steel Sheet for Door: Nominal 0.079 inch, 14 gage.

FIRE STATION 54

PROJECT 10914

- a. Finish: Factory prime.
 - 7. Frame Material: Same material, thickness, and finish as door.
 - 8. Hinges: Manufacturer's standard security hinge.
 - 9. Hardware: Tamper-resistant latch lock.
- J. Fire-Rated, Flush Access Doors with Concealed Flanges:
- 1. Basis-of-Design Product: Larsen's Manufacturing Company.
 - 2. 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 plaster beads for concealed flange installation.
 - 3. Locations: Wall and ceiling.
 - 4. Fire-Resistance Rating: Not less than that of adjacent construction and required.
 - 5. Temperature-Rise Rating: 450 deg F at the end of 30 minutes.
 - 6. Uncoated Steel Sheet for Door: Nominal 0.036 inch, 20 gage.
 - a. Finish: Factory prime Factory finish.
 - 7. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage.
 - a. Finish: Factory prime Factory finish.
 - 8. Frame Material: Same material, thickness, and finish as door.
 - 9. Hinges: Manufacturer's standard.
 - 10. Hardware: Latch.
- K. Hardware:
- 1. Latch: Cam latch operated by screwdriver by knurled knob by hex-head wrench by pinned-hex-head wrench by spanner-head wrench by flush key by ring turn as shown on Drawings as indicated in schedule Insert operator with interior release.
 - 2. Lock: Cylinder Mortise cylinder.
 - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "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. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.
- F. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304 Type 316. Remove tool and die marks and stretch lines or blend into finish.
- G. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- H. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

FIRE STATION 54

PROJECT 10914

- I. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2.
- J. Frame Anchors: Same type as door face.
- K. 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 and gypsum base securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
 - 3. Provide mounting holes in frames for attachment of units to metal or wood framing.
 - 4. Provide mounting holes in frame for attachment of masonry anchors.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
 - 1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.
- E. 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.
- F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

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.

FIRE STATION 54

PROJECT 10914

- 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.
- E. Stainless-Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
 - 3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.
- F. Aluminum Finishes:
 - 1. Mill finish.
 - 2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

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 083113

FIRE STATION 54

PROJECT 10914

SECTION 083300
ROLL-UP DOORS FOR APPARATUS OPENINGS

PART 1 – GENERAL**1.01 RELATED DOCUMENTS**

- A. All of the Contract Documents, including General and Supplementary Conditions, and Division General Requirements, apply to the work of this Section.

1.02 SUMMARY

- A. The work of this Section includes rolling doors. A) Apparatus Bays (4)
- B. Related Sections: Other specification sections which directly relate to the work of this Section include, but are not limited to, the following:
1. Provide complete operating door assemblies including door sections, guides, hardware, operators/motors, remote control devices, and installation accessories.

1.03 SUBMITTALS

- A. General - Submit the following:
- B. Product Data: Submit manufacturer's product data, roughing-in diagrams, and installation instructions for each type and size of roll-up door. Provide operating instructions, maintenance information, and electrical rough-in instructions.
- C. Shop Drawing: Show construction details; clearance requirements, metal gauges, finish, electrical requirements, design data, and interface requirements for work of others.
- D. Door Manufacturer shall submit a reference list including names and telephone numbers of five (5) successful installations of the type specified within the past two (2) years.
- E. Door Manufacturer to provide Notice of Approval (NOA) for submittals that meets Dade County product approval or Florida Building Code Product Approval for HVWZ.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Rolling doors shall be manufactured by a firm with a minimum of five years experience in the fabrication and installation of rolling doors. Manufacturers proposed for use, which are not named in these specifications, shall submit evidence of ability to meet performance and fabrication requirements specified, and include a list of five projects of similar design and complexity completed within the past five years.
- B. Installer: Installation of rolling doors shall be performed by an authorized representative of the manufacturer.
- C. Single-Source Responsibility: Provide doors, guides, motors, and related primary components from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

FIRE STATION 54

PROJECT 10914

- D. Pre-Installation Conference: Schedule and convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working Conditions and to coordinate this work with related and adjacent work.
- E. Design Criteria: The door sections will be designed such that they will not deflect more than L/120 of their span under a minimum windload of 65 pounds per square foot with calculations based on the premise that the door panels are supported on the two non-spanning edges. Door components shall be designed in accordance with the following specifications of latest adoption:
 - 1. Shapes, Plates, and Bars – AISC Specification for the design, fabrication, and erection of structural steel for buildings
 - 2. Sheet or Strip Metal – AISI Specification for the design of cold-formed steel structural members
- F. Testing Performance: Compliance with Florida Building Code TAS 201, TAS 202, and TAS 203 for HVWZ.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in labeled protective packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures and construction operations.

PART 2 - PRODUCTS**2.01 ACCEPTABLE MANUFACTURER**

- A. Overhead Door Corporation, Pennsylvania Division; Telephone 800-929-2553 or 717-248-0131; Fax 800-929-1274.
- B. South Florida Rolling Door, Inc.; Telephone 305 885-6400; Fax 305 885-6402
- C. U.S. Door & Building Components; Telephone 407 859-6770; Fax 407 251-4637

2.02 ROLLING DOORS

- A. Trade Reference: BASIS OF DESIGN: 610 Series Service Doors by Overhead Door Corporation.
- B. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
 - 1. Flat profile type F-265 for doors between 25'4" and 40'0" wide, fabricated of 18 gauge galvanized steel.
- C. Finish:
 - 1. Galvanized Steel: Slats and hood shall be galvanized steel in accordance with ASTM A653, G-90 and receive rust-inhibitive, roll coating process, including 0.2 mils thick

ROLL-UP DOORS

CAM 17-0531-2
 EXHIBIT 1B
 Page 186 of 600

FIRE STATION 54

PROJECT 10914

baked-on prime paint, and 0.6 mils thick baked-on polyester (powder coated) top coat. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer.

- D. Color: Powder coating finish in color RAL #3020
- E. Min. Wind Design Load: 65 PSF per Florida Building Code and Miami Dade Product Approval. (NOA# 09-0324.12)
- F. Weatherseals: Vinyl bottom seal.
- G. Bottom Bar: Two galvanized steel angles.
- H. Guides: Three structural galvanized steel angles with minimum thickness of 3/16".
- I. Brackets: Hot rolled steel to support counterbalance, curtain and hood.
- J. Counterbalance: Helical torsion spring type designed for 100,000 cycle life design. Counterbalance shall be housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03" per foot of span. Counterbalance shall be adjustable by means of an adjusting tension wheel.
- K. Hood: G-90 Galvanized steel, 24 gauge hood with intermediate supports as required.
- M. Electric Motor Operation: Provide UL listed electric operator, size as recommended by Manufacture to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
 - 1. Sensing Edge Protection: Electric sensing edge.
 - 2. Operator Controls: Push-button operated control stations with open, close, and stop buttons for surface mounting, for interior location.
 - 3. Special Operation: Long range radio control operation w/ (2) dual button transmitters per door, Thru-beam type electric photocells.
- N. Locking: Interior bottom bar slide bolt.
- O. Wall Mounting Condition: Face-of-wall mounting.
- P. Remote Control Operator: as per M. Electric Motor Operation (3) require 2 per door.
- Q. Contractor shall provide (2) Electric eyes per door and mount. Mounting height to be coordinated with City of Fort Lauderdale Fire Truck requirements. Contractor to provide all electrical services required for overhead roll-up doors to operate as a complete system.
- R. FOR TRASH ROOM ROLL-UP DOOR: 610 Series shall have slide bolts on the outside with padlock ability.

FIRE STATION 54

PROJECT 10914

PART 3 - EXECUTION**3.01 PREPARATION**

- A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Strictly comply with manufacturer's installation instructions and recommendations. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.
- B. Instruct City's personnel in proper operating procedures and maintenance schedule.

3.03 ADJUSTING AND CLEANING

- A. Test rolling doors for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- B. Touch-up damaged coatings and finishes and repair minor damage. Clean exposed surfaces using non-abrasive materials and methods recommended by manufacturer of material or product being cleaned.

PART 4 – SERVICE

- A. All proposed doors must be able to be repaired and/or serviced by a factory authorized service center located within the Broward, Dade or Palm Beach County area during the manufacturer's and building contractor's product warrantee periods.
 1. Scope of Work: The work to be performed by the Service Contractor consists of furnishing all material, labor, supervision, tools, supplies and equipment necessary to provide full repair service, including inspections, adjustments, test and repairs to keep the hydraulic folding doors in continuous use and efficiency for the intended purpose at locations specified herein.
 2. Working Hours: The Contractor must provide service 24 hours per day, 7 days per week and must have 24 hour per day, 7 days per week communication capabilities. A telephone answering machine will not be acceptable. The standard workweek shall be considered Monday through Friday, from 7:30 AM to 4:30 PM; excluding normal holidays granted to City employees. Workdays are exclusive of Saturday and Sunday.

The Contractor must be capable of meeting a response time of no more than two (2) hours during the standard workweek and no more than three (3) hours during off-hour call outs.

3. Replacement Parts: The Contractor shall provide replacement parts as required during the term of the contract. Only Original Equipment Manufactured (OEM) parts may be utilized unless authorized by proper City personnel.

ROLL-UP DOORS

CAM 17-0531-4
08330-4
EXHIBIT 1B
Page 188 of 600

FIRE STATION 54

PROJECT 10914

Service vehicles must be fully stocked with basic materials and standard parts so that response to normal repair calls can be accomplished without returning to the shop.

END OF SECTION 083300

ROLL-UP DOORS

FIRE STATION 54

PROJECT 10914

SECTION 084113
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Exterior and interior storefront framing.
 2. Storefront framing for window walls.
 3. Exterior and interior manual-swing entrance doors and door-frame units.
- B. Related Sections:
1. Division 08 Section "All-Glass Entrances and Storefronts" for systems without aluminum support framing.
 2. Division 08 Section "Structural-Sealant-Glazed Curtain Walls" for curtain-wall systems that retain glazing with structural sealant.
 3. Division 08 Section "Louvers and Vents" for units installed with aluminum-framed systems.
 4. Division 07 Section "Joint Sealants" for installation of joint sealants installed with aluminum-framed systems and for sealants to the extent not specified in this Section.
 5. Division 08 Section "Door Hardware" for hardware to the extent not specified in this Section.
 6. Division 08 Section "Glazing" for glazing requirements to the extent not specified in this Section.

1.3 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 2. Dimensional tolerances of building frame and other adjacent construction.
 3. Failure includes the following:
 - a. Deflection exceeding specified limits.

FIRE STATION 54

PROJECT 10914

- b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Noise or vibration created by wind and by thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Sealant failure.
 - g. Failure of operating units.
- B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Loads:
- 1. Wind Loads: As indicated on Drawings.
 - a. Basic Wind Speed: As indicated on Drawings.
 - b. Importance Factor: As indicated on Drawings.
 - c. Exposure Category: As indicated on Drawings.
- D. Deflection of Framing Members:
- 1. Deflection Normal to Wall Plane: As indicated on Drawings or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch, whichever is smaller.
- E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
- 1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.
- F. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass large and small missile-impact tests and cyclic-pressure tests according to Florida Building Code TAS 202 and ANSI/AAMA/MWWDA 101/IS 2. Shall meet and be an approved system with Dade County approval numbers (NOAs).
- 1. Large-Missile Impact: For aluminum-framed systems located within 30 feet of grade.
 - 2. Small-Missile Impact: For aluminum-framed systems located more than 30 feet above grade.
- G. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.05 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of.
- H. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
- I. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to

FIRE STATION 54

PROJECT 10914

- AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
1. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.
- J. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
 2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 3. Interior Ambient-Air Temperature: 75 deg F.
- K. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 53 when tested according to AAMA 1503.
- L. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.
- M. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:
1. Sound Transmission Class (STC): Minimum 30 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
 2. Outdoor-Indoor Transmission Class (OITC): Minimum 30 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.
- N. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
1. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 2. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
- O. Structural-Sealant Joints: Designed to produce tensile or shear stress of less than 20 psi.
- P. Contractor shall provide a product based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems. Submit Miami-Dade County N.O.A. and meet all local, state (Florida Building Code 2010), Federal Codes. Contractor shall provide and submit all required engineering calculations

FIRE STATION 54

PROJECT 10914

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
- B. Sustainable Design Submittal:
 - 1. Product Data for Credit: For adhesives and sealants used inside of the weatherproofing system, including printed statement of VOC content.
- C. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
 - 2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- F. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch lengths of full-size components and showing details of the following:
 - 1. Joinery, including concealed welds.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- G. Other Action Submittals:
 - 1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- H. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of aluminum-framed systems.
 - 2. Include design calculations.
- I. Qualification Data: For qualified Installer and testing agency.
- J. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- K. Welding certificates.

FIRE STATION 54

PROJECT 10914

- L. Preconstruction Test Reports: For sealant.
- M. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
- N. Source quality-control reports.
- O. Quality-Control Program for Structural-Sealant-Glazed System: Include reports.
- P. Field quality-control reports.
- Q. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
- R. Warranties: Sample of special warranties.
- S. Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems. Submit Miami-Dade County N.O.A. and meet all local, state (Florida Building Code 2010), Federal Codes. Contractor shall provide and submit all required engineering calculations

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- D. Quality-Control Program for Structural-Sealant-Glazed System: Develop quality control program specifically for Project. Document quality-control procedures and verify results for aluminum-framed systems. Comply with ASTM C 1401 recommendations including, but not limited to, system material-qualification procedures, preconstruction sealant-testing program, procedures for system fabrication and installation, and intervals of reviews and checks.
- E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- F. Preconstruction Sealant Testing: For structural-sealant-glazed systems, perform sealant manufacturer's standard tests for compatibility with and adhesion of each material that will come in contact with sealants and each condition required by aluminum-framed systems.

FIRE STATION 54

PROJECT 10914

1. Test a minimum five samples each of metal, glazing, and other material.
 2. Prepare samples using techniques and primers required for installed systems.
 3. For materials that fail tests, determine corrective measures necessary to prepare each material to ensure compatibility with and adhesion of sealants including, but not limited to, specially formulated primers. After performing these corrective measures on the minimum number of samples required for each material, retest materials.
- G. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- H. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- I. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
- J. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.
- K. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
- L. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical wall area as shown on Drawings.
 2. Field testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- M. Preinstallation Conference: Conduct conference at Project site.
- N. Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems. Submit Miami-Dade County N.O.A. and meet all local, state (Florida Building Code 2010), Federal Codes. Contractor shall provide and submit all required engineering calculations

1.7 PROJECT CONDITIONS

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

FIRE STATION 54

PROJECT 10914

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that 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 caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage through fixed glazing and framing areas.
 - f. Failure of operating components.
 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
1. Warranty Period: Twenty 20 years from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

- A. Entrance Door Hardware:
1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for City's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
 2. Initial Maintenance Service: Beginning at Substantial Completion, provide twelve months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
- B. Structural-Sealant-Glazed Systems:
1. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of structural-sealant-glazed system Installer. Include quarterly preventive maintenance, repair or replacement to ensure long-term performance and durability of structural-sealant-glazed system as required for proper entrance door hardware operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original system.
 2. Continuing Maintenance Proposal: From Installer to City, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - 1. Arcadia, Inc.
 - 2. Arch Aluminum & Glass Co., Inc.
 - 3. CMI Architectural
 - 4. Commercial Architectural Products, Inc.
 - 5. EFCO Corporation.
 - 6. Kawneer North America; an Alcoa company.
 - 7. TRACO.
 - 8. Tubelite.
 - 9. United States Aluminum.
 - 10. YKK AP America Inc.

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 SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - 1. Construction: Nonthermal.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: As indicated.
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

FIRE STATION 54

PROJECT 10914

- 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, finished to match framing system, fabricated from stainless steel.
- D. 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.
- E. Concealed Flashing: [Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials] Dead-soft, 0.018-inch-thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
 - 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).

2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
- D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
 - 1. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Color: As selected by Architect from manufacturer's full range of colors.
 - 2. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - a. 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).

FIRE STATION 54

PROJECT 10914

- b. Color: Matching structural sealant.

2.5 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - 1. Door Construction: 2-inch overall thickness, with minimum 0.188-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
 - 2. Door Design: As indicated.
 - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches above floor or ground plane.
 - 3. Glazing Stops and Gaskets: Beveled Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
- B. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

2.6 ENTRANCE DOOR HARDWARE

- A. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.
 - 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products complying with BHMA standard referenced.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 - 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 - 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
 - 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- C. Opening-Force Requirements:
 - 1. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force of not more than 15 lbf for not more than 3 seconds.

FIRE STATION 54

PROJECT 10914

2. Latches and Exit Devices: Not more than 15 lbf required to release latch.
- D. Pivot Hinges: BHMA A156.4, Grade 1.
1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.
- E. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
 2. Exterior Hinges: Stainless steel, with stainless-steel pin.
 3. Quantities:
 - a. For doors up to 87 inches high, provide 3 hinges per leaf.
 - b. For doors more than 87 and up to 120 inches high, provide 4 hinges per leaf.
- F. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.
- G. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- H. Manual Flush Bolts: BHMA A156.16, Grade 1.
- I. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
- J. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- K. Cylinders: As specified in Division 08 Section "Door Hardware." BHMA A156.5, Grade 1.
1. Keying: No master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" to be furnished by City.
- L. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing. Electric as per indicated in drawings. Contractor to coordinate with door schedule and manufacturer.
- M. Operating Trim: BHMA A156.6.
- N. Removable Mullions: BHMA A156.3, extruded aluminum.
1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.
- O. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.
- P. Concealed Overhead Holders: BHMA A156.8, Grade 1.
- Q. Surface-Mounted Holders: BHMA A156.16, Grade 1.

FIRE STATION 54

PROJECT 10914

- R. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- S. Weather Stripping: Manufacturer's standard replaceable components.
 - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 - 2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- T. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- U. Silencers: BHMA A156.16, Grade 1.
- V. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.
- W. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.7 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
 - 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).
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

2.8 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. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.

FIRE STATION 54

PROJECT 10914

7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
 - E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
 - F. Storefront Framing: Fabricate components for assembly using head-and-sill-receptor system with shear blocks at intermediate horizontal members.
 - G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 1. At exterior doors, provide compression weather stripping at fixed stops.
 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
 - H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 2. At exterior doors, provide weather sweeps applied to door bottoms.
 - I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
 - J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31, Class II, 0.010 mm] or thicker.
- B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 1. Color and Gloss: As selected by Architect as indicated on drawings.
 2. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.
 3. Color: As selected by Architect from manufacturer's full range.

2.10 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate structural-sealant-glazed systems.

FIRE STATION 54

PROJECT 10914

- B. Structural-Sealant-Glazed Systems: Perform quality-control procedures complying with ASTM C 1401 recommendations, including, but not limited to, system material-qualification procedures, sealant testing, and system fabrication reviews and checks.
- C. Structural-sealant-glazed system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. General:
 1. Comply with manufacturer's written instructions.
 2. Do not install damaged components.
 3. Fit joints to produce hairline joints free of burrs and distortion.
 4. Rigidly secure nonmovement joints.
 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- F. Install glazing as specified in Division 08 Section "Glazing."
 1. Structural-Sealant Glazing:

FIRE STATION 54

PROJECT 10914

- a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - b. Install weatherseal sealant according to Division 07 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
- 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

3.3 ERECTION TOLERANCES

- A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
- 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment:
 - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
- 1. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.
 - a. Destructive Test Method A, "Hand Pull Tab (Destructive)," in ASTM C 1401, Appendix X2, shall be used.
 - 1) A minimum of four areas on each building face shall be tested.
 - 2) Repair installation areas damaged by testing.
 - 2. Structural-Sealant Glazing Inspection: After installation of aluminum-framed systems is complete, structural-sealant glazing shall be inspected and evaluated according to recommendations in ASTM C 1401.
 - 3. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing under "Performance Requirements" Article, but not more than 0.09

FIRE STATION 54

PROJECT 10914

- cfm/sq. ft., of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft..
4. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform and cyclic static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than 4.18 lbf/sq. ft., and shall not evidence water penetration.
 5. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
 - D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
 - F. Prepare test and inspection reports.
 - G. All test shall meet the requirements of the Florida Building Code 2010 and Miami-Dade County product approvals (NOAs).

3.5 ADJUSTING

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
 1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches from the latch, measured to the leading door edge. Insert additional requirements and sequence of operation in entrance door hardware set above for electrified entrance door hardware if required.

END OF SECTION 084113

FIRE STATION 54

PROJECT 10914

**SECTION 087100
DOOR HARDWARE**

PART 1 – GENERAL**1.01 SUMMARY**

- A. Section includes furnishing and installation of door hardware for doors specified in “Hardware Sets” and required by actual conditions. Including screws, bolts, expansion shields, electrified door hardware, and other devices for proper application of hardware.
- B. Where items of hardware are not specified and are required for intended service, such omission, error or other discrepancy shall be submitted to Architect 14 calendar days prior to bid date for clarification by addendum.
- C. Products supplied but not installed under this Section:
 - 1. Hardware for aluminum doors will be furnished under this Section, but installed under Division 8-Entrances and Storefronts.
 - 2. Final replacement of cylinder cores to be installed by City.
- D. Refer to Division 1 Price and Payment Procedures for alternates that may affect work of this Section.
- E. Related Divisions:
 - 1. Division 6 Section Finish Carpentry
 - 2. Division 8 Section Metal Doors and Frames
 - 3. Division 8 Section Wood and Plastic Doors
 - 4. Division 8 Section Entrances and Storefronts
 - 5. Division 13 Section Security Access and Surveillance
 - 6. Division 16 Section Electrical

1.02 REFERENCES

- A. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI):
 - 1. ANSI/BHMA A156.1 Butts & Hinges (2006)
 - 2. ANSI/BHMA A156.2 Bored & Preassembled Locks & Latches (2003)
 - 3. ANSI/BHMA A156.4 Door Controls – Closers (2000)
 - 4. ANSI/BHMA A156.5 Auxiliary Locks (2001)
 - 5. ANSI/BHMA A156.6 Architectural Door Trim (2005)
 - 6. ANSI/BHMA A156.7 Template Hinge Dimensions (2003)
 - 7. ANSI/BHMA A156.8 Door Controls – Overhead Stops and Holders (2005)
 - 8. ANSI/BHMA A156.15 Closer Holder Release Devices (2006)
 - 9. ANSI/BHMA A156.16 Auxiliary Hardware (2002)
 - 10. ANSI/BHMA A156.18 Materials & Finishes (2006)
 - 11. ANSI/BHMA A156.21 Thresholds (2006)
 - 12. ANSI/BHMA A156.22 Door Gasketing Systems (2005)
 - 13. ANSI/BHMA A156.25 Electrified Locks (2002)
 - 14. ANSI/BHMA A156.28 Keying Systems (2008)
 - 15. ANSI/BHMA A250.13 Testing and Rating of Severe Windstorm Resistant Components for Swinging Door Assemblies (2003)

FIRE STATION 54

PROJECT 10914

- B. International Code Council/American National Standards Institute (ICC/ANSI):
 1. ICC/ANSI A117.1 Standards for Accessible and Usable Buildings and Facilities (2003).
- C. Underwriters Laboratories, Inc. (UL):
 1. UL 10C Positive Pressure Fire Test of Door Assemblies
 2. UL 1784 Air Leakage Test of Door Assemblies
- D. Door and Hardware Institute (DHI):
 1. DHI Publication – Keying Systems and Nomenclature
 2. DHI Publication – Abbreviations and Symbols
 3. DHI Publication – Installation Guide for Doors and Hardware
 4. DHI Publication – Sequence and Format of Hardware Schedule
- E. National Fire Protection Agency (NFPA)
 1. NFPA 70 National Electrical Code
 2. NFPA 80 Standard for Fire Doors and Other Opening Protectives (2007)
 3. NFPA 101 Life Safety Code (2006)
 4. NFPA 105 Standard for the Installation of Smoke Door Assemblies (2003)
- F. Building Codes
 1. IBC 2006 International Building Code
 2. Local Building Code (latest edition)– Florida Building Code 2010
- G. Miami Dade Building Code Compliance:
 1. Provide products where indicated with NOA numbers approved by Miami-Dade Building Code Compliance.

1.03 SUBMITTALS

- A. Submit in accordance with Conditions of the Contract and Division 1 Administrative Requirements.
- B. Shop Drawings:
 1. Hardware schedule shall be organized in vertical format illustrated in DHI Publications Sequence and Formatting for the Hardware Schedule. Include abbreviations and symbols page according to DHI Publications Abbreviations and Symbols. Complete nomenclature of items required for each door opening as indicated.
 2. An Architectural Hardware Consultant (AHC), as certified by DHI, who shall affix seal attesting to completeness and correctness, shall review hardware schedule prior to submittal.
- C. Submit manufacturer's catalog sheet on design, grade and function of items listed in hardware schedule. Identify specific hardware item per sheet, provide index, and cover sheet.
- D. Coordination:
 1. Distribute door hardware templates to related divisions within 14 calendar days of approved hardware schedule.
- E. Electrified Hardware: Provide electrical information to include voltage, and amperage requirements for electrified door hardware, description of operation, and riser diagrams.

FIRE STATION 54

PROJECT 10914

1. Description of operation for each electrified opening to include description of component functions including location, sequence of operation and interface with other building control systems.
- F. Upon hardware submittal approval, provide for each electrified opening, 3 copies of point to point diagrams.
- G. Closeout Submittals: Submit to City in a three ring binder.
1. Warranties.
 2. Maintenance and operating manual.
 3. Maintenance service agreement.
 4. Record documents.
 5. Copy of approved hardware schedule.
 6. Copy of approved keying schedule with bitting list.
 7. Hardware supplier name, phone number and fax.
- H. Sustainable Design Submittals: Submit data on rapidly renewable materials:
1. Agricultural products harvested within a ten year cycle.
 2. Regionally manufactured materials within seven hundred miles of the Project.
 3. Regionally extracted, harvested, and recovered materials within seven hundred miles.
 4. Recycled content, percentage by weight of constituents per consumer and post-consumer as applicable to product.

1.04 QUALITY ASSURANCE

- A. Hardware supplier shall employ an Architectural Hardware Consultant (AHC) as certified by DHI and a member of the seal program who shall be available at reasonable times during course of work for Project hardware consultation.
- B. Door hardware shall conform to ICC/ANSI A117.1.
- C. Fire Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL 10C, unless otherwise indicated.
- D. Smoke and Draft Control Door Assemblies: Where smoke and draft control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
- E. Door hardware shall be certified to ANSI/BHMA standards as noted, participate and be listed in BHMA Certified Products Directory.
- F. Pre-installation Meeting: Comply with requirements in Division 1 Section "Project Meetings."
1. Convene meeting seven calendar days before installation. Participants required to attend: Contractor, installer, material supplier, manufacturer representatives, electrical contractor, security consultant and fire alarm consultant.
 2. Include in conference decisions regarding proper installation methods and procedures for receiving and handling hardware.
 3. Review sequence of operation for each type of electrified door hardware, inspect, and discuss electrical roughing-in and other preparatory work performed by other trades.
 4. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.

FIRE STATION 54

PROJECT 10914

- G. Installer Qualifications: Specialized in performing installation of this Section and shall have 5 years minimum documented experience.
- H. Hardware listed in 3.07- Hardware Schedule is intended to establish a type and grade.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Provide a clean, dry and secure room for hardware delivered to Project but not yet installed.
- B. Furnish hardware with each unit marked and numbered in accordance with approved finish hardware schedule. Include door and item number for each type of hardware.
- C. Pack each item complete with necessary parts and fasteners in manufacturer's original packaging.
- D. Deliver permanent keys and access control credentials, software and related accessories directly to City via registered mail or overnight package service. Instructions for delivery to City shall be established at "Keying Conference."
- E. Waste Management and Disposal
 - 1. Separate waste materials for reuse or recycling in accordance with Division 1- Section 01300 Administration Requirements, Waste Management and Disposal.

1.06 WARRANTY

- A. General Warranty: City may have under provisions of the Contract Documents and shall be an addition and run concurrent with other warranties made by Contractor under requirements of the Contract documents.
- B. Special Warranty: Warranties specified in this article shall not deprive City of other rights. Contractor, hardware supplier, and hardware installer shall be responsible for servicing hardware and keying related problems.
 - 1. Ten years for manual door closers.
 - 2. Five years for mortise, auxiliary and bored locks.
 - 3. Five years for exit devices.
 - 4. Two years for electromechanical door hardware.
- C. Products judged defective during warranty period shall be replaced or repaired in accordance with manufacturer's warranty at no cost to City. There is no warranty against defects due to improper installation, abuse and failure to exercise normal maintenance.

PART 2 – PRODUCTS**2.01 HINGES**

- A. Hinges and electric hinges shall be of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards: Products to be certified by the following:
 - 1. Hinges: ANSI/BHMA A156.1
 - 2. Template Hinge Dimensions: ANSI/BHMA A156.7

FIRE STATION 54

PROJECT 10914

C. Butt Hinges:

1. Hinge weight and size unless otherwise indicated in hardware sets:
 - a. Doors up to 36" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .134" and a minimum of 4-1/2" in height.
 - b. Doors from 36" wide up to 42" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .145" and a minimum of 5" in height.
 - c. For doors from 42" wide up to 48" wide and up to 1-3/4" thick provide hinges with a minimum thickness of .180" and a minimum of 5" in height.
 - d. Doors greater than 1-3/4" thick provide hinges with a minimum thickness of .180" and a minimum of 5" in height.
 - e. Width of hinge is to be minimum required to clear surrounding trim.

2. Base material unless otherwise indicated in hardware sets:
 - a. Exterior Doors: 304 Stainless Steel, Brass or Bronze material.
 - b. Interior Doors: Steel material.
 - c. Fire Rated Doors: Steel or 304 Stainless Steel materials.

3. Quantity of hinges per door:
 - a. Doors up to 60" in height shall have 2 hinges.
 - b. Doors 60" up to 90" in height shall have 3 hinges.
 - c. Doors 90" up to 120" in height shall have 4 hinges.
 - d. Doors over 120" in height add 1 additional hinge per each additional 30" in height.
 - e. Dutch doors shall have 4 hinges.

4. Hinge design and options unless otherwise indicated in hardware sets:
 - a. Hinges are to be of a square corner five-knuckle design, flat button tips and have ball bearings unless otherwise indicated in hardware sets.
 - b. Out-swinging exterior and out-swinging access controlled doors shall have non-removable pins (NRP) to prevent removal of pin while door is in closed position.
 - c. When full width of opening is required, use hinges that are designed to swing door completely from opening when door is opened to 95 degrees.
 - d. Electric Through Wire (ETW) to have appropriate number of wires to transfer power through door frame to door for proper connection of finish hardware and certified to handle an amperage rating of 3.5AMPS/continuous duty with 16.0AMPS/intermittent duty.
 - e. Provide mortar boxes for frames that require any electrically modified hinges if not an integral part of frame.
 - f. When shims are necessary to correct frame or door irregularities, provide metal shims only.

5. Acceptable Manufactures:

	Hager	Bommer	McKinney
Standard Weight	BB1279	BB5000	TA2714
Heavy Weight	BB1199	BB5006	T4A3386

2.02 FLUSH BOLTS

- A. Labeled openings: Provide automatic or constant latching flush bolts per hardware schedule for inactive leaf of pairs of doors. Provide dust proof strikes for bottom bolt.

FIRE STATION 54

PROJECT 10914

B. Non-Labeled openings: Provide two flush bolts for inactive leaf of pairs of doors per hardware schedule. Top bolt shall not be more than 78" centerline from floor. Provide dust proof strike for bottom bolt.

C. Acceptable Manufactures:

Hager Companies	282D	280X
Rockwood	555	570
Trimco	3917	3911

D. Coordinators: Provide for labeled pairs of doors with automatic flush bolts or with vertical rod exit device with a mortise-locking device per hardware schedule. Provide filler piece to extend full width of stop on frame. Provide mounting brackets and special preparation for latches where applicable.

E. Acceptable Manufactures:

Hager Companies	297D	297N	297M
Rockwood	1600	1601C	1601AB
Trimco	3094	3096	3095

2.03 LOCKS AND LATCHES

A. Locks and latches shall be of one manufacturer as listed for continuity of design and consideration of warranty.

B. Standards: Product to be certified and listed by following:

1. ANSI/BHMA A156.2 Series 4000 Certified to Grade 1.
2. ANSI/BHMA A250.13 Certified for a minimum design load of 1150lbf (100psf) for single out swinging doors measuring 36" in width and 84" in height and a minimum design load of 1150lbf (70psf) for out swinging single doors measuring 48" in width and 84" in height.
3. UL/cUL Labeled and listed for functions up to 3 hours for single doors up to 48" in width and up to 96" in height.
4. UL10C/UBC 7-2 Positive Pressure Rated.
5. ICC/ANSI A117.1.

C. Lock and latch function numbers and descriptions of manufactures series as listed in hardware sets.

D. Material and Design:

1. Lock and Latch chassis to be Zinc dichromate for corrosion resistance.
2. Keyed functions to be of a freewheeling design to help resists against vandalism.
3. Non-handed, field reversible.
4. Thru-bolt mounting with no exposed screws.
5. Levers shall be Zinc cast and plated to match finish designation in hardware sets.
6. Roses shall be of solid Brass or Stainless Steel material.

E. Latch and Strike:

1. Stainless Steel latch bolt with minimum of 1/2" throw and deadlocking for keyed and exterior functions. Standard backset to be 2-3/4" and faceplate shall be adjustable to accommodate a square edge door or a standard 1/8" beveled edge door.
2. Strike is to fit a standard ANSI A115 prep measuring 1-1/4" x 4-7/8" with proper lip length to protect surrounding trim.

FIRE STATION 54

PROJECT 10914

F. Electric Locks

1. Fail Safe (power lock) Outside trim is locked when power is applied and unlocked when power is removed. Lockset will unlock in the event of a power failure.
2. Fail Secure (power unlock) Outside trim is locked when there is no power and unlocked when power is applied. Lockset will be locked in the event of a power failure.
3. Continuous duty solenoids.
4. 24VDC, 24VAC, 150ma.

G. Acceptable Manufactures:

1. Hager Companies: 3400 Series.
2. Schlage: ND Series.
3. Sargent: 10 Line.

2.04 EXIT DEVICES

A. Shall be touch pad type, finish to match balance of door hardware. Exit Devices shall be of one manufacturer as listed for continuity of design and consideration of warranty.

1. Standards: Manufacturer to be certified by the following:
2. Exit Devices: ANSI/BHMA A156.3 Grade 1
3. Exit Devices: ANSI/BHMA A250.13 Severe Windstorm Resistant Component
4. UL labeled panic exit hardware.
5. UL labeled fire exit hardware.
6. 2007 Florida Building Code Certification Number: FL9481.1

B. Touch pad shall extend a minimum of one half-door width. Freewheeling lever design shall match design of locks levers. Exit device to mount flush with door.

C. Components:

1. Covers and end caps shall be brass, bronze, or stainless steel.
2. Chassis shall be aluminum.

D. Lock and Latch Functions: Function numbers and descriptions of manufacturer's series and lever styles indicated in door hardware sets.

E. Mounting:

1. 5" minimum stile width required for double doors with surface vertical rod devices.
2. 5-3/8" minimum stile width required for single.
3. 5" minimum stile width required for double door with rim devices and hardware mullion.
4. 5-3/4" minimum stile width required for double door with rim devices and a 2" mullion.

F. Fasteners:

1. Wood and machine screws and thru-bolts.

G. Acceptable Manufactures:

1. Hager Companies: 4500 Series
2. Von Duprin: 99 Series
3. Sargent: 80 Series

FIRE STATION 54

PROJECT 10914

2.05 CYLINDERS AND KEYING

- A. Cylinders shall be of one manufacturer as listed for continuity of design and consideration of warranty.
- B. Standards:
 - 1. DHI Handbook "Keying systems and nomenclature" (1989)
- C. Cylinders:
 - 1. Manufacturer's standard tumbler type, six-pin.
 - 2. Shall be furnished with cams/tailpieces as required for locking device that is being furnished for project.
- D. Keying:
 - 1. Contact City with representative from hardware supplier to establish a keying conference. Verify keyway, visual key identification, number of master keys and keys per lock. Provide keying system per City's instructions.
 - 2. Copy of City's approved keying schedule shall be submitted to City and Architect with documentation of which keying conference was held and City's sign-off.
 - 3. Provide a bitting list to City of combinations as established, and expand to twenty five percent for future use or as directed by City.
 - 4. Key into City's existing keying system if applicable.
 - 5. Keys to be shipped to City's representative, individually tag per keying conference.
- E. Acceptable manufactures:
 - 1. Hager Companies
 - 2. Schlage
 - 3. Sargent

2.06 CLOSERS

- A. Shall be product of one manufacturer. Unless otherwise indicated on hardware schedule, comply with manufacturer's recommendation for size of closer, depending on width of door, frequency of use, atmospheric pressure, ADAAG requirements, and fire rating.
- B. Standards: Manufacturer to be certified and or listed by the following:
 - 1. Closers ANSI/BHMA A156.4 Grade 1
 - 2. ADD AG
 - 3. ICC/ANSI A117.1
 - 4. UL/cUL listed up to 3 hours.
 - 5. UL10C Positive Pressure Rated
- C. Provide cast iron non-handed bodies with full plastic covers. Closers shall have separate staked adjustable valve screws for latch speed, sweep speed, and backcheck. Provide Tri-Pack arms and brackets for regular arm, top jamb, and parallel arm mounting for each closer.
- D. Components:
 - 1. One-piece seamless steel spring tube to seal in hydraulic fluid.
 - 2. Double heat-treated steel tempered springs.
 - 3. Precision-machined heat-treated steel piston.
 - 4. Triple heat-treated steel spindle.
 - 5. Full rack and pinion operation.

DOOR HARDWARE

CAM 087-0501 - 8
 EXHIBIT 1B
 Page 213 of 600

FIRE STATION 54

PROJECT 10914

- E. Mounting:
1. Out swing doors shall have surface parallel arm mount closers except where noted on hardware schedule.
 2. In swing doors shall have surface regular arm mount closers except where noted on hardware schedule.
 3. Provide brackets and shoe supports for aluminum doors and frames to mount fifth screw.
 4. Furnish drop plates where top rail conditions on door do not allow for mounting of closer and where backside of closer is exposed through glass.
- F. Size closers in compliance with requirements for accessibility (ADDAG). Comply with following maximum opening force requirements.
1. Interior hinged openings: 5.0 lbs.
 2. Exterior hinged openings: 8.5 lbs.
 3. Fire Rated Openings: Minimum opening force allowable by authority having jurisdiction.
- G. Fasteners: Provide self-reaming and self-tapping wood and machine screws and sex nuts and bolts for each closer.
- H. Acceptable manufactures:
1. Hager Companies: 5100 Series
 2. LCN: 4040 Series
 3. Sargent: 281 Series

2.07 PROTECTIVE TRIM

- A. For single doors, size two inches less door width (LDW) on push side of door, and one inch less on pull side of door. For pairs of doors, size one inch less door width (LDW) on push side of door, and ½ inch on pull side of door.
1. Kickplates 8" high or sized to door bottom rail height
 2. Mop Plates 4" high or sized to door bottom rail height
 3. Armor Plates 36" high or sized to door bottom rail height
- B. Standards: Manufacturer to be certified by the following:
1. Architectural Door Trim: ANSI/BHMA A156.6
 2. UL
- C. Kick plates, armor plates and mop plates shall be 0.050" thick stainless steel, beveled four edges, and countersunk holes.
- D. Fasteners: Supply #6 x 5/8" oval head screws, unless otherwise noted.
- E. Acceptable Manufactures:
1. Hager Companies: 194S
 2. Rockwood: K1050 x B4E
 3. Burns

2.08 STOPS AND HOLDERS

- A. Wall Stops: Provide door stops wherever necessary to prevent door or hardware from striking an adjacent partition or obstruction. Provide wall stops when possible. Door stops and holders mounted in concrete floor or masonry walls shall have stainless steel machine screws and lead expansion shields.

FIRE STATION 54

PROJECT 10914

B. Acceptable Manufactures:

Hager Companies	236W/232W
Rockwood	409/406
Burns	575/

C. Overhead stops and holders: Provide overhead stop and holders for doors that open against equipment, casework sidelights and other objects that would make wall stops/holders and floor stops/holders inappropriate. Provide sex bolt attachments for mineral core wood door applications.

D. Acceptable Manufactures:

Rixson	9 Series
Glynn Johnson	90 Series
Hager	7000 Series

E. Standards: Manufacturer to be certified by the following:

1. Stops and Bumpers: ANSI/BHMA A156.8
2. Overhead Stops and Holders: ANSI/BHMA A156.8

2.09 DOOR GASKETING AND WEATHERSTRIP

A. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing where indicated on hardware schedule. Provide non-corrosive fasteners for exterior applications.

1. Perimeter gasketing: Apply to head and jamb, forming seal between door and frame.
2. Meeting stile gasketing: Fasten to meeting stiles, forming seal when doors are in closed position.
3. Door bottoms: Apply to bottom of door, forming seal with threshold or floor when door is in closed position.
4. Sound Gasketing: Cutting or notching for stop mounted hardware not permitted.
5. Drip Guard: Apply to exterior face of frame header. Lip length to extend 4" beyond width of door.

B. Standards: Manufacturer to be certified by the following:

1. Door Gasketing and Edge Seal Systems: ANSI/BHMA A156.22

C. Smoke-Labeled Gasketing: Comply with NFPA 105 listed, labeled, and acceptable to authorities having jurisdiction, for smoke control indicated.

1. Provide smoke labeled gasketing on 20 minute rated doors and on smoke rated doors.

D. Fire-Rated Gasketing: Comply with NFPA 80 listed, labeled, and acceptable to Authorities Having Jurisdiction, for fire ratings indicated.

E. Comply with UBC 7-2 and UL10C positive pressure where frame applied intumescent seals are required.

F. Acceptable Manufactures:

1. Perimeter Gasketing:
 - a. Hager Companies: 721S/881S
 - b. National Guard: 5020/700E

FIRE STATION 54

PROJECT 10914

- c. Pemko: 290
- 2. Door Bottoms:
 - a. Hager Companies: 750S/770S
 - b. National Guard: 200
 - c. Pemko: 315
- 3. Meeting Stile:
 - a. Hager Companies: 872S
 - b. National Guard: B606
 - c. Pemko: 18061

2.10 THRESHOLDS

- A. Secured with lead expansion shields and stainless steel machine screws. Notched in field to fit frame by hardware installer. Refer to Drawings for special details.
- B. Standards: Manufacturer to be certified by the following:
 - 1. Thresholds: ANSI/BHMA A156.21
 - 2. Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- C. Acceptable Manufactures:
 - 1. Hager Companies: 413S/520S
 - 2. National Guard: 513
 - 3. Pemko:271

2.11 SILENCERS

- A. Where smoke, light, or weather seal are not required, provide three silencers per single door frame, two per double door frame and four per Dutch door frame.
- B. Acceptable Manufactures:
 - 1. Hager Companies: 307D
 - 2. Rockwood: 608
 - 3. Trimco: 1229A

2.12 KEY CABINET

- A. Provide key cabinet by Lund Equipment, Telkee Incorporated, or Key Control.
- B. Key control system:
 - 1. Include two sets of key tags, hooks, labels, and envelopes.
 - 2. Contain system in metal cabinet with baked enamel finish, surface mounted to wall.
 - 3. Capacity shall be able to hold actual quantities of keys, plus 25 percent.
 - 4. Provide tools, instruction sheets and accessories required to complete installation.

2.13 MISCELLANEOUS

- A. Power Supply for Electric Locks:
 - 1. Power Supply for electric locks to be 12/24VDC with 2 amp output. Located in central location. Coordinate with Section 13200 and Section 16000 for junction boxes and conduit placement.

FIRE STATION 54

PROJECT 10914

- B. Standards: Products to be certified by the following:
 - 1. U.L. Listed
- C. Acceptable Manufacturers:
 - 1. Hager: 2908
 - 2. Detex- PP-5152
 - 3. RCI: 10-5-PDD-FT
 - 4. Push Button Lockset – Simplex – L1011

2.14 FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if within 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 range of approved Samples.
- B. Comply with base material and finish requirements indicated by BHMA designations in hardware schedule.

PART 3 – EXECUTION**3.01 EXAMINATION**

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install hardware per manufacturer's instructions and in compliance with:
 - 1. NFPA 80.
 - 2. NFPA 105.
 - 3. ICC/ANSI A117.1.
 - 4. ANSI/BHMA A115.
 - 5. UL10C/UBC7-2
 - 6. Local building code.
 - 7. Approved shop drawings.
 - 8. Approved finish hardware schedule.
- B. Do not install surface mounted items until finishes have been completed on substrates involved. Set unit level, plumb and true to line location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

3.03 FIELD QUALITY CONTROL

- A. Material supplier to schedule final walk through to inspect hardware installation ten business days before final acceptance of City. Material supplier shall provide a written report detailing

FIRE STATION 54

PROJECT 10914

discrepancies of each opening to General Contractor within seven calendar days of walk through.

3.04 ADJUSTMENT, CLEANING AND DEMONSTRATING

- A. Adjustment: Adjust and check each opening to ensure proper operation of each item of finish hardware. Replace items that cannot be adjusted to operate freely and smoothly or as intended for application at no cost to City.
- B. Cleaning: Clean adjacent surfaces soiled by hardware installation. Clean finished hardware per manufacturer's instructions after final adjustments has been made. Replace items that cannot be cleaned to manufacturer's level of finish quality at no cost to City.
- C. Demonstration: Conduct a training class for building maintenance personnel demonstrating the adjustment, operation of mechanical and electrical hardware. Special tools for finished hardware to be turned over and explained usage at this meeting.

3.05 PROTECTION

- A. Leave manufacturer's protective film intact and provide proper protection for all other finish hardware items that do not have protective material from the manufacture until City accepts Project as complete.

3.06 HARDWARE SETS

- A. The following schedule of hardware sets shall be considered a guide only. Furnish door hardware to meet required codes. Contractor to coordinate with hardware schedule on sheet A-14.

3.07 HARDWARE SCHEDULE**HDW SET A**

Door Numbers: 1 (Lobby)
Each opening to receive:

1 ea	Cylinder	3900 Series as required. Finish to match hardware.
1 ea	Card Reader	By Security Contractor.
1 ea	Power Supply	All hardware and power supply shall be provided by Door Manuf. and contractor.

Balance of hardware by aluminum door supplier.

Door hardware to be Miami Dade County Product Control Approved (NOA) for an assembly, and designed to comply with High Velocity Hurricane Zone of the Florida Building Code.

HDW SET B

Door Numbers: 14 (Pantry)
Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Push Button Lockset	L1011	US26D
1 ea	Overhead Holder	7017 x SRF	US32D

DOOR HARDWARE

FIRE STATION 54

PROJECT 10914

1 ea	Kickplate	194S	US32D
1 set	Seal	721S	CHARCOAL

HDW SET C

Door Numbers: 2 (Multi-Purpose Room)

Each opening to receive:

1 ea Cylinder 3900 Series as required. Finish to match hardware.
Balance of hardware by aluminum door supplier.

HDW SET D

Door Numbers: Exterior Door 3, 21 (Stair 2, Apparatus, Elev. Equip.)

Each opening to receive:

2 ea	Hinges	BB1199 4.5" x 4.5" NRP	US32D
1 ea	Electrified Hinge	BB1199 4.5" x 4.5" ETW	US32D
1 ea	Electrified Lock	3480 x WTN x EU	US26D
1 ea	Closer	5100 x HDCS	ALM
1 ea	Kickplate	194S	US32D
1 ea	Threshold	520SV	MIL
1 ea	Door Sweep	770SV	MIL
1 set	Seal	881SN	MIL
1 ea.	Drip Guard	810S	MIL
1 ea.	Power Supply	2908	
1 ea.	Card Reader	By Security Contractor	
1 ea.	Wire Chase in door	by door supplier	

Description of Operation:

1. The door is normally closed and locked.
2. Upon proper credential validation lever will unlock and permit entry or by key override.
3. Free egress at all times.
4. Electrified lock is fail secure and will remain locked in the event of a fire alarm or power failure.

HDW SET DA

Door Numbers: 7 (medical Storage)

Each opening to receive:

2 ea	Hinges	BB1199 4.5" x 4.5" NRP	US32D
1 ea	Electrified Hinge	BB1199 4.5" x 4.5" ETW	US32D
1 ea	Electrified Lock	3480 x WTN x EU	US26D
1 ea	Closer	5100	ALM
1 ea.	Overhead Stop	7016 x SRF	US32D
1 ea	Kickplate	194S	US32D
1 ea	Threshold	413S	MIL
1 ea	Door Sweep	750SN	MIL
1 set	Seal	721S	CHARCOAL

DOOR HARDWARE

CA 17-0531-14
087100
EXHIBIT 1B

FIRE STATION 54

PROJECT 10914

- 1 ea. Power Supply 2908
- 1 ea. Card Reader By Security Contractor
- 1 ea. Wire Chase in door by door supplier

Description of Operation:

1. The door is normally closed and locked.
2. Upon proper credential validation lever will unlock and permit entry or by key override.
3. Free egress at all times.
4. Electrified lock is fail secure and will remain locked in the event of a fire alarm or power failure.

HDW SET DB

Door Numbers: 10, 31 (Corr. 2/Apparatus, Stair 1/Apparatus)

Each opening to receive:

- | | | | |
|-------|-------------------------------------|--------------------------|----------|
| 1 ea. | Electrified Hinge | BB1199 4.5" x 4.5" x ETW | US32D |
| 2 ea | Hinges | BB1199 4.5" x 4.5" NRP | US32D |
| 1 ea | Electrified Lock | 3480 x WTN x EU | US26D |
| 1 ea | Closer | 5100 | ALM |
| 1 ea | Kickplate | 194S | US32D |
| 1 ea. | Wall Stop | 232W | US32D |
| 1 ea | Threshold | 413S | MIL |
| 1 ea | Door Sweep | 750SN | MIL |
| 1 set | Seal | 721S | CHARCOAL |
| 1 ea. | Power Supply | 2908 | |
| 1 ea. | Card Reader | By Security Contractor | |
| 1 ea. | Wire Chase in door by door supplier | | |

Description of Operation:

1. The door is normally closed and locked.
2. Upon proper credential validation lever will unlock and permit entry or by key override.
3. Free egress at all times.
4. Electrified lock is fail secure and will remain locked in the event of a fire alarm or power failure.

HDW SET DC

Door Numbers: 20 (Stair 1)

Each opening to receive:

- | | | | |
|-------|----------------|------------------------|-------|
| 3 ea | Hinges | BB1199 4.5" x 4.5" NRP | US32D |
| 1 ea | Storeroom Lock | 3480 x WTN | US26D |
| 1 ea | Closer | 5100 x HDCS | ALM |
| 1 ea | Kickplate | 194S | US32D |
| 1 ea | Threshold | 520SV | MIL |
| 1 ea | Door Sweep | 770SV | MIL |
| 1 set | Seal | 881SN | MIL |
| 1 ea. | Drip Guard | 810S | MIL |

DOOR HARDWARE

CA 17-0531-15
 087100-
 EXHIBIT 1B
 Page 220 of 600

FIRE STATION 54

PROJECT 10914

HDW SET E

Door Numbers: 4 (Electrical)
Each opening to receive:

6 ea	Hinges	BB1199 4.5" x 4.5" NRP	US32D
2 ea	Flush Bolts	282D	US26D
1 ea	Dustproof Strike	280X	US26D
1 ea	Storeroom Lock	3480 x WTN	US26D
1 ea	Closer	5100 x HDCS (active leaf)	ALM
1 ea	Overhead Stop	7016 x SRF (Inactive Leaf)	US32D
2 ea	Kickplates	194S	US32D
1 ea	Threshold	413S	MIL
2 ea	Door Sweep	750SN	MIL
1 set	Seal	721S	CHARCOAL

Astragal by door Manufacturer.

HDW SET F

Door Numbers: 13 (Gymnasium), 16 (Corr. 1), 19 (Laundry), 23 (Stair 1)
Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Latchset	3410 x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea	Stop	232W	US32D
1 set	Seal	721S	CHARCOAL

HDW SET G

Door Numbers: 8 (Bunker Storage)
Each opening to receive:

6 ea	Hinges	BB1279 4.5" x 4.5"	US26D
2 ea	Flush Bolts	282D	US26D
1 ea	Dust Proof Strike	280X	US26D
1 ea	Latchset	3410 x WTN	US26D
1 ea	Closer	5100 x HDCS (active leaf)	ALM
1 ea	Overhead Stop	7016 x SRF (inactive leaf)	US32D
2 ea	Kickplates	194S	US32D
1 ea	Threshold	413S	MIL
2 ea	Door Sweeps	750SN	CLR
1 set	Seal	721S	CHARCOAL
1 set	Meeting Stile	872SN	CLR

DOOR HARDWARE

CA 17-0531-16
087100
EXHIBIT 1B
Page 221 of 600

FIRE STATION 54

PROJECT 10914

HDW SET H

Door Numbers: 22 (Mechanical)

Each opening to receive:

6 ea	Hinges	BB1279 4.5" x 4.5"	US26D
2 ea	Flush Bolts	282D	US26D
1 ea	Dust Proof Strike	280X	US26D
1 ea.	Classroom Lockset	3470 x WTN	US26D
1 ea	Closer	5100 x HDCS (active leaf)	ALM
1 ea	Overhead Stop	7016 x SRF (Inactive Leaf)	US32D
2 ea	Kickplates	194S	US32D
1 set	Seal	721S	CHARCOAL
1 set	Meeting Stile	872SN	CLR

HDW SET I

Door Numbers: 17 (Bunks 1-7)

Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Privacy Set	3440 x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea	Stop	236W	US32D
1 set	Seal	721S	CHARCOAL

HDW SET IA

Door Numbers: 18, 18A (Men, Women, Baths)

Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Privacy Set	3440 x WTN	US26D
1 ea	Closer	5100 x HDCS	ALM
1 ea	Kickplate	194S	US32D
3 ea.	Silencers	307D	GREY

HDW SET J

Door Numbers: 9 (Decon)

Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Latchset	3410 x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea	Stop	232W	US32D
3 ea.	Silencers	307D	GREY

DOOR HARDWARE

FIRE STATION 54

PROJECT 10914

HDW SET K

Door Numbers: 5 (Watch Office)

Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Lockset	3453 x WTN	US26D
1 ea	Overhead Stop	7016 x SRF	US32D
3 ea	Silencers	307D	GREY

HDW SET L

Door Numbers: 12 (Corr. 1)

Each opening to receive:

2 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Electrified Hinge	BB1279 4.5" x 4.5" ETW	US26D
1 ea	Electrified Lock	3480 x EL x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea	Stop	232W	US32D
1 set	Seal	721S	CHARCOAL
1 ea	Power Supply	2908	
1 ea	Card Reader	By security contractor.	
1 ea.	Wire Chase in door	by door supplier	

Description of operation:

1. The door is normally closed and locked.
2. Upon proper credential validation lever will unlock and permit entry or by key override.
3. Free egress at all times.
4. Electrified lock is fail safe and will unlock in the event of a fire alarm or power failure.

HDW SET M

Not Used

HDW SET N

Door Numbers: 11 (Office 1, Office 2)

Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Office Lock	3450 x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea	Stop	236W	US32D
1 set	Seal	721S	CHARCOAL

DOOR HARDWARE

FIRE STATION 54

PROJECT 10914

HDW SET O

Door Numbers: 15A, 24 (Telecom, Supply, Closets, Recycling)
Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Classroom Lock	3470 x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea	Stop	232W	US32D
1 set	Seal	721S	CHARCOAL

HDW SET OA

Door Numbers: 15 (Janitor)
Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Classroom Lock	3470 x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea.	Mop Plate	194S	US32D
1 ea	Stop	232W	US32D
1 set	Seal	721S	CHARCOAL

HDW SET OB

Door Numbers: 26 (Storage/Ice)
Each opening to receive:

3 ea	Hinges	BB1279 4.5" x 4.5"	US26D
1 ea	Classroom Lock	3470 x WTN	US26D
1 ea	Closer	5100 x HDCS	ALM
1 ea	Kickplate	194S	US32D
1 set	Seal	721S	CHARCOAL

HDW SET OC

Door Numbers: 29 (Stair 1 Roof)
Each opening to receive:

3 ea	Hinges	BB1199 4.5" x 4.5" x NRP	US32D
1 ea	Classroom Lock	3470 x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D

DOOR HARDWARE

FIRE STATION 54

PROJECT 10914

1 ea	Stop	232W	US32D
1 ea.	Threshold	520SV	MIL
1 ea.	Sweep	770SV	MIL
1 set	Weatherstrip	881SN	MIL
1 ea.	Drip Guard	810S	MIL

HDW SET P

Door Numbers: 25 (Fire Pole)

Each opening to receive:

3 ea	Hinges	BB1168 4.5" x 4.5"	US26D
1 ea	Exit Device	4500 x RIM x F	US26D
1 ea	Trim	45BE x WTN	US26D
1 ea	Closer	5100	ALM
1 ea	Kickplate	194S	US32D
1 ea	Stop	232W	US32D
1 set	Seal	721S	CHARCOAL

HDW SET Q

Door Numbers: 6/6A -Overhead roll-up door

Each opening to receive:

Hardware by overhead door supplier.

END OF SECTION 087100

DOOR HARDWARE

FIRE STATION 54

PROJECT 10914

**SECTION 088000
GLAZING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes 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. Storefront framing.
 - 4. Glazed entrances.
 - 5. Interior borrowed lites.
- B. Related Sections:
 - 1. Division 08 Section "Hollow Metal Doors and Frames".
 - 2. Division 08 Section "Aluminum-Framed Entrances and Storefronts".

1.3 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.

1.4 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. Provide glass units for exterior openings that have Miami-Dade Products Control Approval (NOAs) for hurricane wind resistance and air-borne missile impact from hurricane force winds, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."

FIRE STATION 54

PROJECT 10914

- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:
1. Design Wind Pressures: As indicated on Structural Drawings.
 2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings. See Drawings for Design Wind Loads and all shall meet Miami-Dade Products Control Approval (NOAs) for hurricane wind resistance and air-borne missile impact from hurricane force winds and Florida Building Code.
 - a. Wind Design Data: As indicated on Structural Drawings.
 - b. Basic Wind Speed: 180 mph
 - c. Importance Factor: Emergency Facility
 - d. Site Exposure Category: D
 - e. Risk Category: IV
 3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 4. Glass Type Factors for Wired, Patterned, and Sandblasted Glass:
 - a. Short-Duration Glass Type Factor for Wired Glass: 0.5.
 - b. Long-Duration Glass Type Factor for Wired Glass: 0.3.
 - c. Short-Duration Glass Type Factor for Patterned Glass: 1.0.
 - d. Long-Duration Glass Type Factor for Patterned Glass: 0.6.
 - e. Short-Duration Glass Type Factor for Sandblasted Glass: 0.5.
 5. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 6. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 7. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
 8. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. 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.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

FIRE STATION 54

PROJECT 10914

1.6 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Sustainable Design Submittals:
 - 1. Product Data for Credit: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.
- C. Glass Samples: For each type of the following products; 12 inches square.
 - 1. Tinted glass.
 - 2. Patterned glass.
 - 3. Coated glass.
 - 4. Wired glass.
 - 5. Fire-resistive glazing products.
 - 6. Laminated glass with colored interlayer.
- D. Glazing Accessory Samples: For gaskets sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Qualification Data: For installers manufacturers of insulating-glass units with sputter-coated, low-e coatings glass testing agency and sealant testing agency.
- H. Product Certificates: For glass and glazing products, from manufacturer.
- I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for tinted glass coated glass glazing sealants and glazing gaskets.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- J. Preconstruction adhesion and compatibility test report.
- K. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.
- B. 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.

FIRE STATION 54

PROJECT 10914

- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- E. Source Limitations for Glass: Obtain tinted float glass and laminated glass from single source from single manufacturer for each glass type.
- F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- G. 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 "Laminated Glazing Reference Manual" and 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."
- H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
- J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Install glazing in mockups specified in Division 08 Section "Aluminum-Framed Entrances and Storefronts Aluminum Windows" to match glazing systems required for Project, including glazing methods.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- L. Preinstallation Conference: Conduct conference at Project site.
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Review temporary protection requirements for glazing during and after installation.

FIRE STATION 54

PROJECT 10914

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 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.

1.10 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: 10 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.

FIRE STATION 54

PROJECT 10914

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.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- 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. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes enhanced-protection testing requirements in ASTM E 1996 and High Velocity Wind Zone (per Florida Building Code 2010 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.
1. Large-Missile Test: For glazing located within 30 feet of grade.
 2. Small-Missile Test: For glazing located more than 30 feet above grade.
 3. Large-Missile Test: For all glazing, regardless of height above grade.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6.0 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.
- B. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I, complying with other requirements specified and with visible light transmission not less than 91 percent, solar heat gain coefficient .25 maximum and U value = 1.22.
1. Products: Subject to compliance with requirements, provide the following:
 - a. AFG Industries, Inc.; Krystal Klear.
 - b. Guardian Industries Corp.; Ultrawhite.
 - c. Pilkington North America; Optiwhite.

GLAZING

CAM 17-0521-6
EXHIBIT 1B
Page 231 of 600

FIRE STATION 54

PROJECT 10914

d. PPG Industries, Inc.; Starphire.

- C. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 2. For uncoated glass, comply with requirements for Condition A.
 3. For coated vision glass, comply with requirements for Condition C (other coated glass).

2.3 LAMINATED GLASS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Guardian Industries Corp
- B. 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.
- C. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, 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 one of the following to comply with interlayer manufacturer's written recommendations:
 - a. Polyvinyl butyral interlayer.
 - b. Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
 - c. Ionoplast interlayer.
 - d. Cast-in-place and cured-transparent-resin interlayer.
 - e. Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Color: Clear unless otherwise indicated.
- D. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.

FIRE STATION 54

PROJECT 10914

2.4 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. Fire-Protection-Rated Tempered Glass: 1/4-inch-thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. InterEdge, Inc., a subsidiary of AFG Industries, Inc.; PyroEdge-20.
 - b. Safti First; SuperLite20.
 - c. Vetrotech Saint-Gobain; SSG Pyroswiss.
- 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, provide the following:
 - a. Oldcastle Glass, Inc.; Pyroguard.

2.5 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.

2.6 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. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.

FIRE STATION 54

PROJECT 10914

4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Single-Component Neutral-Curing Silicone Glazing Sealants GS:
 - a. Products:
 - 1) Dow Corning Corporation; 790.
 - 2) GE Silicones; SilPruf LM SCS2700.
 - 3) Tremco; Spectrem 1 (Basic).
 - 4) GE Silicones; SilPruf SCS2000.
 - 5) Pecora Corporation; 864.
 - 6) Pecora Corporation; 890.
 - 7) Polymeric Systems Inc.; PSI-641.
 - 8) Sonneborn, Div. of ChemRex, Inc.; Omniseal.
 - 9) Tremco; Spectrem 3.
 - b. Type and Grade: S (single component) and NS (nonsag).
 - c. Class: 100/50.
 - d. Use Related to Exposure: NT (nontraffic).
 - e. Uses Related to Glazing Substrates: M, G, A, and, as applicable to glazing substrates indicated, O.
 - 1) Use O Glazing Substrates: Coated glass color, anodic aluminum] [aluminum coated with a high-performance coating, galvanized steel and wood.
 2. Applications: windows, doors, storefront all to meet Miami-Dade product approvals.
- 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.

2.7 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.

FIRE STATION 54

PROJECT 10914

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- 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.

2.9 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.

2.10 MONOLITHIC-GLASS TYPES

- A. Coated Tinted Float-Glass Units MG: Class 2 (tinted) annealed Kind FT (fully tempered) float glass.
 - 1. Products:
 - a. PPG Industries, Inc.
 - b. Pilkington Building Products North America
 - c. Viracon
 - 2. Thickness: to meet Miami-Dade Product Approvals NOAs.
 - 3. Tint Color: Gray
 - 4. Reflective Coating: Pyrolytic
 - a. Color: Pewter
 - b. Location: Second surface.

FIRE STATION 54

PROJECT 10914

5. Visible Light Transmittance: 83 percent minimum.
 6. Solar Heat Gain Coefficient: .25 maximum.
 7. Outdoor Visible Reflectance: 75 percent maximum.
- B. Coated Tinted Heat-Strengthened Spandrel Glass MG: Condition C (other coated glass), Kind HS (heat strengthened), with the same reflective coating as coated tinted float glass and with the opacifier on the second surface.
- C. Glass Type: Reflective-coated spandrel glass, heat-strengthened float glass.
1. Thickness: 6.0 mm.
 2. Coating Location: First surface.
 3. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.
 4. Factory apply manufacturer's standard opacifier of the following material to coated second surface of lites, with resulting products complying with Specification No. 89-1-6 in GANA's Tempering Division's "Engineering Standards Manual":
 - a. Manufacturer's standard opacifier material.
 - b. Polyester film laminated to glass with solvent-based adhesive.

2.11 LAMINATED-GLASS TYPES

- A. Laminated-Glass Units LG:
1. Basis-of-Design Product: or a comparable product by one of the following:
 - a. Viracon
 2. Products:
 - a. PPG Industries, Inc.
 - b. Pilkington Building Products North America
 - c. Viracon
 - d. Guardian
 3. Kind LA, consisting of two lites of annealed float glass.
 4. Outer Lite: Class 1 (clear) and 2 (tinted) float glass.
 - a. Tint Color: Gray
 - b. Thickness: As indicated by manufacturer recommendation to meet Miami-Dade Product Approvals NOAs.
 - c. Self-Cleaning, Low-Maintenance Coating: Pyrolytic coating on first surface.
 5. Plastic Interlayer:
 - a. Thickness: 0.060 inch, but not less than that required to comply with Miami-Dade NOAs.
 - b. Interlayer Color: Gray
 - c. If a color is selected, insert light-transmittance value below.
 - d. Visible Light Transmittance of Interlayer: 85 percent minimum.
 6. Inner Lite: Class 1 (clear) float glass.
 - a. Thickness: not less than that required to comply with Miami-Dade NOAs.
 7. Visible Light Transmittance: 83 percent minimum.
 8. Solar Heat Gain Coefficient: .25 maximum
 9. Outdoor Visible Reflectance: 75 percent maximum.

FIRE STATION 54

PROJECT 10914

2.12 FIRE-PROTECTION-RATED GLAZING TYPES

- A. Polished Wired-Glass Units WG: Form 1 (wired glass, polished both sides), Quality-Q6, Mesh 2 (M2) (Square), 6.0 mm thick.
 - 1. Manufacturers:
 - a. Asahi/AMA Glass Corp.; affiliated with AFG Industries, Inc.
 - b. Central Glass Co., Ltd.; distributed by Northwestern Industries Inc.
 - c. Pilkington Sales (North America) Ltd.

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.

FIRE STATION 54

PROJECT 10914

- 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.

FIRE STATION 54

PROJECT 10914

- 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.

FIRE STATION 54

PROJECT 10914

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 088000

FIRE STATION 54

PROJECT 10914

**SECTION 092116.23
GYPSUM BOARD SHAFT WALL ASSEMBLIES**

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: Gypsum board shaft wall assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.
- B. Sustainable Design Submittals:
1. Product Data for Credit: 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. Product Certificates for Credit: 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.
 3. Product Certificates for Credit: 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.
 4. Laboratory Test Reports for Credit: For gypsum board shaft wall systems, 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."

GYPSUM BOARD SHAFT WALL ASSEMBLIES

092116.23 - 1
CAM 17-0531
EXHIBIT 1B
Page 241 of 600

FIRE STATION 54

PROJECT 10914

1.4 INFORMATIONAL SUBMITTALS

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM 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.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.
- C. Low-Emitting Materials: Gypsum shaft wall assemblies shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: As indicated.
- B. STC Rating: As indicated.

GYPSUM BOARD SHAFT WALL ASSEMBLIES

092116.23 - 2
CAM 17-0531
EXHIBIT 1B
Page 242 of 600

FIRE STATION 54

PROJECT 10914

- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Depth: As indicated.
 - 2. Minimum Base-Metal Thickness: As indicated.
- D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches long and matching studs in depth.
 - 1. Minimum Base-Metal Thickness: As indicated Matching steel studs.
- E. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.
- F. Elevator Hoistway Entrances: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches, matching studs in depth, and not less than 0.033 inch thick.
- G. Room-Side Finish: As indicated.
- H. Shaft-Side Finish: As indicated.
- I. Insulation: Sound attenuation blankets.

2.3 PANEL PRODUCTS

- A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent by weight.
- B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- C. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site.
- D. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- E. 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, provide one of the following:
 - a. American Gypsum; Shaft Liner.
 - b. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; ToughRock Fireguard Shaftliner.
 - c. Lafarge North America, Inc.; Firecheck Type X Shaftliner.
 - d. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner.
 - e. USG Corporation; Sheetrock Brand Gypsum Liner Panel.

FIRE STATION 54

PROJECT 10914

2. Thickness: 1 inch.
 3. Long Edges: Double bevel.
- F. Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Georgia-Pacific Gypsum LLC, Subsidiary of Georgia Pacific; Dens-Glass Ultra Shaftliner.
 - b. Lafarge North America, Inc.; Firecheck Moldcheck Type X Shaftliner.
 - c. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
 - d. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.
 2. Thickness: 1 inch.
 3. Long Edges: Double bevel.
 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- G. Gypsum Board: As specified in Division 09 Section "Gypsum Board."
- H. Gypsum Base for Gypsum Veneer Plaster: As specified in Division 09 Section "Gypsum Veneer Plastering."
- I. Cementitious Backer Units: As specified in Division 09 Section "Gypsum Board." /Division 09 Section "Tiling."

2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Recycled Content of Steel: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. 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 ASTM A 653/A 653M, G40, hot-dip galvanized, or ASTM A 653/A 653M, G60, hot-dip galvanized unless otherwise indicated.
- C. Firestop Tracks: 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.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Fire Trak Corp.; Fire Trak System.
 - b. Grace Construction Products; FlameSafe FlowTrak System.
 - c. Metal-Lite, Inc.; The System.

FIRE STATION 54

PROJECT 10914

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 as specified in Division 09 Section "Gypsum Board" Division 09 Section "Gypsum Veneer Plastering" 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.
 - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
 - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing according to ASTM E 1190 conducted by a qualified testing agency.
- E. Sound Attenuation Blankets: As specified in Division 09 Section "Gypsum Veneer Plastering."
- F. Acoustical Sealant: As specified in Division 09 Section "Gypsum Board." Or Division 09 Section "Gypsum Veneer Plastering."

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.

FIRE STATION 54

PROJECT 10914

3.2 PREPARATION

- A. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies to comply with requirements specified in Division 07 Section "Applied Fireproofing."
- B. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft wall assemblies 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 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturers 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. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.
- 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. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- G. Control Joints: Install control joints at locations indicated on Drawings while maintaining fire-resistance rating of gypsum board shaft wall assemblies.

FIRE STATION 54

PROJECT 10914

- H. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.
- I. Cant Panels: At projections into shaft where indicated, install 1/2- or 5/8-inch-thick gypsum board cants covering tops of projections.
 - 1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft wall framing.
 - 2. Where steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft wall framing.
- J. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.4 PROTECTION

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

END OF SECTION 092116.23

FIRE STATION 54

PROJECT 10914

**SECTION 092216
NON-STRUCTURAL METAL FRAMING**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
- B. Related Requirements:
1. Division 05 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
1. Product Data for Credit: 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For dimpled steel studs and runners / firestop tracks, from ICC-ES.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

NON-STRUCTURAL METAL FRAMING

092216 - 1
CAM 17-0531
EXHIBIT 1B
Page 248 of 600

FIRE STATION 54

PROJECT 10914

- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 2. Protective Coating: ASTM A 653/A 653M, G40 Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.
- C. Studs and Runners: ASTM C 645. Use dimpled steel studs and runners.
1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
 2. Dimpled Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
- D. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch-deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide the following:
 - 1) MBA Building Supplies; FlatSteel Deflection Track.
 - 2) Steel Network Inc. (The); VertiClip SLD Series.
 - 3) Superior Metal Trim; Superior Flex Track System (SFT).
 - 4) Telling Industries; Vertical Slip Track.

FIRE STATION 54

PROJECT 10914

- E. Firestop Tracks: 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.
1. Products: Subject to compliance with requirements, provide the following provide one of the following:
 - a.
 - b. Grace Construction Products; FlameSafe FlowTrak System.
 - c. Metal-Lite, Inc.; The System.
 - d. Steel Network Inc. (The); VertiClip SLD Series.
- F. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: As indicated on Drawings.
- G. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch-wide flanges.
1. Depth: As indicated on Drawings.
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- H. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: As indicated on Drawings.
 2. Depth: As indicated on Drawings.
- I. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical or hat shaped.
- J. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- K. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

FIRE STATION 54

PROJECT 10914

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- B. Hanger Attachments to Concrete:
1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
 - a. Type: Cast-in-place anchor, designed for attachment to concrete forms or Postinstalled, expansion anchor.
 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, in size indicated on Drawings.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch and minimum 1/2-inch-wide flanges.
1. Depth: As indicated on Drawings.
- F. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges, 3/4 inch deep.
 2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
 3. Dimpled Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - b. Depth: As indicated on Drawings.
 4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.

FIRE STATION 54

PROJECT 10914

5. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; Drywall Grid System.
 - c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

FIRE STATION 54

PROJECT 10914

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. 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 fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.

FIRE STATION 54

PROJECT 10914

- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- E. Direct Furring:
1. Screw to wood framing.
 2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Furring Members:
1. Erect insulation, specified in Division 07 Section "Thermal Insulation," vertically and hold in place with Z-furring members spaced 16 inches o.c.

FIRE STATION 54

PROJECT 10914

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches (1219 mm) max o.c.
 2. Carrying Channels (Main Runners): 48 inches max o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.

FIRE STATION 54

PROJECT 10914

7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

FIRE STATION 54

PROJECT 10914

**SECTION 092400
PORTLAND CEMENT PLASTERING**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Interior portland cement plasterwork on metal lath unit masonry and monolithic concrete.
 2. Exterior portland cement plasterwork (stucco) on metal lath unit masonry and monolithic concrete.
- B. Related Sections:
1. Division 05 Section "Cold-Formed Metal Framing" for structural, load-bearing (transverse and axial) steel studs and joists that support lath and portland cement plaster.
 2. Division 06 Section "Rough Carpentry" for wood framing and furring included in portland cement plaster assemblies.
 3. Division 06 Section "Sheathing" for sheathing and water-resistant barriers included in portland cement plaster assemblies.
 4. Division 07 Section "Thermal Insulation" for thermal insulations and vapor retarders included in portland cement plaster assemblies.
 5. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support lath and portland cement plaster.
 6. Division 09 Section "Gypsum Plastering" for gypsum-based conventional plaster and associated lath.
 7. Division 09 Section "Gypsum Veneer Plastering" for gypsum-based veneer plaster applied on gypsum base for veneer plaster, unit masonry, and monolithic concrete.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals:
1. Product Data for Credit: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - a. Include statement indicating costs for each product having recycled content.
 2. Product Data for Credit: For sealants, including printed statement of VOC content.
- C. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

FIRE STATION 54

PROJECT 10914

- D. Samples for Initial Selection: For each type of factory-prepared finish coat indicated.
- E. Samples for Verification: For each type of factory-prepared colored textured finish coat indicated; 12 by 12 inches, and prepared on rigid backing.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
- C. Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for each type of finish indicated.
 - 2. For interior plasterwork, simulate finished lighting conditions for review of mockups.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F for at least 48 hours before plaster application, and continuously during and after application.
 - 1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 - 2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.
- C. Exterior Plasterwork:
 - 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - 2. Apply plaster when ambient temperature is greater than 40 deg F.

FIRE STATION 54

PROJECT 10914

3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- D. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS**2.1 METAL LATH**

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
 - b. CEMCO.
 - c. Clark Western Building Systems.
 - d. Dietrich Metal Framing; a Worthington Industries company.
 - e. Phillips Manufacturing Co.
 2. Recycled Content: Provide steel products with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 3. Diamond-Mesh Lath: Self-furring, 3.4 lb/sq. yd..
 4. Flat Rib Lath: Rib depth of not more than 1/8 inch, 2.75 lb/sq. yd..
 5. 3/8-Inch Rib Lath: 3.4 lb/sq. yd..
- B. Paper Backing: FS UU-B-790, Type I Grade D, Style 2 vapor-permeable paper.
1. Provide paper-backed lath at exterior locations in locations indicated on Drawings.

2.2 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- 1.
- B. Plastic Accessories: Fabricated from high-impact PVC.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
 - b. Plastic Components, Inc.
 - c. Vinyl Corp.
 2. Cornerbeads: With perforated flanges.
 - a. Small nose cornerbead; use unless otherwise indicated.
 - b. Bull nose cornerbead, radius 3/4 inch minimum; use at locations indicated on Drawings.
 3. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
 - a. Square-edge style; use unless otherwise indicated.
 - b. Bull-nose style, radius 3/4 inch minimum; use at locations indicated on Drawings.

FIRE STATION 54

PROJECT 10914

4. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
5. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged 1/2-inch-wide reveal; with perforated concealed flanges.

2.3 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- F. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.
- G. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content recycled content constitutes a minimum of percent by weight required by Florida Green Building Coalition.
- H. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants"
 1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150, Type I.
 1. Color for Finish Coats: Gray.
- B. Masonry Cement: ASTM C 91, Type N.
 1. Color for Finish Coats: Gray.
- C. Plastic Cement: ASTM C 1328.

FIRE STATION 54

PROJECT 10914

- D. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to match Architect's sample.
- E. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- F. Sand Aggregate: ASTM C 897.
 - 1. Color for Job-Mixed Finish Coats: In color matching Architect's sample.

2.5 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
 - 1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.
- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
 - 1. Portland Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
 - 2. Masonry Cement Mixes:
 - a. Scratch Coat: 1 part masonry cement and 2-1/2 to 4 parts aggregate.
 - b. Brown Coat: 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
 - 3. Portland and Masonry Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
- C. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:
 - 1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 2. Portland and Masonry Cement Mix: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.
- D. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:
 - 1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 2. Masonry Cement Mix: Use 1 part masonry cement and 2-1/2 to 4 parts aggregate.
 - 3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.
- E. Job-Mixed Finish-Coat Mixes:

FIRE STATION 54

PROJECT 10914

1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
2. Masonry Cement Mix: 1 part masonry cement and 1-1/2 to 3 parts aggregate.
3. Portland and Masonry Cement Mix: For cementitious materials, mix 1 part portland cement and 1 part masonry cement. Use 1-1/2 to 3 parts aggregate per part of cementitious material.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
- C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.4 INSTALLING METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C 1063.
 1. Partition Framing and Vertical Furring: Install lath.
 2. Flat-Ceiling and Horizontal Framing: Install 3/8-inch rib lath.
 3. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.5 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.

FIRE STATION 54

PROJECT 10914

- B. Reinforcement for External Corners:
 1. Install lath-type, external-corner reinforcement at exterior locations.
 2. Install cornerbead at interior and exterior locations.
- C. Control Joints: Install control joints at locations indicated on Drawings.
 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft..
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft..
 2. At distances between control joints of not greater than 18 feet o.c.
 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 4. Where control joints occur in surface of construction directly behind plaster.
 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
 1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
 2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Bonding Compound: Apply on unit masonry and concrete plaster bases.
- C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on masonry, on concrete; 3/4-inch thickness.
 1. Portland cement mixes.
 2. Masonry cement mixes.
 3. Portland and masonry cement mixes.
 4. Plastic cement mixes.
 5. Portland and plastic cement mixes.
- D. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; 1/2 inch thick.
 1. Portland cement mixes.
 2. Masonry cement mixes.
 3. Portland and masonry cement mixes.
 4. Plastic cement mixes.
 5. Portland and plastic cement mixes.
- E. Walls; Base-Coat Mix: Scratch coat for two-coat plasterwork, 3/8 inch thick on concrete masonry.
 1. Portland cement mixes.
 2. Masonry cement mixes.
 3. Portland and masonry cement mixes.

FIRE STATION 54

PROJECT 10914

4. Plastic cement mixes.
 5. Portland and plastic cement mixes.
- F. Ceilings; Base-Coat Mix: Scratch coat for two-coat plasterwork, 1/4 inch thick on concrete.
1. Portland cement mixes.
 2. Masonry cement mixes.
 3. Portland and masonry cement mixes.
 4. Plastic cement mixes.
 5. Portland and plastic cement mixes.
- G. Plaster Finish Coats: Apply to provide float finish to match Architect's sample.
- H. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.
- I. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.
- J. Concealed Interior Plasterwork:
1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
 2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
 3. Where plaster application will be used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.7 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 PROTECTION

- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 092400

FIRE STATION 54

PROJECT 10914

**SECTION 092900
GYPSUM BOARD****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Interior gypsum board.
 2. Exterior gypsum board for ceilings and soffits.
 3. Tile backing panels.
- B. Related Requirements:
1. Division 06 Section "Sheathing" for gypsum sheathing for exterior walls.
 2. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
 3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
 4. Division 09 Section "Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
1. Product Data for Credit: For products having recycled content, documentation indicating percentages by weight of postconsumer. Include statement indicating cost for each product having recycled content.
 2. Product Certificates for Credit: 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.
 3. Product Certificates for Credit: 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.

GYPSUM BOARD

092900 - 1

FIRE STATION 54

PROJECT 10914

- 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.
4. Product Data for Credit: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.
 5. Laboratory Test Reports for Credit: For adhesives used to laminate gypsum board panels to substrates, 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. Samples: For the following products:
1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.
 2. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.4 QUALITY ASSURANCE

- A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 3. Simulate finished lighting conditions for review of mockups.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

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

FIRE STATION 54

PROJECT 10914

1.6 FIELD CONDITIONS

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

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.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying 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 GYPSUM BOARD, GENERAL

- A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Regional Materials: Gypsum panel products shall be manufactured within 700 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 700 miles of Project site.
- C. Regional Materials: Gypsum panel products shall be manufactured within 700 miles of Project site.
- D. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

GYPSUM BOARD

092900 - 3

FIRE STATION 54

PROJECT 10914

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
1. American Gypsum.
 2. Georgia-Pacific Gypsum LLC.
 3. Lafarge North America Inc.
 4. National Gypsum Company.
 5. PABCO Gypsum.
 6. USG Corporation.
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- D. Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- E. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
- F. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 1.
1. Core: 5/8 inch, Type X.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10.
- G. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Core: 5/8 inch, Type X. Use: USG Corporation; FIBEROCK Brand Aqua-Tough.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10.

2.4 SPECIALTY GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.

GYPSUM BOARD

092900 - 4

FIRE STATION 54

PROJECT 10914

1. Products: Subject to compliance with requirements, provide the following:
 - a. American Gypsum; Firebloc Type C.
 - b. Lafarge North America Inc.; Firecheck Type C.
 - c. National Gypsum Company; Gold Bond Fire-Shield C.
 - d. USG Corporation; Firecode C Core.
2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered.

2.5 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Gypsum.
 - b. Lafarge North America Inc.
 - c. National Gypsum Company.
 - d. USG Corporation.
 2. Basis of Design:
 1. National Gypsum Company; Gold Bond Exterior Soffit Board or equal approved by Architect.
 2. Cornerbead.
 3. LC-Bead: J-shaped; exposed long flange receives joint compound.
 4. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening
 5. Core: 5/8 inch, Type X Type C as required by fire-resistance-rated assembly indicated on Drawings.

2.6 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. USG Corporation; FIBEROCK Brand Aqua-Tough.
 - b. Or equal material approved by Architect.
 2. Thickness: 5/8 inch.
 3. Mold Resistance: ASTM D 3273, score of 10.

GYPSUM BOARD

092900 - 5

FIRE STATION 54

PROJECT 10914

- B. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. American Gypsum.
 - b. Georgia-Pacific Gypsum LLC.
 - c. Lafarge North America Inc.
 - d. USG Corporation.
 2. Core: 5/8 inch, Type X Type C as required by fire-resistance-rated assembly indicated on Drawings.

2.7 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.
- B. Exterior Trim: ASTM C 1047.
1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.8 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
1. Interior Gypsum Board: Paper.
 2. Exterior Gypsum Soffit Board: Paper.
 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 4. Tile Backing Panels: As recommended by panel manufacturer.

FIRE STATION 54

PROJECT 10914

- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
- D. Joint Compound for Exterior Applications:
1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
 2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
- E. Joint Compound for Tile Backing Panels:
1. Cementitious Backer Units: As recommended by backer unit manufacturer.
 2. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.9 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Laminating adhesive 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. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

FIRE STATION 54

PROJECT 10914

- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 2. Recycled Content of Blankets: Postconsumer recycled content not less than 25 percent.
- E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products: Subject to compliance with requirements, provide the following:
 - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - c. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

2.10 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Polystyrene Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E 84.
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. Georgia-Pacific Gypsum LLC; ToughRock Ceiling Textures/Polystyrene.
 - b. National Gypsum Company; ProForm Perfect Spray.
 - c. USG Corporation; SHEETROCK Ceiling Spray Texture, QT.
 2. Texture: Fine.
- C. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.

GYPSUM BOARD

092900 - 8

FIRE STATION 54

PROJECT 10914

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. CertainTeed Corp.; ProRoc Easi-Tex Spray Texture.
 - b. USG Corporation; BEADEx FasTex Wall and Ceiling Spray Texture.
2. Texture: Orange Peel.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc., except in chases braced internally).
 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.
 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

GYPSUM BOARD

092900 - 9

FIRE STATION 54

PROJECT 10914

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Type X: As indicated on Drawings.
 - 3. Flexible Type: As indicated on Drawings.
 - 4. Ceiling Type: As indicated on Drawings.
 - 5. Abuse-Resistant Type: As indicated on Drawings.
 - 6. Moisture- and Mold-Resistant Type: As indicated on Drawings.
 - 7. Type C: As indicated on Drawings.
 - 8. Skim-Coated Type: As indicated on Drawings.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

FIRE STATION 54

PROJECT 10914

3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

- A. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 1. Install with 1/4-inch open space where panels abut other construction or structural penetrations.
 2. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints at locations indicated on Drawings according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:

GYPSUM BOARD

092900 - 11

FIRE STATION 54

PROJECT 10914

1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.
- D. Exterior Trim: Install in the following locations:
1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.

3.7 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

FIRE STATION 54

PROJECT 10914

3.9 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

GYPSUM BOARD

092900 - 13

FIRE STATION 54

PROJECT 10914

**SECTION 093000
TILING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Stone thresholds.
3. Waterproof membrane.
4. Crack isolation membrane.
5. Tile backing panels.
6. Metal edge strips.
7. Porcelain tile.

B. Related Sections:

1. Division 07 Section "" Cold Fluid-Applied Waterproofing for waterproofing under thickset mortar beds.
2. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
3. Division 09 Section "Portland Cement Plastering" for portland cement scratch coat over metal lath on wall surfaces.
4. Division 09 Section "Gypsum Veneer Plastering" for cementitious backer units.
5. Division 09 Section "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

TILING

FIRE STATION 54

PROJECT 10914

1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
1. Level Surfaces: Minimum 0.6 to meet ADA requirements.
 2. Step Treads: Minimum 0.6 to meet ADA requirements.
 3. Ramp Surfaces: Minimum 0.6 to meet ADA requirements.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittal:
1. Product Data for Credit: For adhesives and sealants, including printed statement of VOC content.
- C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- D. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- E. Samples for Verification:
1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
 3. Full-size units of each type of trim and accessory for each color and finish required.
 4. Stone thresholds in 6-inch lengths.
 5. Metal edge strips in 6-inch lengths.
- F. Qualification Data: For qualified Installer.
- G. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- H. Product Certificates: For each type of product, signed by product manufacturer.
- I. Material Test Reports: For each tile-setting and -grouting product and special purpose tile.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type and color or finish tile from one source or producer.

FIRE STATION 54

PROJECT 10914

1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 1. Stone thresholds.
 2. Waterproof membrane.
 3. Crack isolation membrane.
 4. Joint sealants.
 5. Cementitious backer units.
 6. Metal edge strips.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockup of each type of floor tile installation.
 2. Build mockup of each type of wall tile installation.
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.
 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

FIRE STATION 54

PROJECT 10914

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 - PRODUCTS**2.1 PRODUCTS, GENERAL**

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
1. Where tile is indicated for installation or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

- A. Tile Type: Factory-mounted unglazed ceramic mosaic tile.
1. Manufacturers: Subject to compliance with requirements, 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:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

TILING

CAM 17-0531-4
 EXHIBIT 1B
 Page 281 of 600

FIRE STATION 54

PROJECT 10914

- a. American Olean; Division of Dal-Tile International Inc.
 - b. Crossville, Inc.
 - c. Daltile; Division of Dal-Tile International Inc.
 - d. Florida Tile Industries, Inc.
 - e. Summitville Tiles, Inc.
3. Composition: Impervious natural clay or porcelain.
 4. Module Size: 2 by 2 inches.
 5. Thickness: 1/4 inch.
 6. Face: Plain with cushion edges.
 7. Surface: Slip-resistant, with abrasive admixture.
 8. Finish: Mat, clear glaze.
 9. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
 10. Grout Color: As selected by Architect from manufacturer's full range.
 11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base Cove: Cove, module size 2 by 1 inch.
 - b. Base Cap for Portland Cement Mortar Installations: Bead (bullnose), module size 2 by 1 inch.
 - c. Base Cap for Thin-Set Mortar Installations: Surface bullnose, module size 2 by 1 inch 2 by 2 inches.
 - d. External Corners for Thin-Set Mortar Installations: Surface bullnose, module size 2 by 1 inch 2 by 2 inches.
 - e. Internal Corners: Cove, module size 2 by 1 inch.
 - f. Internal Corners: Field-buttet square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.

B. Tile Type: Unglazed paver tile.

1. Manufacturers: Subject to compliance with requirements, 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Crossville, Inc.
 - c. Daltile; Division of Dal-Tile International Inc.
 - d. Florida Tile Industries, Inc.
3. Composition: Porcelain.
4. Face Size: 11-13/16 by 11-13/16 inches.
5. Thickness: 1/4 inch.
6. Face: Plain with square or cushion edges.
7. Finish: Mat, clear glaze.
8. Tile Color and Pattern: As selected by Architect from manufacturer's full range color and pattern.
9. Grout Color: As selected by Architect from manufacturer's full range.
10. Textured: For use at the "PATIO" exterior area Textured Surface tile shall be used.

FIRE STATION 54

PROJECT 10914

C. Tile Type: Glazed wall tile.

1. Manufacturers: Subject to compliance with requirements, 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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Crossville, Inc.
 - c. Daltile; Division of Dal-Tile International Inc.
 - d. Florida Tile Industries, Inc.
 - e. Summitville Tiles, Inc.
3. Module Size: 4-1/4 by 4-1/4 inches.
4. Thickness: 5/16 inch.
5. Face: Plain with modified square edges or cushion edges.
6. Finish: Bright, opaque glaze.
7. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
8. Grout Color: As selected by Architect from manufacturer's full range.
9. Mounting: Factory, back mounted.
10. Mounting: PregROUTED sheets of tiles factory assembled and grouted with manufacturer's standard white silicone rubber.
11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base for Portland Cement Mortar Installations: Coved, module size 4-1/4 by 4-1/4 inches.
 - b. Base for Thin-Set Mortar Installations: Straight, module size 4-1/4 by 4-1/4 inches.
 - c. Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap, module size 4-1/4 by 4-1/4 inches.
 - d. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size 4-1/4 by 4-1/4 inches.
 - e. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
 - f. External Corners for Portland Cement Mortar Installations: Bullnose shape with radius of at least 3/4 inch unless otherwise indicated.
 - g. External Corners for Thin-Set Mortar Installations: Surface bullnose, same size as adjoining flat tile.
 - h. Internal Corners: Field-buttet square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

D. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as adjoining wall tile.

1. One wall recessed tiled "NITCH" shelf roughly (12"x12"x4") 3 tiles wide x 3 tiles high x 1 tile deep for each shower location in the project. (see drawings)
2. Color and Finish: Match adjoining glazed wall tile as selected by Architect from manufacturer's full range.

FIRE STATION 54

PROJECT 10914

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.
 - 1. Description: Uniform, fine- to medium-grained white stone with gray veining.
 - 2. Description: Architect's to select from manufacturer's sample.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Aqua-Tuff wall board.
 - b. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: 5/8 inch As indicated.

2.5 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; 0.040-inch nominal thickness.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Noble Company Rich pan PVC Liner.
- C. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness.
 - 1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Schluter Systems L.P.; KERDI. – BASIS OF DESIGN
 - b. Blanke Corporation Aqua Shield.

FIRE STATION 54

PROJECT 10914

- D. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. MAPEI Corporation; Mapelastic (PRP 315).
 - b. Laticrete 9235 waterproof- Anti fracture membrane.

2.6 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; 0.040-inch nominal thickness.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Noble Company Rich Pan PVC Liner
- C. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch nominal thickness.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Schluter Systems L.P.; KERDI.
- D. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, modified-bituminous sheet with fabric reinforcement facing; 0.040-inch nominal thickness.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. MAPEI Corporation; Mapelastic SM.
 - b. National Applied Construction Products, Inc.; Strataflex.

FIRE STATION 54

PROJECT 10914

2.7 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete International, Inc. or comparable product by one of the following:
 - a. Jamo, Inc.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 3. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 4. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
 5. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
- B. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete International, Inc. or comparable product by one of the following:
 - a. Jamo, Inc.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 3. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.
- C. Chemical-Resistant Furan Mortar: ANSI A118.5, with carbon filler.
1. Manufacturers: Subject to compliance with requirements, 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:
 - a. Jamo, Inc.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.

2.8 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated. COLOR: See Drawings.
- B. Standard Cement Grout: ANSI A118.6.

FIRE STATION 54

PROJECT 10914

1. Manufacturers: Subject to compliance with requirements, 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:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete International, Inc. or comparable product by one of the following:
 - a. Jamo, Inc.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
- C. Polymer-Modified Tile Grout: ANSI A118.7.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete International, Inc. or comparable product by one of the following:
 - a. Jamo, Inc.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 3. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
 4. Polymer Type: Acrylic resin or styrene-butadiene rubber (to work with LEED requirements) in liquid-latex form for addition to prepackaged dry-grout mix.
- D. Water-Cleanable Epoxy Grout: ANSI A118.3.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete Latapoxy 2000 or comparable product by one of the following:
 - a. Jamo, Inc.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 3. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F and 212 deg F, respectively, and certified by manufacturer for intended use.
- E. Chemical-Resistant Furan Grout: ANSI A118.5, with carbon filler.
1. Manufacturers: Subject to compliance with requirements, 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:
 - a. MAPEI Corporation. (epoxy based on Latapoxy 2000 Industrial epoxy)
 - b. Laticrete International, Inc., Latapoxy 2000 Industrial epoxy
- F. Grout for PregROUTed Tile Sheets: Same product used in factory to pregROUT tile sheets.

FIRE STATION 54

PROJECT 10914

2.9 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."
1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
 - b. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
 - c. Tremco Incorporated;
- D. Chemical-Resistant Sealants: For chemical-resistant floors, provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout.
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. Atlas Minerals & Chemicals, Inc.
 - b. Laticrete International, Inc.; Latasil Tile & Stone Sealant

2.10 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
- C. Temporary Protective Coating: Either product] indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar,

TILING

CAM 07-0571-11
 093000
 EXHIBIT 1B
 Page 288 of 600

FIRE STATION 54

PROJECT 10914

and grout products; and easily removable after grouting is completed without damaging grout or tile.

1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Jamo, Inc.; Matte Finish Penetrating Sealer.
 - b. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.

2.11 MIXING MORTARS AND GROUT

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.

FIRE STATION 54

PROJECT 10914

- a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.
 - c. Tile swimming pool decks.
 - d. Tile floors in laundries.
 - e. Tile floors composed of tiles 8 by 8 inches or larger.
 - f. Tile floors composed of rib-backed tiles.
- B. 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.

FIRE STATION 54

PROJECT 10914

- C. 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.
- D. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Paver Tile: 1/4 inch.
 2. Glazed Wall Tile: 1/16 inch.
- F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).
 2. Do not extend cleavage membrane waterproofing or crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane waterproofing or crack isolation membrane with elastomeric sealant.
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

FIRE STATION 54

PROJECT 10914

3.4 TILE BACKING PANEL INSTALLATION

- A. Install cementitious backer units and fiber-cement underlayment and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.7 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093000

TILING

FIRE STATION 54

PROJECT 10914

**SECTION 095113
ACOUSTICAL PANEL CEILINGS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Related Requirements:
 - 1. Division 09 Section "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles used with concealed suspension systems, stapling, or adhesive bonding.
- C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data for Credit: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - 2. Product Data for Credit: For sealants, documentation including printed statement of VOC content.
 - 3. Laboratory Test Reports for Credit: For ceiling systems and sealants, 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."

ACOUSTICAL PANEL CEILINGS

095113 - 1

FIRE STATION 54

PROJECT 10914

- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Initial Selection: For components with factory-applied color finishes.
- E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch-square Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.

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. Suspended ceiling components.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Size and location of initial access modules for acoustical panels.
 - 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - 5. Perimeter moldings.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.
- E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

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

ACOUSTICAL PANEL CEILINGS

095113 - 2

FIRE STATION 54

PROJECT 10914

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 5 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2 percent of quantity installed.
 - 4. Impact Clips: Equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
- 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 mockup of typical ceiling area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

ACOUSTICAL PANEL CEILINGS

095113 - 3

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. 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: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.
- C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Low-Emitting Materials: Acoustical panel 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."
- B. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- C. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.
- D. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 35 percent.
- E. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- F. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

ACOUSTICAL PANEL CEILINGS

095113 - 4

FIRE STATION 54

PROJECT 10914

- G. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc., Fine Fissured Angled Tegular (#1732) or comparable product by one of the following:
1. Armstrong World Industries, Inc.
 2. Chicago Metallic Corporation.
 3. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. Classification: Provide fire-resistance-rated panels complying with ASTM E 1264 for type, form, and pattern as follows:
1. Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
- D. Color: White- As selected from manufacturer's full range- As indicated by manufacturer's designation.
- E. LR: Not less than 0.85.
- F. NRC: Not less than 0.55.
- G. CAC: Not less than 35.
- H. AC: Not less than 170.
- I. Edge/Joint Detail: Angled Tegular
- J. Thickness: 5/8 inch.
- K. Thickness: 5/8 inch As indicated in a schedule.
- L. Modular Size: 24 by 24 inches 24 by 48 inches 600 by 600 mm and 600 by 1200 mm As indicated on Drawings.
- M. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus,

ACOUSTICAL PANEL CEILINGS

095113 - 5

FIRE STATION 54

PROJECT 10914

mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
 - 1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
 - 2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E 1190, conducted by a qualified testing and inspecting agency.
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
 - 3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.

ACOUSTICAL PANEL CEILINGS

095113 - 6

FIRE STATION 54

PROJECT 10914

4. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 16 gauge min. diameter wire.
- E. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.
- G. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
- H. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- I. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place.
- J. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.
- K. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
- L. Clean-Room Gasket System: Where indicated, provide manufacturer's standard system, including manufacturer's standard gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.

2.5 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Basis-of-Design Product: Subject to compliance with requirements, Armstrong World Industries, Inc. provide or comparable product by one of the following:
 2. Armstrong World Industries, Inc.
 3. CertainTeed Corp.
 4. Chicago Metallic Corporation.
 5. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Wide-Face, Capped, Double-Web, Fire-Rated, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.

ACOUSTICAL PANEL CEILINGS

095113 - 7

FIRE STATION 54

PROJECT 10914

1. Structural Classification: Intermediate Heavy-duty system.
 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 3. Face Design: Flat, flush.
 4. Cap Material: Steel or aluminum cold-rolled sheet.
 5. Cap Finish: Painted white.
- C. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished 9/16-inch-wide metal caps on flanges.
1. Structural Classification: Intermediate and Heavy-duty system.
 2. End Condition of Cross Runners: Override (stepped) or butt-edge type.
 3. Face Design: Flat, flush.
 4. Cap Material: Steel or aluminum cold-rolled sheet.
 5. Cap Finish: Painted white.
- D. Narrow-Face, Steel-Capped, Double-Web, Fire-Rated Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation; with prefinished, cold-rolled, 9/16-inch-wide metal caps on flanges.
1. Structural Classification: Intermediate-duty system.
 2. Face Design: Flat, flush.
 3. Cap Finish: Painted white.
- E. Narrow-Face, Uncapped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized; to produce structural members with 9/16-inch-wide faces.
1. Structural Classification: Intermediate and Heavy-duty system.
 2. Face Design: With 1/8-inch-wide, slotted, box-shaped flange With 1/4-inch-wide, slotted, box-shaped flange.
 3. Face Finish: Painted white.
 4. Reveal Finish: Painted white.
- F. Wide-Face, Capped, Double-Web, Fire-Rated, Hot-Dip Galvanized, G60, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized according to ASTM A 653/A 653M, G60 coating designation; with prefinished, cold-rolled, 15/16-inch-wide aluminum caps on flanges.
1. Structural Classification: Intermediate and Heavy-duty system.
 2. Face Design: Flat, flush.
 3. Face Finish: Painted white.
- G. Wide-Face, Single-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet electrolytically zinc coated, with prefinished flanges of width indicated.
1. Structural Classification: Heavy-duty system.

ACOUSTICAL PANEL CEILINGS

095113 - 8

FIRE STATION 54

PROJECT 10914

2. Face Finish: Painted white.
- H. Wide-Face, Capped, Double-Web, Stainless-Steel Suspension System: Main and cross runners roll formed from Type 304 or 316, stainless-steel sheet, with prefinished 15/16-inch-wide stainless-steel caps on flanges.
1. Structural Classification: Intermediate-duty system.
 2. Face Design: Flat, flush.
- I. Narrow-Face, Single-Web, Extruded-Aluminum Suspension System: Main and cross runners formed from extruded aluminum to produce structural members with 9/16-inch-wide faces.
1. Structural Classification: Intermediate and Heavy-duty system.
 2. Face Design: Screw-slot profile.
 3. Face Finish: Painted white.
 4. Reveal Finish: Match face finish, Painted white.
- J. Extra-Wide-Face, Double Single-Web, Metal Suspension System: Main and cross runners formed from extruded aluminum to produce structural members with 1-1/2-inch-and 2-inch-wide flanges.
1. Structural Classification: Intermediate and Heavy-duty system.
 2. Face Design: Flat, flush.
 3. Face Finish: Painted white.
 4. Gasket System: Clean-room type.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
1. Armstrong World Industries, Inc.
 2. CertainTeed Corp.
 3. Chicago Metallic Corporation.
 4. Fry Reglet Corporation.
 5. USG Interiors, Inc.; Subsidiary of USG Corporation.
- C. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

FIRE STATION 54

PROJECT 10914

1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- D. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:
1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 for Alloy and Temper 6063-T5.
 2. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
 3. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils. Comply with ASTM C 635/C 635M and coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.7 ACOUSTICAL SEALANT

- A. Products: Subject to compliance with requirements, provide one of the following:
1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Acoustical Sealant for Concealed Joints:
 - a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
 - b. Pecora Corporation; AIS-919.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
 2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.
 3. Acoustical sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

ACOUSTICAL PANEL CEILINGS

095113 - 10

FIRE STATION 54

PROJECT 10914

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.

ACOUSTICAL PANEL CEILINGS

095113 - 11

FIRE STATION 54

PROJECT 10914

5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 - b. Install panels with pattern running in one direction parallel to long axis of space.
 - c. Install panels in a basket-weave pattern.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.

ACOUSTICAL PANEL CEILINGS

095113 - 12

FIRE STATION 54

PROJECT 10914

3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
5. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
6. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.
7. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
8. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 1. Compliance of seismic design.
- B. Testing Agency: City will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
 - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- D. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

ACOUSTICAL PANEL CEILINGS

095113 - 13

FIRE STATION 54

PROJECT 10914

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

ACOUSTICAL PANEL CEILINGS

095113 - 14

FIRE STATION 54

PROJECT 10914

**SECTION 096220
RESILIENT ATHLETIC FLOORING**

PART 1 - GENERAL**1.0 SUMMARY**

- 1.1 Work Included
 - A. Rubber sports flooring
 - B. Adhesive and accessories required for installation and maintenance.
- 1.2 Related Sections
 - A. Division 02 Section: Cement and Concrete (includes bituminous material and bituminous concrete).
 - C. Division 02 Section: Athletic and Recreational Surfaces.
 - E. Division 03 Section: Basic Concrete Materials and Methods.
 - G. Division 07 Section: Basic Thermal and Moisture Protection Materials and Methods.
 - H. Division 07 Section: Dampproofing and Waterproofing.

1.1 REFERENCES

- 1.1.1 American Society for Testing & Materials (ASTM)
 - A. ASTM D 2047: Standard Test Method for Static Coefficient of Friction of Floor Surfaces.
 - B. ASTM D 2240: Standard Test Method for Rubber Property—Durometer Hardness.
 - C. ASTM D 5116: Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
 - D. ASTM E 648: Standard Test Method for Critical Radial Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - E. ASTM E 1745: Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 - F. ASTM F 970: Standard Test Method for Static Load Limit.
 - G. ASTM F 1869: Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Sub-floor Using Anhydrous Calcium Chloride.
 - H. ASTM G 21: Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

FIRE STATION 54

PROJECT 10914

1.1.2 National Fire Protection Association

A. NFPA 101: Code for Safety to Life from Fire in Buildings and Structures.

1.2 SYSTEM DESCRIPTION

- A. Provide a prefabricated athletic rubber flooring, dual durometer, vulcanised and calandered with a marbleized pattern and hammered finish.
- B. Provide an athletic rubber flooring, which has been manufactured to maintain performance criteria stated by manufacturer without defects, damage or failure.
- C. Contractor to provide all required backup and information to guaranty that the resilient athletic flooring is LEED certified including adhesives to be used.

1.3 SUBMITTALS

- A. Product data, including manufacturer's information for specified products
- B. Adhesive and line paint product data and manufacturer's certificate of approval for the proposed application.
- C. Selection and verification samples for finishes, colors and textures.
- D. Shop drawings showing layout, profiles and product components.
- E. Installation and maintenance instructions as published by the manufacturer.
- F. Contractor to provide all required backup and information to guaranty that the resilient athletic flooring is LEED certified including adhesives to be used.

1.4 QUALITY ASSURANCE

- A. The manufacturer must have experience in the manufacturing of prefabricated rubber surface.
- B. Installer must have performed installations of the same scale in the last three years.
- C. Installer to be recognised and approved by the athletic rubber-flooring manufacturer.
Specifier Note: specify mock-up dimensions as instructed by Owner or Architect.
- D. Installation of mock-up is highly recommended and must be deemed acceptable by Owner and Architect. Mock-up to be installed following the same procedure and material as per the actual floor. -Mock-up size: 30" x 30"
- E. Contractor to provide all required backup and information to guaranty that the resilient athletic flooring is LEED certified including adhesives to be used.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Materials must be delivered in manufacturer's original, unopened and undamaged containers with identification labels intact.
- B. Store material protected from exposure to harmful weather conditions, on a clean, dry, flat surface protected from all possible damage.

FIRE STATION 54

PROJECT 10914

- C. Recommended environmental conditions for storage is a minimum of 55o F (13o C).
- D. Material need not suffer excessive damage during handling (i.e. edge chipping, excessive warping etc).

1.6 SITE CONDITIONS

- A. Maintain a stable room and subfloor temperature for a period of 48 hrs prior, during and 48 hrs after installation.
Recommended range: 65o F to 80o F (18o C to 27o C).
- B. Installation to be carried-out no sooner than the specified curing time of concrete sub-floor (normal density concrete curing time is approximately 28 days for development of design strength).
- C. Moisture vapor emission content of the concrete slab must not exceed 3 lbs/1000 ft2 per 24 hrs when using the Calcium Chloride test as per ASTM F 1869-98.
- D. Installation of athletic flooring will not commence unless all other finishes in the building have been completed.

1.7 WARRANTY

- A. Provide manufacturer's standard warranty.
- B. The athletic rubber flooring is warranted to be free from manufacturing defects for a period of three (3) years from the date of shipment from the manufacturer.

1.8 MAINTENANCE AND REPAIR

- A. Provide additional amount of approximately 2% of the total floor surface, of each type and colour.
- B. Repair material must be from the same dye lot as material supplied for initial installation.
- C. Maintain surface as per manufacturer's instructions (see Maintenance Instructions for Sports Flooring)

PART 2 – PRODUCT**2.1 MANUFACTURERS**

- A. MONDO AMERICA INC., 2655 Francis Hughes, Laval, QC, Canada.
Toll-Free: 1-800-361-3747, MONDO USA (Southeast Division), 1140 Hammond Drive N.E., Suite B2190, Atlanta, GA Toll-Free: 1-800-441-6645
- B. CENTAUR FLOOR SYSTEM "DECORA S", 135 Chapala St., Santa Barbara, CA 93101, 1-800-536-9007, fax 1-805-957-0125
- C. JOHNSONITE "TRIUMPH SQUARE EDGE", 16910 Munn Road Chagrin Falls, Ohio 44023, 1-800-899-8916, fax 1-440-543-8920

FIRE STATION 54

PROJECT 10914

- D. SPECTATION FLOORING, Contact Athletic Resources, Inc., 8162 Lowbank Drive, Naples, FL 34109, 1-888-822-5638, fax 1-239-643-8988

2.2 MONDO “RAMFLEX” or equal rubber flooring material basis of design:

2.2.1 Description

- A. Prefabricated athletic rubber flooring, calandered and vulcanized with a base of natural and synthetic rubber, stabilizing agents and pigmentation, as manufactured by MONDO AMERICA INC. or City of Fort Lauderdale approved equal.
- B. Thickness: .394 inches (3/8” inches or 10mm)
- C. Color: GRAY
- D. Finish: Marbleized & Hammered.
- E. Manufactured in two layers, which are vulcanised together. The shore hardness of the top layer will be greater than that of the bottom layer, shore hardness of layers to be recommended by the manufacturer and the limits specified.
- F. Available in: Tiles: 36” x 36” (91 cm x 91 cm)].

2.2.2 Physical Properties

- A. Physical properties of the prefabricated athletic rubber floor, to conform to the following requirements:

Physical Properties	Standard	Specification
Hardness Shore A	ASTM D 2240	78/72
72Critical Radiant Flux	ASTM E 648, NFPA 101	0.94 W/cm2, Class I
Static Load Limit	ASTM F 970	≤0.004 in.
Fungal Resistance Test	ASTM G 21-90	No growth
Coefficient of Friction	ASTM D 2047	> 0.9
V.O.C. Compliance	ASTM D 5116	Yes
Color Stability		Good
Light reflection		Average
Chemical Resistance		Good

FIRE STATION 54

PROJECT 10914

2.3 MATERIAL

- A. Provide athletic rubber surface "Ramflex", in tiles (as specified in subsection 2.2.1). or City of Fort Lauderdale approved equal material.
- B. Provide adhesive certified by the manufacturer, P.U. 100 Polyurethane Adhesive (refer to Instruction Manual of Adhesives provided by manufacturer).
- C. Patching compound and line marking paint, to be supplied or approved/recommended by rubber athletic flooring manufacturer.

PART 3 – EXECUTION**3.1 INSTALLERS**

- A. Refer to section 1.4 of this document for information on installers.

3.2 EXAMINATION AND PREPARATION

The following must be ensured prior to installation of the primary product:

- A. Concrete or Asphalt subfloors to be placed a minimum of thirty (30) days prior to the installation of athletic rubber floor.
- B. No concrete or asphalt sealers or curing compounds are applied or mixed with the subfloors (refer to Section 03050 of Division 3 and/or Section 02065 of Division 2).
- C. The Underlayment is adequate (if installing over wood subfloors). APA Exterior Underlayment Grade Plywood is recommended.
- D. Water vapor membrane complies with specification in ASTM E 1745-97.
- E. Alkalinity test and moisture test must be preformed. PH level should be in the range of 7 to 8.5. Moisture content must not exceed 3 lbs/1000 ft² per 24 hrs (verify using the calcium chloride test as per ASTM F 1869-98).
- F. Smooth, dense finish, highly compacted with a tolerance of 1/8" in a 10 ft radius (3 mm in 3.05 m radius). Floor Flatness and Floor Levelness (FF and FL) numbers are not recognized.
- G. Concrete or Asphalt subfloors on- or below-grade are installed over a suitable moisture retardant membrane.
- H. Subfloors must be clean, free of paint, dust, sealer, hardeners, grease, oil, solvents, old adhesive and any other foreign substances that may act as a bond barrier.
- I. Sealing of cracks, holes and, smoothing and leveling of rough, uneven surfaces, must be carried out using a good quality Portland cement based leveling compound (feathering compound), approved by the manufacturer.

FIRE STATION 54

PROJECT 10914

- J. The beginning of installation stipulates the acceptance of surface and site conditions.
- K. Installation will not be carried out unless above conditions are satisfied.
- L. Report any discrepancies to the General Contractor for correction.

3.3 INSTALLATION

Review manufacturer's printed instructions prior to installation.

3.3.1 Tile

- A. Dry-lay the complete surface in an Ashlar pattern (staggered joints).
- B. Inspect tiles for any damages or defects.
- C. Cut and adjust tiles prior to adhesion.
- D. Lift tiles row by row to apply adhesive.
- E. Apply the recommended adhesive with the recommended trowel.
- F. Allow for the required open time that may vary according to site conditions.
- G. Apply tiles in the adhesive and make sure they are well positioned.
- H. Roll tiles in both directions on 45deg angle with a 100 lbs (45 kg) sectional floor roller.
- I. Check for air bubbles and continue rolling if needed.
- J. Repeat the same procedure for the rest of the installation.
- K. Allow adhesive to set 72 hrs before the initial cleaning of the surface.
- L. Contractor to provide all required backup and information to guaranty that the resilient athletic flooring is LEED certified installed including adhesives used.

END OF SECTION 096220

FIRE STATION 54

PROJECT 10914

**SECTION 096513
RESILIENT BASE AND ACCESSORIES**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Resilient base.
 2. Resilient stair accessories.
 3. Resilient molding accessories.
- B. Related Sections:
1. Division 09 Section "Resilient Sheet Flooring" for resilient sheet floor coverings.
 2. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.
 3. Division 09 Section "Resilient Athletic Flooring" for resilient floor coverings for use in athletic-activity or support areas.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals:
1. Product Data for Credit: For adhesives, including printed statement of VOC content.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- E. Product Schedule: For resilient products. [Use same designations indicated on Drawings.]

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

FIRE STATION 54

PROJECT 10914

- B. Mockups: Provide resilient products with mockups specified in other Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products 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. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS**2.1 RESILIENT BASE**

- A. Resilient Base:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - c. Endura Rubber Flooring; Division of Burke Industries, Inc.
 - d. Johnsonite.
 - e. Mondo Rubber International, Inc.
 - f. Roppe Corporation, USA.

FIRE STATION 54

PROJECT 10914

- B. Resilient Base Standard: ASTM F 1861.
 - 1. Material Requirement: Type TS (rubber, vulcanized thermoset).
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style: Cove (base with toe).
- C. Minimum Thickness: 0.080 inch.
- D. Height: 4 inches As indicated on Drawings.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed or preformed.
- G. Inside Corners: Job formed or preformed.
- H. Finish: Satin As selected by Architect from manufacturer's full range.
- I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 RESILIENT MOLDING ACCESSORY

- A. Resilient Molding Accessory:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
 - b. Johnsonite.
 - c. R.C.A. Rubber Company (The).
 - d. Roppe Corporation, USA.
 - e. VPI, LLC; Floor Products Division.
- B. Description: Cap for cove carpet Cap for cove resilient floor covering Carpet bar for tackless installations Carpet edge for glue-down applications Nosing for carpet Nosing for resilient floor.
- C. Material: Rubber.
- D. Profile and Dimensions: As indicated.
- E. 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 resilient products and substrate conditions indicated.

FIRE STATION 54

PROJECT 10914

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Cove Base Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.
- C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread 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 resilient products.
- 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 for Resilient Stair Treads and Accessories: 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.
 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 maximum Insert acceptable percentage relative humidity level measurement.

FIRE STATION 54

PROJECT 10914

- 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 resilient products until they are same temperature as the 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 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 practicable 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. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

FIRE STATION 54

PROJECT 10914

- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of 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 surfaces thoroughly.
 - 3. Damp-mop 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. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply two coat(s).
- E. Cover resilient products until Substantial Completion.

END OF SECTION 096513

FIRE STATION 54

PROJECT 10914

**SECTION 096516
RESILIENT SHEET FLOORING**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Vinyl sheet floor covering, with and without backing.
 2. Rubber sheet floor covering, with and without backing.
- B. Related Sections:
1. Division 09 Section "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.
 2. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.
 3. Division 09 Section "Resilient Athletic Flooring" for resilient floor coverings for use in athletic-activity or support areas.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals:
1. Product Data for Credit: For adhesives and chemical-bonding compounds, including printed statement of VOC content.
- C. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
1. Show details of special patterns.
- D. Samples for Initial Selection: For each type of floor covering indicated.
- E. Samples for Verification: In manufacturer's standard size, but not less than 6-by-9-inch sections of each different color and pattern of floor covering required.
1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

FIRE STATION 54

PROJECT 10914

- F. Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.
- G. Product Schedule: For floor coverings. Use same designations indicated on Drawings.
- H. Qualification Data: For qualified Installer.
- I. Maintenance Data: For each type of floor covering to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor covering installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor covering manufacturer for installation techniques required.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- C. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for floor coverings including resilient base and accessories.
 - a. Size: Minimum 100 sq. ft. for each type, color and pattern in locations directed by Architect.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive floor coverings 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.

FIRE STATION 54

PROJECT 10914

- C. Close spaces to traffic during floor covering installation.
- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install floor coverings after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Covering: Furnish quantity not less than 10 linear feet for every 500 linear feet or fraction thereof, in roll form and in full roll width for each color, pattern, and type of floor covering installed.

PART 2 - PRODUCTS**2.1 VINYL SHEET FLOOR COVERING**

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong World Industries, Inc.;
 - 2. Forbo Flooring, Inc.;
 - 3. Polyflor, Ltd., Distributed by Gerbert Limited;
 - 4. Tarkett, Inc.;
 - 5. TOLI International;
- B. Unbacked Vinyl Sheet Floor Covering: ASTM F 1913, 0.080 inch thick.
- C. Wearing Surface: Smooth with embedded abrasives.
- D. Sheet Width: As standard with manufacturer.
- E. Seaming Method: Heat welded.
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 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 covering and substrate conditions indicated.
 - 1. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

FIRE STATION 54

PROJECT 10914

C. Seamless-Installation Accessories:

1. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - a. Color: Match floor covering.
2. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
 - a. VOC Content: Not more than 510 g/L. when calculated according to 40 CFR 59, Subpart D (EPA method 24).

D. Integral-Flash-Cove-Base Accessories:

1. Cove Strip: 1-inch radius provided or approved by manufacturer.
2. Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.

E. 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 coverings.
- 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 floor coverings.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. 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. Proceed with installation only after substrates pass testing.

FIRE STATION 54

PROJECT 10914

- 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 percent 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 coverings until they are same temperature as space where they are to be installed.
1. Move floor coverings 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 floor coverings immediately before installation.

3.3 FLOOR COVERING INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor coverings.
- B. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- C. Lay out floor coverings as follows:
1. Maintain uniformity of floor covering direction.
 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches away from parallel joints in floor covering substrates.
 3. Match edges of floor coverings for color shading at seams.
 4. Avoid cross seams.
- D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:

FIRE STATION 54

PROJECT 10914

1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
 2. Chemically-Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly-fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.
- J. Integral-Flash-Cove Base: Cove floor coverings 6 inches up vertical surfaces. Support floor coverings at horizontal and vertical junction by 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 protection of floor coverings.
- B. Perform the following operations immediately after completing floor covering installation:
1. Remove adhesive and other blemishes from floor covering surfaces.
 2. Sweep and vacuum floor coverings thoroughly.
 3. Damp-mop floor coverings to remove marks and soil.
- C. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
1. Apply two coat(s).
- E. Cover floor coverings until Substantial Completion.

END OF SECTION 096516

FIRE STATION 54

PROJECT 10914

**SECTION 099113
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. (See Drawings)

1.2 SUMMARY

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

1. Concrete.
2. Concrete masonry units (CMU).
3. Steel.
4. Galvanized metal.
5. Wood.
6. Plastic trim fabrications.
7. Exterior portland cement plaster (stucco).
8. Exterior gypsum board.

- B. Related Requirements:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 06 Sections for shop priming carpentry with primers specified in this Section.
3. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
4. Division 09 painting Sections for special-use coatings.
5. Division 09 Section "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
6. Division 09 Section "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

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.

EXTERIOR PAINTING

099113 - 1

FIRE STATION 54

PROJECT 10914

- 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, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 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.

EXTERIOR PAINTING

099113 - 2

FIRE STATION 54

PROJECT 10914

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 City.
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, provide products by one of the following:
 1. Behr Process Corporation.
 2. Benjamin Moore & Co.
 3. ICI Paints.
 4. Sherwin-Williams Company (The).

EXTERIOR PAINTING

099113 - 3

FIRE STATION 54

PROJECT 10914

- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

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 indicated in a color schedule listed on the drawings.
 - 1. 20 percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.
 - 1. VOC Content: E Range of E2.

2.4 PRIMERS/SEALERS

- A. Primer, Alkali Resistant, Water Based: MPI #3.
 - 1. VOC Content: E Range of E2.
- B. Primer, Bonding, Water Based: MPI #17.
 - 1. VOC Content: E Range of E2.
- C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.5 METAL PRIMERS

- A. Primer, Galvanized, Water Based: MPI #134.

EXTERIOR PAINTING

099113 - 4

FIRE STATION 54

PROJECT 10914

1. VOC Content: E Range of E2.
2. Environmental Performance Rating: EPR 2.

2.6 WOOD PRIMERS

- A. Primer, Latex for Exterior Wood: MPI #6.
 1. VOC Content: E Range of E2.

2.7 WATER-BASED PAINTS

- A. Latex, Exterior Flat (Gloss Level 1): MPI #10.
 1. VOC Content: E Range of E.
- B. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
 1. VOC Content: E Range of E2.

2.8 SOLVENT-BASED PAINTS

- A. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5): MPI #81.
 1. VOC Content: E Range of E2.
- B. Alkyd, Quick Dry, Gloss (Gloss Level 7): MPI #96.
 1. VOC Content: E Range of E2.

2.9 TEXTURED AND HIGH-BUILD COATINGS

- A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.
 1. See Part 2 subsection 2.2 Manufacturers for names.
- B. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.
 1. See Part 2 subsection 2.2 Manufacturers for names.
- C. Textured Coating, Latex, Flat: MPI #42.
 1. See Part 2 subsection 2.2 Manufacturers for names.

EXTERIOR PAINTING

099113 - 5

FIRE STATION 54

PROJECT 10914

- D. Primer for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.
 - 1. See Part 2 subsection 2.2 Manufacturers for names.
- E. Intermediate Coat for Latex, Exterior, High Build: As recommended in writing by topcoat manufacturer.
 - 1. See Part 2 subsection 2.2 Manufacturers for names.
- F. Latex, Exterior, High Build: MPI #40.
 - 1. See Part 2 subsection 2.2 Manufacturers for names.

2.10 ALUMINUM PAINT

- A. Aluminum Paint: MPI #1.
 - 1. VOC Content: E Range of E2.

2.11 FLOOR COATINGS

- A. Sealer, Water Based, for Concrete Floors: MPI #99.
 - 1. VOC Content: E Range of E2.
- B. Floor Paint, Latex, Low Gloss (Maximum Gloss Level 3): MPI #60.
 - 1. VOC Content: E Range of E2.

2.12 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: City reserves the right to invoke the following procedure:
 - 1. City will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. City may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

EXTERIOR PAINTING

099113 - 6

FIRE STATION 54

PROJECT 10914

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. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Portland Cement Plaster: 12 percent.
 - 5. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. 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.

EXTERIOR PAINTING

099113 - 7

FIRE STATION 54

PROJECT 10914

- 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 exceeds 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 by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

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.

EXTERIOR PAINTING

099113 - 8

FIRE STATION 54

PROJECT 10914

3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Paint entire exposed surface of window frames and sashes.
 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 6. 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: City 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.

EXTERIOR PAINTING

099113 - 9

FIRE STATION 54

PROJECT 10914

- 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 Substrates, Nontraffic Surfaces:

- 1. Latex System: MPI EXT 3.1A.
 - a. Prime Coat: Exterior latex matching topcoat.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (flat).

B. CMU Substrates:

- 1. Latex System: MPI EXT 4.2A.
 - a. Prime Coat: Interior/exterior latex block filler.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (flat).

C. Steel Substrates:

- 1. Quick-Drying Enamel System: MPI EXT 5.1A.
 - a. Prime Coat: Quick-drying alkyd metal primer.
 - b. Intermediate Coat: Quick-drying enamel matching topcoat.
 - c. Topcoat: Quick-drying enamel (semigloss).

D. Galvanized-Metal Substrates:

- 1. Latex System: MPI EXT 5.3A.
 - a. Prime Coat: Cementitious galvanized-metal primer.
 - b. Intermediate Coat: Exterior latex matching topcoat.
 - c. Topcoat: Exterior latex (semigloss).

E. Dressed Lumber Substrates: Including architectural woodwork.

- 1. Latex System: MPI EXT 6.3L.

EXTERIOR PAINTING

099113 - 10

FIRE STATION 54

PROJECT 10914

- a. Prime Coat: Exterior latex wood primer.
- b. Intermediate Coat: Exterior latex matching topcoat.
- c. Topcoat: Exterior latex (semigloss).

F. Stucco Substrates:

1. Latex System: MPI EXT 9.1A.

- a. Prime Coat: Exterior latex matching topcoat.
- b. Intermediate Coat: Exterior latex matching topcoat.
- c. Topcoat: Exterior latex (flat).

G. 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 (flat)
- d. Topcoat: Latex, exterior (semi-gloss).

H. Plastic Trim Fabrication Substrates:

1. Latex System:

- a. Prime Coat: Primer, bonding, water based
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior (semi-gloss).

END OF SECTION 099113

FIRE STATION 54

PROJECT 10914

**SECTION 099123
INTERIOR PAINTING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
1. Concrete.
 2. Concrete masonry units (CMU).
 3. Steel.
 4. Galvanized metal.
 5. Wood.
 6. Gypsum board.
 7. Plaster.
- B. Related Requirements:
1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
 2. Division 06 Sections for shop priming carpentry with primers specified in this Section.
 3. Division 08 Sections for factory priming windows and doors with primers specified in this Section.
 4. Division 09 painting Sections for high-performance and special-use coatings.
 5. Division 09 Section "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
 6. Division 09 Section "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

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 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

INTERIOR PAINTING

099123 - 1

FIRE STATION 54

PROJECT 10914

- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. 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. Sustainable Design Submittals:
 - 1. Product Data for Credit: For paints and coatings, including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit: For paints and coatings, documentation indicating that they meet 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. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and in 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.
- E. 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 in Part 2, with the proposed product highlighted.
 - 3. VOC content.

FIRE STATION 54

PROJECT 10914

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. 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 City.
 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 when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

INTERIOR PAINTING

099123 - 3

CAM 17-0531
EXHIBIT 1B
Page 338 of 600

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Behr Process Corporation.
 2. Benjamin Moore & Co.
 3. Duron, Inc.
 4. ICI Paints.
 5. PPG Architectural Finishes, Inc.
 6. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

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: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.

INTERIOR PAINTING

099123 - 4

FIRE STATION 54

PROJECT 10914

- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Colors: As selected by Architect from manufacturer's full range as indicated in a color schedule on the drawings.
 - 1. See drawings for paint/color schedule for this project.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.
 - 1. VOC Content: E Range of E2.

2.4 PRIMERS/SEALERS

- A. Interior Latex Primer/Sealer: MPI #50.
 - 1. VOC Content: E Range of E2.
 - 2. Environmental Performance Rating: EPR 2.
- B. Interior Alkyd Primer/Sealer: MPI #45.
 - 1. VOC Content: E Range of E2.
 - 2. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.5 METAL PRIMERS

- A. Quick-Drying Alkyd Metal Primer: MPI #76.
 - 1. VOC Content: E Range of E2.
- B. Cementitious Galvanized-Metal Primer: MPI #26.
 - 1. VOC Content: E Range of E1.

2.6 WATER-BASED PAINTS

- A. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.
- B. Light Industrial Coating, Interior, Water Based, Semi-Gloss (Gloss Level 5): MPI #153.

INTERIOR PAINTING

099123 - 5

FIRE STATION 54

PROJECT 10914

- C. Light Industrial Coating, Interior, Water Based, Gloss (Gloss Level 6): MPI #154.

2.7 SOLVENT-BASED PAINTS

- A. Alkyd, Interior, Semi-Gloss (Gloss Level 5): MPI #47.
- B. Alkyd, Quick Dry, Semi-Gloss (Gloss Level 5): MPI #81.

2.8 TEXTURED COATING

- A. Primer for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.
 - 1. Intermediate Coat for Textured Coating, Latex, Flat: As recommended in writing by topcoat manufacturer.
- B. Textured Coating, Latex, Flat: MPI #42.

2.9 ALUMINUM PAINT

- A. Aluminum Paint: MPI #1.

2.10 FLOOR COATINGS

- A. Sealer, Water Based, Semi-Gloss Epoxy for Concrete Floors: MPI #99.
 - 1. Contractor to select from manufacturers list supplied within this specification.
- B. Sealer, Solvent Based, Semi-Gloss Epoxy for Concrete Floors: MPI #104.
 - 1. Contractor to select from manufacturers list supplied within this specification.

2.11 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: City reserves the right to invoke the following procedure:
 - 1. City will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. City may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from

INTERIOR PAINTING

099123 - 6

FIRE STATION 54

PROJECT 10914

previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
 - 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. 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 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.

INTERIOR PAINTING

099123 - 7

FIRE STATION 54

PROJECT 10914

- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 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.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

FIRE STATION 54

PROJECT 10914

1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards and switch gear.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Tanks that do not have factory-applied final finishes.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - f. Other items as directed by Architect.
 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

FIRE STATION 54

PROJECT 10914

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: City 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 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Nontraffic Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
 - 2. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.
- B. Concrete Substrates, Traffic Surfaces:
 - 1. Epoxy Floor System:

INTERIOR PAINTING

099123 - 10

FIRE STATION 54

PROJECT 10914

- a. Prime Coat: Floor paint, epoxy, institutional low odor/VOC, semi-gloss
- b. Intermediate Coat: Floor paint, epoxy, institutional low odor/VOC matching topcoat
- c. Topcoat: Floor paint, epoxy, institutional low odor/VOC, semi-gloss

C. CMU Substrates:

1. Latex System:

- a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

2. Institutional Low-Odor/VOC Latex System:

- a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

D. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System:

- a. Prime Coat: Primer, rust-inhibitive, water based MPI #107.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

2. Quick-Drying Enamel System:

- a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
- b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
- c. Topcoat: Alkyd, quick dry, institutional low odor/VOC semi-gloss (Gloss Level 5), MPI #81.

E. Galvanized-Metal Substrates:

1. Institutional Low-Odor/VOC Latex System:

- a. Prime Coat: Primer, galvanized, water based, MPI #134.
- b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
- c. Topcoat: Latex, interior, institutional low odor/VOC, satin

F. Aluminum (Not Anodized or Otherwise Coated) Substrates:

1. Institutional Low-Odor/VOC Latex System:

FIRE STATION 54

PROJECT 10914

- a. Prime Coat: Primer, quick dry, for aluminum, MPI #95.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.
- G. Wood Substrates: Including wood trim architectural woodwork doors windows wood-based panel products.
1. Latex System:
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
 2. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.
- H. Fiberglass and Plastic Substrates:
1. Latex System:
 2. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer, bonding, water based, MPI #17.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.
- I. Gypsum Board Substrates:
1. Institutional Low-Odor/VOC Latex System:
 - a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (eggshell).
 2. High-Performance Architectural Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
 - c. Topcoat: Latex, interior, high performance architectural, institutional low odor/VOC semi-gloss (Gloss Level 5), MPI #141.

FIRE STATION 54

PROJECT 10914

END OF SECTION 099123

INTERIOR PAINTING

099123 - 13

FIRE STATION 54

PROJECT 10914

**SECTION 099600
HIGH-PERFORMANCE COATINGS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes surface preparation and application of high-performance coating systems on the following substrates:
1. Interior Substrates:
 - a. Concrete, and horizontal surfaces. (i.e. Apparatus Bay)
- B. Related Requirements:
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.

1.3 DEFINITIONS

- A. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- B. 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 indicated. Include preparation requirements and application instructions.
- B. Sustainable Design Submittals:
1. Product Data for Credit: For interior coatings, documentation including printed statement of VOC content.
 2. Laboratory Test Reports for Credit: For interior coatings, documentation indicating that products comply with the testing and product requirements of the California

HIGH-PERFORMANCE COATINGS

099600 - 1

FIRE STATION 54

PROJECT 10914

Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Samples for Initial Selection: For each type of topcoat product indicated.
- D. Samples for Verification: For each type of coating system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- E. Product List: For each product indicated, 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 in Part 2, 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. Coatings: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each coating system specified in Part 3.
 - a. Wall and Ceiling 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 City.

HIGH-PERFORMANCE COATINGS

099600 - 2

FIRE STATION 54

PROJECT 10914

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Behr Process Corporation.
 2. Benjamin Moore & Co.
 3. ICI Paints.
 4. PPG Architectural Finishes, Inc.
 5. Sherwin-Williams Company (The).
 6. Epoxy-Coat Flooring, Inc.
- B. Products: Basis of design: Epoxy-Coat Flooring, Inc. system for use in the Apparatus bay area.

HIGH-PERFORMANCE COATINGS

099600 - 3

FIRE STATION 54

PROJECT 10914

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."
- B. 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. For each coat in a coating system, provide products recommended in writing by manufacturers of topcoat for use in coating system and on substrate indicated.
 - 3. Provide products of same manufacturer for each coat in a coating system.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior coatings applied at project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
 - 4. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: 250 g/L.
 - 5. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 - 6. Pre-Treatment Wash Primers: 420 g/L.
 - 7. Floor Coatings: 100 g/L.
 - 8. Shellacs, Clear: 730 g/L.
 - 9. Shellacs, Pigmented: 550 g/L.
- D. Low-Emitting Materials: Interior coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Colors: Use a "light gray" As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.
- B. Block Filler, Epoxy: MPI #116.

2.4 INTERIOR PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior: MPI #50.

HIGH-PERFORMANCE COATINGS

099600 - 4

FIRE STATION 54

PROJECT 10914

2.5 EPOXY COATINGS

- A. Epoxy (w/ minor Slip-Resistant): Gloss: MPI #77.

2.6 SOURCE QUALITY CONTROL

- A. Testing of Coating Materials: City reserves the right to invoke the following procedure:
 - 1. City will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. City may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Masonry (Clay and CMU): 12 percent.
- B. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- C. Plaster Substrates: Verify that plaster is fully cured.
- 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.

HIGH-PERFORMANCE COATINGS

099600 - 5

FIRE STATION 54

PROJECT 10914

1. Beginning coating application constitutes Contractor's acceptance of substrates 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. 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 coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce coating systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 1. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi at 6 to 12 inches.
 2. Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
- E. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions.
 1. Clean surfaces with pressurized water. Use pressure range of 100 to 600 psi at 6 to 12 inches.
- 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 7/NACE No. 4, "Brush-Off Blast Cleaning."
 2. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 3. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 4. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 5. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."

HIGH-PERFORMANCE COATINGS

099600 - 6

FIRE STATION 54

PROJECT 10914

- 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 by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
- I. Aluminum Substrates: Remove loose surface oxidation.

3.3 APPLICATION

- A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 - 1. Use applicators and techniques suited for coating and substrate indicated.
 - 2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
- D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: City will engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.
 - 1. Contractor shall touch up and restore coated surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

HIGH-PERFORMANCE COATINGS

099600 - 7

FIRE STATION 54

PROJECT 10914

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 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.

3.6 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

- A. Concrete Substrates, Horizontal Surfaces.
 - 1. Epoxy System (w/ minor Slip-Resistant material added):
 - a. Prime Coat: Epoxy, gloss, MPI #77.
 - b. Intermediate Coat: Epoxy, gloss, MPI #77.
 - c. Topcoat: Epoxy, gloss, MPI #77.
- B. CMU Substrates:
 - 1. Epoxy System:
 - a. Block Filler: Block filler, epoxy, MPI #116.
 - b. Intermediate Coat: Epoxy, gloss, MPI #77.
 - c. Topcoat: Epoxy, gloss, MPI #77.
 - 2. Epoxy-Modified Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.
 - c. Topcoat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.
- C. Gypsum Board Substrates:
 - 1. Epoxy System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.

HIGH-PERFORMANCE COATINGS

099600 - 8

FIRE STATION 54

PROJECT 10914

- b. Intermediate Coat: Epoxy, gloss, MPI #77.
 - c. Topcoat: Epoxy, gloss, MPI #77.
2. Epoxy-Modified Latex System:
- a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.
 - c. Topcoat: Epoxy-modified latex, interior, gloss (Gloss Level 6), MPI #115.

END OF SECTION 099600

HIGH-PERFORMANCE COATINGS

099600 - 9

FIRE STATION 54

PROJECT 10914

**SECTION 099653
ELASTOMERIC COATINGS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section includes surface preparation and application of elastomeric coatings to the following exterior substrates:
1. Concrete.
 2. Concrete unit masonry.
 3. Stucco.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of elastomeric coating.
- C. Samples for Verification: For each type of elastomeric coating indicated and in each color and gloss.
1. Submit Samples on same type of substrate as that to receive application, 8 inches square.
 2. Apply coats on Samples in steps to show each separate coat, including primers and block fillers as applicable.
 3. Label each coat of each Sample.
 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

FIRE STATION 54

PROJECT 10914

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Quantity: Furnish an additional 5 percent but not less than 1 gal. of each material, color, and texture applied.

1.5 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.
 - 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.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 90 deg F unless otherwise permitted by manufacturer's written instructions.
- B. Do not apply coatings 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.

FIRE STATION 54

PROJECT 10914

- C. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before starting or continuing coating operation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace elastomeric coatings that fail within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Water penetration through the coating.
 - b. Deterioration of coating beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. GAF
1 Campus Drive
Parsippany, NJ 07054
(800) 766-3411
- B. PPG Architectural Coatings
Pittsburgh, PA
(800) 774-7732
- C. Sherwin Williams Company (The)
5501 Cass Avenue
Cleveland, OH 44101
(800) 321-8194
- D. Sto Corp.
3800 Camp Creek Parkway
Building 1400, Suite 120
Atlanta, GA 30331-6228
(800) 221-2397
- E. Textured Coatings of America
5950 South Avalon Blvd.
Los Angeles, CA 90003
(213) 233-3111
- F. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Elastomeric Coating Schedule for the paint category indicated.

FIRE STATION 54

PROJECT 10914

2.2 MATERIALS

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. Colors: As selected by Architect from manufacturer's full range.
- D. Crack Fillers: Elastomeric coating manufacturer's recommended, factory-formulated crack fillers or sealants, including crack filler primers, compatible with substrate and other materials indicated.
- E. Primer: Elastomeric coating manufacturer's recommended, factory-formulated, alkali-resistant primer compatible with substrate and other materials indicated.
- F. Concrete Unit Masonry Block Filler: Elastomeric coating manufacturer's recommended, factory-formulated, high-performance latex block filler compatible with substrate and other materials indicated.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with manufacturer's requirements for maximum moisture content, alkalinity, and other conditions affecting performance of work.
- B. Begin coating only when moisture content of substrate is 12 percent or less when measured with an electronic moisture meter.
- C. Begin coating no sooner than 28 days after substrate is constructed and is visually dry on both sides.
- D. Verify that substrate is within the range of alkalinity recommended by manufacturer.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

FIRE STATION 54

PROJECT 10914

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in the "MPI Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.
- B. Remove hardware and hardware accessories, plates, machined surfaces, light fixtures, and similar items already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - 1. After completing coating 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 coatings, including dirt, oil, grease, and incompatible paints and encapsulants. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
 - 2. Perform cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- D. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.

3.3 APPLICATION

- A. Apply elastomeric coatings according to manufacturer's written instructions.
 - 1. Use equipment and techniques best suited for substrate and type of material being applied.
 - 2. Coat surfaces behind movable items the same as similar exposed surfaces.
 - 3. Apply each coat separately according to manufacturer's written instructions.
- B. Primers: Apply at a rate to ensure complete coverage.
- C. Block Fillers: Apply at a rate to ensure complete coverage with pores filled.
- D. Elastomeric Finish Coat(s): Minimum two coats with a total dry film thickness of 16 to 18 mils.
- E. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform finish, color, and appearance.
- F. Apply coatings 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.

FIRE STATION 54

PROJECT 10914

- G. Apply coatings to prepared surfaces as soon as practicable after preparation and before subsequent surface soiling or deterioration.
- H. Spray Application: Use spray equipment for application only when permitted by authorities having jurisdiction. Wherever spray application is used, do not double back with spray equipment to build up film thickness of two coats in one pass.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following testing procedures:
 - 1. Owner will engage the services of a qualified testing agency to sample materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance of materials with product requirements.
 - 3. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Remove noncomplying materials from Project site, pay for testing, and recoat surfaces that were coated with rejected materials. Remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.
- B. Field Testing and Inspection: Owner reserves the right to engage the services of a qualified testing agency to verify installed thickness of elastomeric coatings.

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 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 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, touch up and restore damaged or defaced coated surfaces.

3.6 ELASTOMERIC COATING SCHEDULE

- A. Concrete Substrates:
 - 1. Elastomeric Coating System MPI EXT 3.1F:

FIRE STATION 54

PROJECT 10914

- a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Elastomeric, pigmented, exterior, water-based, flat coating; MPI #113.
 - d. Topcoat: Elastomeric, pigmented, exterior, water-based, nonflat coating; MPI #38.
- B. Concrete Unit Masonry Substrates:
1. Elastomeric Coating System MPI EXT 4.2D:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Elastomeric, pigmented, exterior, water-based, flat coating; MPI #113.
- C. Stucco Substrates:
1. Elastomeric Coating System MPI EXT 9.1C:
 - a. Prime Coat: As recommended in writing by topcoat manufacturer.
 - b. Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - c. Topcoat: Elastomeric, pigmented, exterior, water-based, flat coating; MPI #113.
 - d. Topcoat: Elastomeric, pigmented, exterior, water-based, nonflat coating; MPI #38.

END OF SECTION 099653

FIRE STATION 54

PROJECT 10914

**SECTION 101100
VISUAL DISPLAY SURFACES**

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. Chalkboards.
2. Markerboards.
3. Tackboards.
4. Visual display wall panels.
5. Support systems for visual display boards.

- B. Related Sections:

1. Division 10 Section "Display Cases" for built-in trophy and display cases.
2. Division 26 Sections for wiring and other electrical work associated with power-operated, visual display surfaces.

1.3 DEFINITIONS

- A. Tackboard: Framed or unframed, tackable, visual display board assembly.
- B. Visual Display Board Assembly: Visual display surface that is factory fabricated into composite panel form, either with or without a perimeter frame; includes chalkboards, markerboards, and tackboards.
- C. Visual Display Surface: Surfaces that are used to convey information visually, including surfaces of chalkboards, markerboards, tackboards, and surfacing materials that are not fabricated into composite panel form but are applied directly to walls.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for visual display surfaces.
1. Include rated capacities, operating characteristics, electrical characteristics and individual panel weights for sliding visual display units.
 2. Include computer system requirements for electronic markerboards.

VISUAL DISPLAY SURFACES

CAM 107-0501 - 1
EXHIBIT 1B
Page 365 of 600

FIRE STATION 54

PROJECT 10914

- B. Sustainable Design Submittals:
1. Product Data for Credit: For composite wood products, documentation indicating that the product contains no urea formaldehyde.
 2. Product Data for Credit: For adhesives, including printed statement of VOC content and chemical components.
- C. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.
1. Show locations of panel joints.
 2. Show locations of special-purpose graphics for visual display surfaces.
 3. Include sections of typical trim members.
 4. Wiring Diagrams: For power, signal, and control wiring.
- D. Samples for Initial Selection: For each type of visual display surface indicated, for units with factory-applied color finishes, and as follows:
1. Actual sections of visual display wall panel.
 2. Include accessory Samples to verify color selected.
- E. Samples for Verification: For each type of visual display surface indicated.
1. Visual Display Surface: Not less than 8-1/2 by 11 inches, mounted on substrate indicated for final Work. Include one panel for each type, color, and texture required.
 2. Trim: 6-inch-long sections of each trim profile.
 3. Display Rail: 6-inch-long sections.
 4. Rail Support System: 6-inch-long sections.
 5. Accessories: Full-size Sample of each type of accessory.
- F. Product Schedule: For visual display surfaces contractor to coordinate.
- G. Qualification Data: For qualified Installer contractor to coordinate.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.
- I. Operation and Maintenance Data: For visual display surfaces to include in maintenance manuals.
- J. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of motor-operated, sliding visual display units required for this Project.
- B. Source Limitations: Obtain visual display surfaces from single source from single manufacturer.

FIRE STATION 54

PROJECT 10914

- C. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 50 or less.
- 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.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate appearance and aesthetic effects and set quality standards for installation.
 - 1. Build mockup of typical wall area as shown on Drawings. Include accessories.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-built visual display surfaces, including factory-applied trim, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.
- B. Store visual display surfaces vertically with packing materials between each unit.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display surfaces 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 surfaces by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.8 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which 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:

FIRE STATION 54

PROJECT 10914

- a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
2. Warranty Period: 10 years from date of Substantial Completion.
 3. Warranty Period: Life of the building.
- B. Special Warranty for Markerboards: Manufacturer's standard form in which manufacturer agrees to repair or replace markerboards 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, GENERAL**

- A. Porcelain-Enamel Face Sheet: ASTM A 424, enameling-grade steel, uncoated thickness indicated; with exposed face and edges coated with primer, 1.7-to-2.5-mil-thick ground coat, and color cover coat; and with concealed face coated with primer and 1.7-to-2.5-mil-thick ground coat.
1. Matte-Finish Cover Coat: Low reflective; chalk wipes clean with dry cloth or standard eraser. Minimum 2.0-to-2.5-mil-thick cover coat. Cover and ground coats shall be fused to steel at manufacturer's standard firing temperatures but not less than 1250 deg F.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) PolyVision Corporation, a Steelcase company; P³ ceramicsteel Chalkboard.
 - 2) Equal approved by the City of Fort Lauderdale.
 2. Gloss-Finish Cover Coat: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser. Minimum 3.0-to-4.0-mil-thick cover coat. Cover and ground coats shall be fused to steel at manufacturer's standard firing temperatures but not less than 1475 deg F.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) PolyVision Corporation, a Steelcase company; P³ ceramicsteel Markerboard.
 - 2) Equal approved by the City of Fort Lauderdale.
- B. Porcelain-Enamel Face Sheet: Porcelain-enamel-clad, ASTM A 463/A 463M, Type 1, stretcher-leveled aluminized steel, with 0.024-inch uncoated thickness; with porcelain-enamel coating fused to steel at approximately 1000 deg F.
1. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.
 - a. Products: Subject to compliance with requirements, provide one of the following:

FIRE STATION 54

PROJECT 10914

- 1) Claridge Products and Equipment, Inc.; Vitracite Chalkboard.
 - 2) Equal approved by the City of Fort Lauderdale.
2. Gloss Finish: Low gloss; dry-erase markers wipe clean with dry cloth or standard eraser. Suitable for use as projection screen.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Claridge Products and Equipment, Inc.; LCS Markerboard.
 - 2) Equal approved by the City of Fort Lauderdale.
- C. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Claridge Products and Equipment, Inc.
 - b. PolyVision Corporation; a Steelcase company.
 - c. Equal approved by the City of Fort Lauderdale.
 2. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.
 3. Gloss Finish: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser.
- D. Melamine: Thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- E. High-Pressure Plastic Laminate: NEMA LD 3.
- F. Natural Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.
- G. 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.
- H. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, burlap weave; weighing not less than 13 oz./sq. yd.; with surface-burning characteristics indicated.
- I. Hardboard: ANSI A135.4, tempered.
- J. Particleboard: ANSI A208.1, Grade M-1, made with binder containing no urea formaldehyde.
- K. Fiberboard: ASTM C 208.
- L. Extruded Aluminum: ASTM B 221, Alloy 6063.

FIRE STATION 54

PROJECT 10914

2.2 CHALKBOARD ASSEMBLIES

- A. Painted-Finish Chalkboards: Fabricated from two plies of 1/4-inch-thick, treated, tempered hardboard panels permanently surfaced with manufacturer's standard, heat-cured organic coating formulated for chalk-receptive matte finish.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AARCO Products, Inc.
 - b. Marsh Industries, Inc.; Visual Products Group.
 - c. Equal approved by the City of Fort Lauderdale.

2.3 MARKERBOARD ASSEMBLIES

- A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and 0.021-inch-thick, porcelain-enamel face sheet with high-gloss finish.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AARCO Products, Inc.
 - b. ADP Lemco, Inc.
 - c. Aywon.
 - d. Bangor Cork Company, Inc.
 - e. Best-Rite Manufacturing.
 - f. Claridge Products and Equipment, Inc.
 - g. Egan Visual Inc.
 - h. Ghent Manufacturing, Inc.
 - i. Marsh Industries, Inc.; Visual Products Group.
 - j. Platinum Visual Systems; a division of ABC School Equipment, Inc.
 - k. PolyVision Corporation; a Steelcase company.
 - l. Tri-Best Visual Display Products.
 2. Manufacturer's Standard Core: Minimum 1/4 inch thick, with manufacturer's standard moisture-barrier backing.
 3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.
- B. Melamine Markerboards: Fabricated from 1/4-inch-thick, sealed and primed hardboard panels permanently bonded with melamine or another high-pressure-laminate writing surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AARCO Products, Inc.
 - b. Ghent Manufacturing, Inc.
 - c. Marsh Industries, Inc.; Visual Products Group.

FIRE STATION 54

PROJECT 10914

- C. High-Pressure-Laminate Markerboard Assembly: Balanced, high-pressure, factory-laminated chalkboard assembly of three-ply construction consisting of backing sheet, fiberboard core material, and high-pressure-laminate writing surface.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Best-Rite Manufacturing.
 - b. EverProducts by Glenroy Inc.
 - c. Marsh Industries, Inc.; Visual Products Group.

2.4 TACKBOARD ASSEMBLIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. A-1 Visual Systems.
 2. AARCO Products, Inc.
 3. ADP Lemco, Inc.
 4. Aywon.
 5. Bangor Cork Company, Inc.
 6. Best-Rite Manufacturing.
 7. Claridge Products and Equipment, Inc.
 8. Egan Visual Inc.
 9. EverProducts by Glenroy Inc.
 10. Ghent Manufacturing, Inc.
 11. Marsh Industries, Inc.; Visual Products Group.
 12. Platinum Visual Systems; a division of ABC School Equipment, Inc.
 13. PolyVision Corporation; a Steelcase company.
 14. Tri-Best Visual Display Products.
- B. Polyester-Fabric-Faced Tackboard: 1/8-inch-thick, polyester-fabric-faced cork sheet factory laminated to 3/8-inch-thick fiberboard backing.

2.5 VISUAL DISPLAY RAILS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AARCO Products, Inc.
 2. Bangor Cork Company, Inc.
 3. Best-Rite Manufacturing.
 4. Claridge Products and Equipment, Inc.
 5. Ghent Manufacturing, Inc.
 6. Marsh Industries, Inc.; Visual Products Group.
 7. Platinum Visual Systems; a division of ABC School Equipment, Inc.
 8. PolyVision Corporation; a Steelcase company.
 9. Tri-Best Visual Display Products.

FIRE STATION 54

PROJECT 10914

- B. General: Manufacturer's standard, aluminum-framed, tackable cork fabric visual display surface fabricated into narrow rail shape and designed for displaying material.

2.6 VISUAL DISPLAY WALL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following]:
 1. A-1 Visual Systems.
 2. ADP Lemco, Inc.
 3. Best-Rite Manufacturing.
 4. Claridge Products and Equipment, Inc.
 5. Egan Visual Inc.
 6. Platinum Visual Systems; a division of ABC School Equipment, Inc.
 7. PolyVision Corporation; a Steelcase company.
 8. Tri-Best Visual Display Products.
- B. Marker Wall Sheets: Fabricated from 0.021-inch uncoated thickness, porcelain-enamel face sheets; for direct application to wall surface.
- C. Marker Wall Panels: Fabricated from markerboard assembly indicated.
- D. Tack Wall Panels: With tackable surface.
 1. Fabricated from tackboard assembly indicated.
 2. Natural Cork: 1/8-inch-thick, natural cork sheet for direct application to wall surface.
 3. Plastic-Impregnated Cork: 1/8-inch-thick, plastic-impregnated cork sheet for direct application to wall surface.
 4. Vinyl Fabric-Faced Cork: 1/4-inch-thick, vinyl-fabric-faced cork sheet for direct application to wall surface.
 5. Polyester-Fabric-Faced Cork: 1/4-inch-thick, polyester-fabric-faced cork sheet for direct application to wall surface.
- E. Joint Accessories: Manufacturer's standard, concealed aluminum or steel spline at butt joints.
- F. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific tack wall panels and substrate application, as recommended in writing by visual display surface manufacturer, and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- G. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by visual display surface manufacturer for intended substrate.

2.7 MODULAR SUPPORT SYSTEM FOR VISUAL DISPLAY BOARDS

- 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. AARCO Products, Inc.

FIRE STATION 54

PROJECT 10914

2. Best-Rite Manufacturing.
 3. Claridge Products and Equipment, Inc.
 4. Platinum Visual Systems; a division of ABC School Equipment, Inc.
 5. PolyVision Corporation; a Steelcase company.
- B. Standards: 72-inch-long, extruded-aluminum slotted standards designed for supporting visual display boards on panel clips. Standards shall be punched at not less than 4 inches o.c.
1. Finish: Powder coat.
 2. Color and Gloss: As selected by Architect from manufacturer's full range.
- C. Panel Clips: Extruded aluminum or steel with finish to match standards.

2.8 VISUAL DISPLAY WALL COVERINGS

- 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. Best-Rite Manufacturing.
 2. Egan Visual Inc.
 3. Marsh Industries, Inc.; Visual Products Group.
 4. Omnova Solutions Inc.; Decorative Products; Commercial Wallcovering.
 5. walltalkers; a division of RJF International Corporation.
- B. Visual Display Wall Covering: Intended for use with dry-erase markers and as a projection surface and consisting of moderate-gloss, plastic film bonded to fabric backing; not less than 0.020-mil total thickness.
- C. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall covering manufacturer, and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by wall covering manufacturer for intended substrate.

2.9 CHALKBOARD MARKERBOARD AND TACKBOARD ACCESSORIES

- A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch-thick, extruded aluminum; of size and shape indicated on Drawings.
1. Field-Applied Trim: Manufacturer's standard, snap-on trim with no visible screws or exposed joints.
 2. Factory-Applied Trim: Manufacturer's standard.
- B. Factory-Applied Wood Trim: Manufacturer's standard species Insert species, not less than 1/2 inch thick; of size and shape indicated on Drawings.

FIRE STATION 54

PROJECT 10914

- C. Field-Applied Wood Trim: Comply with requirements specified in Division 06 Section "Finish Carpentry."
- D. 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.

2.10 FABRICATION

- A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
- B. Natural-Slate Chalkboards: 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. Length: Furnish panels approximately equal in length with permissible variation not more than 3 inches in either direction of equal spacing. Allow 1/4-inch clearance at trim in length and width for fitting. Provide lengths of panels in each space as follows:
 - a. Up to 5 feet; one panel.
 - b. More than 5 feet but less than 9 feet; two panels.
 - c. More than 9 feet but less than 13.5 feet; three panels.
 - d. More than 13.5 feet but less than 18 feet; four panels.
 - e. More than 18 feet but less than 22.5 feet; five panels.
 - f. More than 22.5 feet but less than 27 feet; six panels.
- C. Visual Display Boards: Factory and Field assemble visual display boards unless otherwise indicated.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.
- D. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with 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. Provide manufacturer's standard vertical-joint spline system between abutting sections of chalkboards and markerboards.
 - 3. Provide manufacturer's standard mullion trim at joints between chalkboards markerboards and tackboards of combination units.
 - 4. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by

FIRE STATION 54

PROJECT 10914

Architect from manufacturer's standard structural support accessories to suit conditions indicated.

- E. Modular Visual Display Boards: Fabricated with integral panel clips attached to core material.
- F. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

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. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.12 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. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

2.13 VISUAL DISPLAY SURFACE SCHEDULE

- A. Visual Display Board: Factory and Field assembled.
 - 1. Chalkboard: Painted-finish chalkboard assembly.
 - a. Color: Black- As selected by Architect from full range of industry colors.
 - 2. Markerboard: Melamine markerboard assembly.
 - a. Color: White as selected by Architect from full range of industry colors.
 - 3. Corners: Square.
 - 4. Width: As indicated on Drawings.
 - 5. Height: As indicated on Drawings.
 - 6. Mounting: Wall and Rail support system.

FIRE STATION 54

PROJECT 10914

7. Mounting Height: As indicated on Drawings.
 8. Factory and Field-Applied Aluminum Trim: with powder-coat finish.
 - a. Color: As selected by Architect from full range of industry colors and color densities.
 9. Factory and Field-Applied Wood Trim: with transparent finish.
 10. Factory-Applied Vinyl Trim: As selected by Architect from full range of industry colors.
 11. Accessories:
 - a. Chalktray: Solid type.
 - b. Map rail with display rail and end stops
- B. Tackboard- Factory and Field assembled.
1. Tack Surface: Natural-cork tackboard assembly.
 2. Tack Surface: Plastic-impregnated-cork tackboard assembly
 3. Corners: Square.
 4. Width: As indicated on Drawings.
 5. Height: As indicated on Drawings.
 6. Mounting: Wall and or Rail support system.
 7. Mounting Height: As indicated on Drawings.
 8. Edges: Concealed by trim.
- C. Visual Display Rail: Factory and Field assembled.
1. Tack Surface: Natural-cork tackboard assembly.
 2. Tack Surface: Plastic-impregnated-cork tackboard assembly
 3. Size: 2 inches high by length indicated on Drawings.
 4. Edges: Extruded-aluminum trim.
 5. Ends: Aluminum.
 6. Aluminum Finish: Clear anodic finish.
- D. Visual Display Wall Panels: Consisting of the following visual display surface:
1. Marker Wall Sheet: Porcelain-enamel face sheet with high-gloss cover coat.
 - a. Color: White.
 2. Marker Wall Panel: High-pressure-laminate markerboard assembly.
 - a. Color: White as selected by Architect from full range of industry colors.
 3. Tack Wall Panel: Plastic-impregnated-cork tackboard assembly.
 4. Width: As indicated on Drawings.
 5. Height: As indicated on Drawings.

FIRE STATION 54

PROJECT 10914

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 motor-operated, sliding visual display units.
- C. Examine walls and partitions for proper preparation and backing for visual display surfaces.
- 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 that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew.
- 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 surfaces and wall surfaces.
 - 1. Prime wall surfaces indicated to receive direct-applied, visual display tack wall panels or visual display wall coverings and as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - 2. Prepare surfaces to receive visual display wall coverings and test for moisture according to requirements specified in Division 09 Section "Wall Coverings."
 - 3. Prepare substrates indicated to receive visual display wall covering as required by manufacturer's written instructions to achieve a smooth, dry, clean, structurally sound surface that is uniform in color.
 - a. Moisture Content: Maximum of 4 percent when tested with an electronic moisture meter.
 - b. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - c. Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - d. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - e. Painted Surfaces: Treat areas susceptible to pigment bleeding.
- D. Prepare recesses for sliding visual display units as required by type and size of unit.

VISUAL DISPLAY SURFACES

CA 1017-0531 13
EXHIBIT 1B
Page 377 of 600

FIRE STATION 54

PROJECT 10914

3.3 INSTALLATION, GENERAL

- 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.
1. Mounting Height for Grades 7 and Higher: 36 inches above finished floor to top of chalk tray/marker tray.

3.4 INSTALLATION OF FIELD-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES

- A. Field-Assembled Visual Display Units: 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.
 2. Provide manufacturer's standard vertical-joint spline system between abutting sections of markerboards.
 3. Provide manufacturer's standard mullion trim at joints between markerboards and tackboards of combination units.
 4. Where size of visual display boards 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.
- B. 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.

3.5 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES

- A. Visual Display Boards: Attach visual display boards to wall surfaces with egg-size adhesive gobs at 16 inches o.c., horizontally and vertically.
- B. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.
1. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.
 - a. Attach chalktrays to boards with fasteners at not more than 12 inches o.c.
 2. Field-Applied Wood Trim: Install trim according to requirements in Division 06 Section "Finish Carpentry."

VISUAL DISPLAY SURFACES

CA 17-0531 14
 101100
 EXHIBIT 1B
 Page 378 of 600

FIRE STATION 54

PROJECT 10914

3.6 INSTALLATION OF VISUAL DISPLAY RAILS

- A. Display Rails: Install rails in locations and 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 o.c.
1. Mounting Height: 48 inches above finished floor to top of rail.

3.7 INSTALLATION OF VISUAL DISPLAY WALL PANELS

- A. Marker Wall Sheets: Attach wall sheets to wall surface with thin layer of adhesive over entire wall surface. Butt join adjacent panels and cover joint with matching joint strip installed with double-stick tape.
- B. Marker Wall Panels: Attach panels to wall surface with egg-size adhesive gobs at 16 inches o.c., horizontally and vertically.
1. Join adjacent wall panels with concealed steel splines for smooth alignment.
 2. Join adjacent wall panels with exposed, H-shaped aluminum trim painted to match wall panel.
- C. Tack Wall Panels: Attach panels to wall surface with egg-size adhesive gobs at 16 inches o.c. horizontally and vertically.
1. Install wrapped-edge wall panels with butt joints between adjacent wall panels.
 2. Join adjacent wall panels with exposed, H-shaped aluminum trim covered with same fabric as wall panels.

3.8 INSTALLATION OF MODULAR SUPPORT SYSTEM

- A. Modular Support System: Install adjustable standards in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Install standards at 48 inches o.c., vertically aligned and plumb, and attached to wall surface with fasteners at 12 inches o.c.
1. Mounting Height: 12 inches 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.

3.9 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY UNITS

- A. Sliding Visual Display Units: Install units in recessed locations and at mounting heights indicated. Attach to wall framing with fasteners at not more than 16 inches o.c.
1. Adjust panels to operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

FIRE STATION 54

PROJECT 10914

- B. Visual Display Conference Units: Install units in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with concealed brackets screwed to wall or concealed wood cleats screwed to wall (contractor to supply backing as required).

1. Mounting Height: 72 inches above finished floor to top of cabinet.

3.10 INSTALLATION OF VISUAL DISPLAY WALL COVERING

- A. Install visual display wall covering according to requirements specified in Division 09 Section "Wall Coverings."
- B. General: Comply with visual display wall covering manufacturers' written installation instructions.
- C. Install seams horizontal and level, with lowest seam 24 inches above finished floor. Railroad fabric (reverse roll direction) to ensure color matching.
- D. Double cut seams, with no gaps or overlaps. Remove air bubbles, wrinkles, blisters, and other defects.
- E. After installation, clean visual display wall covering according to manufacturer's written instructions. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.

3.11 CLEANING AND PROTECTION

- A. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display surfaces after installation and cleaning.

3.12 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain motor-operated, sliding visual display units.

END OF SECTION 101100

FIRE STATION 54

PROJECT 10914

**SECTION 101400
SIGNAGE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Plaques.
 - 2. Dimensional characters.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
 - 2. Division 14 Section "Hydraulic Elevators" for code-required elevator signage.
 - 3. Division 22 Section "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
 - 4. Division 23 Section "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
 - 5. Division 26 Sections for electrical service and connections for illuminated signs.
 - 6. Division 26 Section "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
 - 7. Division 26 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.

SIGNAGE

101400-1

FIRE STATION 54

PROJECT 10914

- C. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Plaque: 6 inches square.
 - 2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
 - 3. Aluminum: For each form, finish, and color, on 6-inch-long sections of extrusions and squares of sheet at least 4 by 4 inches.
- D. Qualification Data: For fabricator.
- E. Maintenance Data: For signs to include in maintenance manuals.
- F. Warranty: Special warranty specified in this Section.
- G. Material content shall be in accordance with Florida Green Building Coalition standards for post-consumer renewable content.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines.
- D. Material content shall be in accordance with Florida Green Building Coalition standards for post-consumer renewable content.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

FIRE STATION 54

PROJECT 10914

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- C. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

2.2 PLAQUES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Advance Corporation; Braille-Tac Division.
 - 2. A. R. K. Ramos.
 - 3. Gemini Incorporated.
 - 4. Matthews International Corporation; Bronze Division.
 - 5. Metal Arts; Div. of L&H Mfg. Co.
 - 6. Mills Manufacturing Company.
 - 7. Nelson-Harkins Industries.
 - 8. Southwell Company (The).
- C. Etched Plaques: Provide metal sheet or plate for etching, as follows:
 - 1. Plaque Material: Aluminum.
 - 2. Custom Paint Colors: Match Pantone color matching system.

SIGNAGE

101400-3

FIRE STATION 54

PROJECT 10914

3. Color(s): As selected by Architect from manufacturer's full range.
4. Edge Style: Square, polished.
5. Mounting: Concealed studs for substrates encountered.
6. Thickness: 0.250 inch thick.

2.3 DIMENSIONAL CHARACTERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. A. R. K. Ramos.
4. ASI-Modulex, Inc.
5. Bunting Graphics, Inc.
6. Charleston Industries, Inc.
7. Gemini Incorporated.
8. Grimco, Inc.
9. Innerface Sign Systems, Inc.
10. Metal Arts; Div. of L&H Mfg. Co.
11. Mills Manufacturing Company.
12. Mohawk Sign Systems.
13. Nelson-Harkins Industries.
14. Signature Signs, Incorporated.
15. Southwell Company (The).

B. Aluminum Extrusions: Comply with the following requirements:

1. Finish: Painted.
2. Thickness: As indicated.
3. Custom Paint Colors: Match Pantone color matching system.
4. Color(s): As selected by Architect from manufacturer's full range.
5. Mounting: Concealed studs, noncorroding for substrates encountered.

2.4 PANEL SIGNS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

1. ACE Sign Systems, Inc.
2. Advance Corporation; Braille-Tac Division.
3. Allen Industries Architectural Signage
4. Allenite Signs; Allen Marking Products, Inc.
5. APCO Graphics, Inc.
6. ASI-Modulex, Inc.
7. Best Sign Systems Inc.
8. Bunting Graphics, Inc.
9. Fossil Industries, Inc.
10. Gemini Incorporated.

SIGNAGE

101400-4

FIRE STATION 54

PROJECT 10914

11. Grimco, Inc.
12. Innerface Sign Systems, Inc.
13. InPro Corporation
14. Matthews International Corporation; Bronze Division.
15. Mills Manufacturing Company.
16. Mohawk Sign Systems.
17. Nelson-Harkins Industries.
18. Seton Identification Products.
19. Signature Signs, Incorporated.
20. Supersine Company (The)

- B. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.

1. Panel Material: Opaque acrylic sheet.
2. Raised-Copy Thickness: Not less than 1/32 inch.

2.5 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.6 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 2. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.7 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before 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

SIGNAGE

101400-5

FIRE STATION 54

PROJECT 10914

components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish, complying with AAMA 611.
- B. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.

2.9 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

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 work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.

FIRE STATION 54

PROJECT 10914

- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 2. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
 3. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
- C. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
1. Flush Mounting: Mount characters with backs in contact with wall surface.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by City.

END OF SECTION 101400

SIGNAGE

101400-7

FIRE STATION 54

PROJECT 10914

**SECTION 101400.001
HIGHWAY SIGNAGE****PART 1 GENERAL****1.1 SECTION INCLUDES**

This section includes all materials, labor, equipment, tools and superintendence necessary to furnish and install signage complete in place.

1.2 REFERENCE

1. Florida Department OF Transportation, Standard Specifications for Road and Bridge Construction. Section 700 - Highway Signing
2. Florida Department OF Transportation, Roadway and Traffic Design Standards, Signing and Marking
3. Florida Department of Community Affairs - Florida Accessibility Code For Building Construction
4. City of Fort Lauderdale Construction Standards and Specifications – Latest Edition

PART 2 PRODUCTS**2.1 MATERIALS**

All signage shall conform to:

1. FDOT SECTION 700 - Highway Signing
2. Florida Department of Community Affairs - Florida Accessibility Code For Building Construction
3. City of Fort Lauderdale Construction Standards and Specifications – Latest Edition
4. Material content shall be in accordance with LEED v2.2 standards pre/post-consumer renewable content.

PART 3 EXECUTION**3.1 INSTALLATION**

Street and parking lot signage shall be constructed in accordance:

1. Florida Department OF Transportation, Standard Specifications for Road and Bridge Construction. Section 700 - Highway Signing
2. Florida Department OF Transportation, Roadway and Traffic Design Standards, Signing and Marking

HIGHWAY SIGNAGE

101400.001
EXHIBIT 1B
Page 388 of 600

FIRE STATION 54

PROJECT 10914

5. Florida Department of Community Affairs - Florida Accessibility Code For Building Construction
6. City of Fort Lauderdale Construction Standards and Specifications – Latest Edition

END OF SECTION 101400.001

HIGHWAY SIGNAGE

101400.001
EXHIBIT 1B
Page 389 of 600

FIRE STATION 54

PROJECT 10914

SECTION 102400
MECHANICAL EQUIPMENT SCREENING AND LOUVERS

PART 1 – GENERAL**1.1 SUMMARY**

A. Section Includes

1. Custom horizontal screening panels.
2. Fasteners.

B. Related Sections

1. Section 06100 - Rough Carpentry
2. Section 07620 - Sheet Metal Flashing and Trim
3. Section 07920 - Joint Sealants
4. Section 05100 - Structural Metal Framing

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A167: Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
2. ASTM A653: Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanized) by the Hot-Dip Process
3. ASTM B137: Test Method for Measurement of Coating Mass Per Unit Area of Anodically Coated Aluminum
4. ASTM B209: Specification for Aluminum and Aluminum-Alloy Sheet and Plate
5. ASTM D1922: Specification for Non-Asphalt, fiberglass-based underlayment used in Roofing and Waterproofing
6. ASTM D1970: Self-adhering rubberized sheet membrane

B. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA)

1. Architectural Sheet Metal Manual

1.3 SUBMITTALS

A. Submit the following in accordance with Section 013300:

1. Product Data: Manufacturer's product literature for the equipment screen specified.

FIRE STATION 54

PROJECT 10914

2. Shop Drawings: Indicate thickness and dimension of parts, flashing and anchoring methods, and detail and location of joints; including joints necessary to accommodate thermal movement.
3. Samples
 - a. 2 samples of each type of panel assembly, 12 inch by 12 inch minimum.
 - b. 6 samples of each finish in color or colors selected, 3 inch by 5 inch minimum.
4. Affidavit certifying that the material meets the requirements specified.
5. Sustainable Design Submittal and all documentation to comply with Florida Green Building Coalition requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum of 5 years experience in manufacturing metal panels similar to those specified.
- B. Installer Qualifications: Acceptable to panel manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the project site in manufacturer's original crating, properly labeled for identification and installation purposes. Store materials in accordance with panel manufacturer's recommendations. Handle materials carefully to avoid damage to panels and finishes.

1.6 WARRANTY

- A. The Contractor shall warrant the materials to be free of faults and defects in accordance with the General Conditions, except that the warranty shall be extended by paint manufacturer's standard multi-year warranty. The warranty shall be in writing and shall be signed by the manufacturer.
- B. Paint finishes shall have a minimum of 5 year warranty from installation.

PART 2 – PRODUCTS**2.1 MANUFACTURER**

- A. Custom fabricated Aluminum/Metal Products
- B. Other manufacturers seeking approval of their products must comply with requirements of the Instructions to Bidders and City of Fort Lauderdale Contract documents.
- C. Other manufacturers seeking approval of their products must comply with requirements of Section 013300 and 012500 during construction.

FIRE STATION 54

PROJECT 10914

2.2 PANEL SCREENING TYPE

- A. As indicated on the drawings and details.
- B. Contractor shall provide all materials and installation for this item.
- C. Contractor shall provide shop drawings for review and approval by the City of Fort Lauderdale Prior to ordering, fabrication, and installation.
- D. Contractor shall weld and sand smooth all connections and joints. Non-corrosive screws per fabrication requirements shall be used.
- E. Contractor shall install to meet all local, state (FBC 2010), Federal codes.

2.3 PANEL MATERIALS AND FABRICATION

- A. Aluminum Panels: ASTM B209, Aluminum Association specification sheet 3003-H14/3105-H14 for painted finish.
 - 1. Thickness: 1/8" inch. (Min.)
- B. Stainless Steel: ASTM A167
 - 1. Thickness: 26 gauge.
- C. Fabricate panels: based upon panel profile specified — see drawings and details.

2.4 ACCESSORIES

- A. Fasteners: Non-corrosive, self-tapping screws for securing to metal substrate.

2.5 FINISHES

- 1. Powder coated Color: Selected by Architect as indicated on drawings.
 - 2. Number of Coats: 3-coats
 - 3. Provide factory applied strippable plastic film for protection during fabrication and installation.
- 1. Film Thickness: Test Method ASTM B137; by weight.
 - a. Class I, 0.7 mils (minimum).

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which materials are to be installed and notify the Contractor and Construction Manager in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.

FIRE STATION 54

PROJECT 10914

- B. Surfaces to receive panels shall be even, smooth, sound, clean, dry, free of ice and snow, and free from defects.

3.2 PREPARATION

- A. Obtain field measurements prior to completion of manufacturing and finishing. When field measurements are not possible, provide method of installation which will allow minor adjustment in the field.

3.3 INSTALLATION

- A. Install fabricated system plumb, level and true, in accordance with manufacturer's instructions, final shop drawings, and SMACNA Architectural Sheet Metal manual and standard practices.
- B. Completed system shall be free from overbending, deforming, stretching, distortion, waves, and buckles.
- C. Contractor shall weld and sand smooth all connections and joints. Non-corrosive screws per fabrication requirements shall be used.
- D. Contractor shall install to meet all local, state (FBC 2010), Federal codes.

3.4 ADJUSTING AND CLEANING

- A. Repair panels with minor damage.
- B. Remove panels damaged beyond repair and replace with new panels to match adjacent undamaged panels.
- C. Clean exposed panel surfaces promptly after installation in accordance with recommendations of panel and coating manufacturers.
- D. Remove protective film immediately after installation.

END OF SECTION 102400

FIRE STATION 54

PROJECT 10914

**SECTION 102600
WALL AND DOOR PROTECTION**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Corner guards.
 2. Door protection systems.
- B. Related Sections:

1. Division 08 Section "Door Hardware" for metal armor, kick, mop, and push plates.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide handrails capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Uniform load of 50 lbf/ft. applied in any direction.
 2. Concentrated load of 200 lbf applied in any direction.
 3. Uniform and concentrated loads need not be assumed to act concurrently.

1.4 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.
- B. LEED Submittals:
1. Certificates for Pre and or post consumer material.
 2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 3. Product Data for Credit IEQ 4.4: For particleboard, documentation indicating that products contain no urea formaldehyde.
 4. Laboratory Test Reports for Credit IEQ 4: 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."

WALL AND DOOR PROTECTION

CAM 170530-1
EXHIBIT 1B
Page 394 of 600

FIRE STATION 54

PROJECT 10914

- C. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.
 - 1. Include similar Samples of accent strips and accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below. Include Samples of accent strips to verify color selected.
 - 1. Corner Guards: 12 inches long. Include examples of joinery, corners, and field splices.
 - 2. Door-Surface Protection: 6 by 6 inches square.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer testing agency.
- B. Material Certificates: For each impact-resistant plastic material, from manufacturer.
- C. Material Test Reports: For each impact-resistant plastic material.
- D. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 4-foot long units.
- B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

FIRE STATION 54

PROJECT 10914

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Division 01 Section "Quality Requirements."
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.
- E. 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.
- F. Preinstallation Conference: Conduct conference at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 - 2. Keep plastic sheet material out of direct sunlight.
 - 3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store corner-guard covers in a vertical position.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F for not less than 72 hours before beginning installation and for the remainder of the construction period.

FIRE STATION 54

PROJECT 10914

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of plastic and other materials beyond normal use.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Stainless-Steel Sheet: ASTM A 240/A 240M.
- B. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Adhesive: As recommended by and approved by LEED standards.
- 1.

2.2 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide WallGuard.com model# 2330- 2" (see drawings) comparable product by one of the following:
 - a. WallGuard.com
 - b. Arden Architectural Specialties, Inc.
 - c. Balco, Inc.
 - d. American Floor Products Co., Inc.
 - e. Construction Specialties, Inc.
 3. Material: Stainless steel, Type 304.
 - a. Thickness: Minimum 0.0590 inch.
 - b. Finish: Directional satin, No. 4.
 4. Wing Size: Nominal 2 by 2 inches.
 5. Corner Radius: 1/8 inch.
 6. Mounting: Adhesive.

WALL AND DOOR PROTECTION

CAM 170530-4
 EXHIBIT 1B
 Page 397 of 600

FIRE STATION 54

PROJECT 10914

2.3 DOOR PROTECTION SYSTEMS

- A. General: Comply with BHMA A156.6.
1. For fire-rated doors, provide door protection systems that are UL listed and labeled.
- B. Protection Plates: Fabricated from extruded rigid plastic, of thickness indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 2. Basis-of-Design Product: Subject to compliance with requirements, provide Hager Companies Model#194S or comparable product by one of the following:
 - a. Hager Companies
 - b. Rockwood
 - c. WallGuard.com.
 - d. American Floor Products Co., Inc.
 - e. Burns
- C. Armor Plates (see Hardware spec):
1. Size: **36 inches** high by door width, with allowance for frame stops.
 2. Color and Texture: Stainless steel
 3. Mounting: Countersunk screws through factory-drilled mounting holes.
- D. Kick Plates (see Hardware spec):
1. Size: **8 inches** high by door width, with allowance for frame stops.
 2. Color and Texture: Stainless steel
 3. Mounting: Countersunk screws through factory-drilled mounting holes.
- E. Mop Plates (see Hardware spec):
1. Size: **4 inches** high by **1 inch** less than door width.
 2. Color and Texture: Stainless steel
 3. Mounting: Countersunk screws through factory-drilled mounting holes.

2.4 FABRICATION

- A. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
- B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

FIRE STATION 54

PROJECT 10914

- D. Miter corners and ends of wood handrails for returns.

2.5 METAL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 3. Run grain of directional finishes with long dimension of each piece.
 - 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. General: Install impact-resistant 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 impact-resistant wall protection units in locations and at mounting heights indicated on Drawings or, if not indicated, at heights indicated below:

WALL AND DOOR PROTECTION

CAM 170530-6
EXHIBIT 1B
Page 399 of 600

FIRE STATION 54

PROJECT 10914

- a. Corner Guards: mount above wall base.
2. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
 - a. Provide anchoring devices to withstand imposed loads.
 - b. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches.
 - c. Adjust end and top caps as required to ensure tight seams.
- B. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

FIRE STATION 54

PROJECT 10914

**SECTION 102800
TOILET, BATH, AND LAUNDRY ACCESSORIES**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Public-use washroom accessories.
 2. Private-use bathroom accessories.
 3. Underlavatory guards.
 4. Custodial accessories.
- B. City-Furnished Material:
1. Contractor to coordinate with City and City's vendor for installation. Contractor to provide backing for all toilet, bath/shower, and laundry accessories.
 2. Toilet paper dispensers
 3. Hand towel dispensers
- C. Related Sections:
1. Division 09 Section "Tiling" for ceramic toilet and bath accessories.

1.3 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.
1. Approved full-size Samples will be returned and may be used in the Work.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

TOILET, BATH, AND LAUNDRY ACCESSORIES

CAM 102800 - 1
EXHIBIT 1B
Page 401 of 600

FIRE STATION 54

PROJECT 10914

1. Identify locations using room designations indicated.
 2. Identify products using designations indicated.
- D. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.
- E. Warranty: Sample of special warranty.

1.4 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.

1.5 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.
- C. Contractor to coordinate with City and City's vendor for installation. Contractor to provide backing for all toilet, bath/shower, and laundry accessories.

1.6 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: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.

FIRE STATION 54

PROJECT 10914

- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, 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 B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, 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. Manufacturers: Subject to compliance with requirements, 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. American Specialties, Inc.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. Bradley Corporation.
 - 4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- C. Toilet Tissue (Roll) Dispenser:
 - 1. City provided with City's vendor installing product. Contractor to coordinate with all parties for installation scheduling.
- D. Paper Towel (Roll) Dispenser:
 - 1. City provided with City's vendor installing product. Contractor to coordinate with all parties for installation scheduling.
- E. Liquid-Soap Dispenser:
 - 1. As indicated on Drawings.
- F. Grab Bars:
 - 1. As indicated on Drawings.
- G. Sanitary-Napkin Disposal Unit:
 - 1. As indicated on Drawings.

FIRE STATION 54

PROJECT 10914

- H. Stainless-Steel "Toiletry" Shelf:
 - 1. As indicated on Drawings.
- I. Mirror Unit:
 - 1. As indicated on Drawings.

2.3 PRIVATE-USE BATHROOM ACCESSORIES

- 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:
- B. Basis-of-Design Product: Bobrick Washroom Equipment, Inc. used for basis-of-design. Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bobrick Washroom Equipment, Inc.
 - 3. Bradley Corporation.
 - 4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- C. Toilet Tissue (Roll) Dispenser:
 - 1. City provided with City's vendor installing product. Contractor to coordinate with all parties for installation scheduling.
- D. Paper Towel (Roll) Dispenser:
 - 1. City provided with City's vendor installing product. Contractor to coordinate with all parties for installation scheduling.
- E. Liquid-Soap Dispenser:
 - 1. As indicated on Drawings.
- F. Grab Bars:
 - 1. As indicated on Drawings.
- G. Sanitary-Napkin Disposal Unit:
 - 1. As indicated on Drawings.
- H. Stainless-Steel "Toiletry" Shelf:
 - 1. As indicated on Drawings.
- I. Mirror Unit:
 - As indicated on Drawings.

FIRE STATION 54

PROJECT 10914

- J. Shower Curtain Rod:
 - 1. As indicated on Drawings.
- K. Shower Curtain:
 - 1. As indicated on Drawings.
- L. Folding Shower Seat:
 - 1. As indicated on Drawings.
 - 2. ADA acceptable manuf. companies with proof of documentation.
- M. Contractor to provide "nitch" recessed shelf in shower wall all exposed surfaces tiled as indicated on Drawings.

2.4 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, 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:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Plumberex Specialty Products, Inc.
 - 2. Truebro by IPS Corporation.
- C. Underlavatory Guard:
 - 1. Basis-of-Design Product: All acceptable ADA manuf. companies with proof of documentation.
 - 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.

2.5 CUSTODIAL ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, 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:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

FIRE STATION 54

PROJECT 10914

1. American Specialties, Inc.
2. Bobrick Washroom Equipment, Inc.
3. Bradley Corporation.
4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

C. Mop and Broom Holder:

1. City provided Contractor to coordinate with City as to location and provide required backing.

2.6 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to City's representative.

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 F 446.

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 102800

FIRE STATION 54

PROJECT 10914

**SECTION 104413
FIRE EXTINGUISHER CABINETS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Fire protection cabinets for the following:
 - a. Portable fire extinguishers.
- B. Related Sections:
1. Division 09 painting Sections for field painting fire protection cabinets.
 2. Division 10 Section "Signage" for directional signage to out-of-sight fire extinguishers and cabinets.
 3. Division 10 Section "Fire Extinguishers."
 4. Division 21 Section "Water-Based Fire-Suppression Systems" for hose systems, racks, and valves.
 5. Division 26 Sections for low-voltage wiring for fire protection cabinet alarms.

1.3 UNIT PRICES

- A. Work of this Section is covered in bid for this project.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for 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.
 2. Show location of knockouts for hose valves.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

FIRE EXTINGUISHER CABINETS

104413 - 1

FIRE STATION 54

PROJECT 10914

- 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. Use same designations indicated on Drawings.
- F. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- 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. Preinstallation 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.

1.6 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire hoses, hose valves, and hose racks indicated are accommodated.
- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

1.7 SEQUENCING

- A. Apply decals on field-painted, fire protection cabinets after painting is complete.

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209.
 - 2. Extruded Shapes: ASTM B 221.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).
- E. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.
- F. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.
- G. Wire Glass: ASTM C 1036, Type II, Class 1, Form 1, Quality q8, Mesh m1 (diamond), 6 mm thick.
- H. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 1.5 mm thick, with Finish 1 (smooth or polished).
- I. Acrylic Bubble: One piece.

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher. (Basis-of-design: Larsen's Manufacturing Company; 2400-R3,w/ MP5 extinguisher)
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Fire End & Croker Corporation;
 - b. J. L. Industries, Inc., a division of Activar Construction Products Group;
 - c. Larsen's Manufacturing Company;
 - d. Moon-American;
 - e. Potter Roemer LLC;
- B. Cabinet Construction: 1-hour fire rated
- C. Retain subparagraph below for fire-rated cabinets. Modern Metal constructs its cabinets to allow gypsum board to be added in the field. Revise below if required.

FIRE EXTINGUISHER CABINETS

104413 - 3

FIRE STATION 54

PROJECT 10914

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch-thick, cold-rolled steel sheet lined with minimum 5/8-inch-thick, fire-barrier material. Provide factory-drilled mounting holes.
- D. Cabinet Material: Aluminum sheet.
1. Shelf: Same metal and finish as cabinet.
- E. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- F. Cabinet Trim Material: Extruded-aluminum shapes.
- G. Door Material: Extruded-aluminum shapes.
- H. Door Style: Fully glazed panel with frame.
- I. Door Glazing: Tempered float glass (clear).
- 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 projecting door pull and friction latch.
 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- K. 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. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
 3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
 4. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
- L. Finishes:
1. Aluminum: Clear satin anodized

FIRE STATION 54

PROJECT 10914

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.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 - 2. Fabricate door frames of one-piece construction with edges flanged.
 - 3. Miter and weld perimeter door frames.
- 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 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31, Class II, 0.010 mm] or thicker.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine roughing-in for hose valves racks and cabinets to verify actual locations of piping connections before cabinet installation.

FIRE EXTINGUISHER CABINETS

104413 - 5

FIRE STATION 54

PROJECT 10914

- B. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:] [or, if not indicated, at heights acceptable to authorities having jurisdiction.]
 - 1. Fire Protection Cabinets: 54 inches above finished floor to top of cabinet.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
 - 2. Provide inside latch and lock for break-glass panels.
 - 3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
 - 4. Fire-Rated, Hose and Valve Cabinets:
 - a. Install cabinet with not more than 1/16-inch tolerance between pipe OD and knockout OD. Center pipe within knockout.
 - b. Seal through penetrations with firestopping sealant as specified in Division 07 Section "Penetration Firestopping."
- C. Identification: Apply decals at locations indicated.

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.

FIRE STATION 54

PROJECT 10914

- 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 104413

FIRE EXTINGUISHER CABINETS

104413 - 7

FIRE STATION 54

PROJECT 10914

**SECTION 105000
METAL LOCKERS****PART 1 - GENERAL****1.1 WORK INCLUDED**

- A. This Section includes heavy-duty, all-welded, ventilated metal lockers and related equipment as indicated on drawings. Contractor to provide and install metal lockers.
- B. BUNK GEAR type lockers in this section include single-tier, athletic-type lockers. Each tier shall measure 18" wide x 21" deep x 72" high. Fully ventilated front and sides. Lockers shall be on 4" housekeeping pad/stand. (Bunk gear)
- C. SLEEPING BUNKROOM types of lockers in this section include single-tier, athletic-type lockers with 9" shelf. Each tier shall measure 24" wide x 24" deep x 72" high on a 4" metal housekeeping stand (pad). There shall be 4 total lockers per bunkroom. Slope tops of lockers. Doors to have horizontal slot vents (Sleeping bunkroom)
- D. Locker bench (as shown in drawing)

1.2 SUBMITTALS

- A. Submit the following in accordance with Section 013300.
- B. Product data and installation instructions for metal locker units.
- C. Color Samples on squares of same metal to be used for fabrication of lockers.
- D. Shop Drawings that show metal lockers in dimensioned relation to adjacent surfaces. Show lockers in detail, method of installation, fillers, trim, base, and accessories. Include locker numbering sequence information.

1.3 QUALITY ASSURANCE

- A. Uniformity: Provide metal lockers that are standard products of single manufacturer, with interchangeable like parts. Include necessary mounting accessories, fittings, and fastenings.

1.4 JOB CONDITIONS

- A. Do not deliver metal lockers until building is enclosed and ready for locker installation. Protect from damage during delivery, handling, storage, and installation.

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
1. Penco Products, Inc. a) "Vanguard" – (Sleeping) bunkrooms & Shower areas b) 1 "Invincible II"– bunk gear room
 2. Republic Storage Systems
 3. Lyon
 4. or equal

2.2 MATERIALS

- A. Sheet Steel: Mild cold-rolled and leveled furniture steel, free from buckle, scale, and surface imperfections.
- B. Expanded Metal: 3/4-inch mesh flattened carbon steel.
- C. Fasteners: Cadmium, zinc, or nickel-plated steel; exposed bolt heads, slot-less type; self-locking nuts or lock washers for nuts on moving parts.
- D. Equipment: Hooks and hang rods of cadmium-plated or zinc-plated steel.

2.3 FABRICATION, GENERAL

- A. Construction: Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch. Weld frame members together to form rigid, one-piece structure. Weld, bolt, or rivet other joints and connections. Grind exposed welds flush. Do not expose bolts or rivet heads on fronts of locker doors or frames.
- B. Frames: Fabricate of 16-gage channels or 16-gage angles, minimum, with continuous stop/strike formed on vertical members.
- C. Finishing: Chemically pre-treat metal with degreasing and phosphatizing process. Apply baked-on enamel finish to all surfaces, exposed and concealed, except plates and nonferrous metal.
- D. Color: Provide locker units in color selected by Architect from manufacturer's standards. Concealed parts may be manufacturer's standard neutral color.

2.4 ATHLETIC LOCKERS

- A. Body: Fabricate back and sides of minimum 16-gage steel, with double-flanged connections extending full height. Form top and bottom of not less than 16-gage steel, with flanged edges. Form exposed ends of non-recessed lockers of minimum 16-gage steel.

METAL LOCKERS

CAM 17-0531-2
EXHIBIT 1B
Page 415 of 600

FIRE STATION 54

PROJECT 10914

- B. Door: One-piece, minimum 16-gage sheet steel, flanged at all edges, constructed to prevent springing when opening or closing. Fabricate to swing 180 degrees.
1. Ventilation: Provide diamond-shaped perforations $\frac{3}{4}$ -inches wide by $1\frac{1}{2}$ inches high to provide free air flow while leaving sufficient metal for rigidity and strength. (Fully ventilated in bunk gear room) (Solid in all others)
 2. Hinges: Steel, full-loop, 2-inch high, 5-knuckle, tight pin style securely welded to frame and double riveted to the inside of the door flange. Weld to inside of frame and secure to door with not fewer than 2 factory-installed rivets that are completely concealed and tamperproof when door is closed. Provide at least 3 hinges for each door 42 inches high or more.
 3. Color of lockers shall be the same to match both outside and inside.
- E. Projecting Handle and Latch: Latching shall be a one-piece, pre-lubricated spring steel latch, completely contained within the lock bar under tension to provide rattle-free operation. The lock bar shall be of pre-coated, double-channel steel construction securely contained in the door channel by self-lubricating polyethylene guides that isolate the lock bar from metal-to-metal contact with the door. Provide three-point latching turn handles for all lockers over 42-inches in height.

2.5 LOCKER ACCESSORIES

- A. Locking: Fabricate lockers to receive the following locking devices:
1. Lock: all lockers to have vertical sliding latch that can accommodate pad locks.
- B. Equipment: Furnish each locker with the following items, unless otherwise shown:
1. One (1) hat/book shelf
 2. One double-prong back hook
 3. Two (2) single prong side wall hooks
- C. All hooks shall be made of steel, formed with ball points, zinc-plated and attached with two (2) bolts or rivets.
- D. Number Plates: Manufacturer's standard etched, embossed, or stamped, nonferrous metal number plates with numerals not less than $\frac{1}{2}$ -inch high. Number lockers in sequence as directed by Architect. Attach plates to each locker door, near top, centered, with at least two (2) rivets of same finish as number plate.
- E. Separators: Provide horizontal dividers of not less than 16-gage sheet steel between doors of multiple-tier lockers to ensure rigidity.
- F. Filler Panels: Provide filler panels where indicated, of not less than 18-gage steel sheet, factory fabricated and finished to match locker units.
- G. Continuously Sloping Tops: Manufacturer's standard continuously sloped top, not less than 0.0359-inch steel sheet. Provide closures at ends and sloped corner fillers.

FIRE STATION 54

PROJECT 10914

H. Color: As selected by Architect from manufacturer's standard color palette.

2.6 LOCKER BENCHES

- A. Provide bench units with overall assembly height of 17-1/2 inches.
- B. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.
 - 1. Size: Minimum 16 inches wide by 1-1/4 inches thick
 - 2. Laminated clear hardwood with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.
- C. Fixed Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:
 - 1. Tubular Steel: 1-1/4-inch-diameter steel tubing, with 0.1265-inch-thick steel flanges welded at top and base; with baked-enamel finish; anchored with exposed fasteners.
 - 2. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install metal lockers at locations shown in accordance with manufacturer's instructions for plumb, level, rigid, and flush installation.
- B. Space fastenings about 48-inches on center unless otherwise recommended by manufacturer, and apply through backup reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.
- C. Install trim, metal base, and metal filler panels and end panels, using concealed fasteners. Provide flush, hairline joints against adjacent surfaces.

3.2 ADJUST AND CLEAN

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices are operating properly.
- B. Touch up marred finishes, but replace units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10500

FIRE STATION 54

PROJECT 10914

**SECTION 107500
FLAGPOLES****PART 1 - GENERAL****1.1 WORK INCLUDED**

- A. Aluminum flagpoles, 25 feet high (exposed), as indicated on the Drawings.
- B. Concrete work is specified in Division 3, Concrete Work.

1.2 QUALITY ASSURANCE

- A. Manufacturing Standards: Provide flagpole as a complete unit produced by a single manufacturer, including fittings, accessories, bases and anchorage devices.
- B. Design Criteria: Provide flagpoles and installations constructed to withstand a 150 mph wind velocity minimum when flying flag of appropriate size. Use heavy pipe sizes required for flagpole type and height indicated.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data and installation instructions for flagpole required.
- B. Shop Drawings: Submit shop drawings of flagpole and base showing general layout, jointing and complete anchoring and supporting systems.
- C. Samples: Submit sample of metal finish and required accessories.
- D. Contractor shall provide all engineering and calculation.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Ship flagpoles to site in one piece.
- B. Spiral wrap flagpoles with heavy Kraft paper or other protective wrapping and prepare for shipment in hard fiber tube or other protective container.
- C. Deliver flagpoles and accessories completely identified for installation procedure.
- D. Handle and store flagpoles to prevent damage or soiling.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

FLAGPOLES

CAM 17-0531-1
EXHIBIT 1B
Page 418 of 600

FIRE STATION 54

PROJECT 10914

1. American Flagpole, Div. of Kearney-National
2. Concord Industries, Inc.
3. Thomas & Betts

2.2 FLAGPOLE TYPE

- A. Aluminum Flagpoles: Fabricate from seamless extruded tubing complying with ASTM B 241, alloy 6063-T6, having a minimum wall thickness of 3/16" (0.1875"), and tensile strength not less than 30,000 psi and a yield point of 25,000 psi. Heat-treat and age-harden after fabrication.
1. Provide cone tapered aluminum flagpole, having outside diameter of 7 inch minimum at the base and 3-1/2 inch minimum at the top. (Shall meet 150 mph)
 2. Contractor shall provide internal conduit for wiring light fixture(s) and light fixture(s) to be mounted on exterior of pole. Contractor to coordinate electrical with subs and manufacturer - provide shop drawings for approval.

2.3 FLAGPOLE MOUNTING

- A. Provide manufacturer's standard base system for the type of flagpole installation required.
1. Design and construct to withstand hurricane winds (150 M.P.H) in accordance with the latest edition of ASCE-7.
- B. Foundation Tube: For ground-set flagpoles, provide 16-gage minimum galvanized corrugated steel tube or 12-gage rolled steel tube, sized to suit flagpole and installation. Furnish complete with welded steel bottom base and support plate, lightning ground spike, and steel centering wedges, all welded construction.
1. Provide loose hardwood wedges at top for plumbing pole after erection
 2. Galvanize steel parts after assembly, including foundation tube
 3. Provide manufacturer's standard flash collar, finished to match flagpole.

2.4 SHAFT FINISH

- A. Aluminum: Fine, directional, mechanical satin polish, (NAAMM-M32), finished as follows:
1. Color anodized finish to match Architect/Engineer's sample, complying with NAAMM-C22A42, Class I (0.7 mil).

2.5 FITTINGS

- A. Finial Ball: Manufacturer's standard flush seam ball, 8-inch diameter, 14 gage aluminum, gold anodized finish. Mount on 5/8 inch rod attached to truck.
- B. Truck: Ball-bearing non-fouling, cast aluminum body, fitted with two, 2-inch diameter aluminum sheaves finished to match pole shaft.

FIRE STATION 54

PROJECT 10914

- C. Cleats: One 9-inch cast aluminum cleats with fasteners, finished to match pole shaft. Provide secured box with padlock latch.
- D. Halyards: Provide 1 continuous halyards flagpole,
 - 1. White, braided polypropylene, with two (2) bronze flag snaps
 - 2. Size: 5/16" diameter

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Excavation: Excavate for foundation concrete to neat clean lines in undisturbed soil. Provide forms where required due to unstable soil conditions. Remove wood, loose soil, rubbish and other foreign matter from excavation, and moisten earth before placing concrete.
- B. Concrete: Provide concrete composed of Portland cement, coarse and fine aggregate and water, mixed in proportions to attain 28-day compressive strength of not less than 3000 psi, complying with ASTM C94.
 - 1. Place concrete immediately after mixing. Perform chuting to avoid segregation of mix. Compact concrete in place by use of vibrators. Moist-cure exposed concrete for not less than 7 days, or use a non-staining curing compound in cold weather.
 - 2. Finish trowel exposed concrete surfaces to smooth, dense surface. Provide positive slope for water runoff to base perimeter.
- C. Flagpole Installation: Install flagpoles as shown and in compliance with final shop drawings and manufacturer's instructions.
 - 1. Provide positive lightning ground for each flagpole installation.
 - 2. Paint portions of ground-set flagpole below grade with a heavy coat of bituminous paint.

END OF SECTION 107500

FIRE STATION 54

PROJECT 10914

**SECTION 111200
PARKING CONTROL EQUIPMENT**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:

1. Automatic barrier gates.
2. Vehicle detectors.
3. Traffic controllers.
4. Entry terminal ticket dispensers.
5. Exit terminals.
6. Parking facility management software.
7. Access control units.

- B. Related Sections:

1. Division 05 Section "Metal Fabrications" for pipe bollards to protect parking control equipment.
2. Division 08 Sections for parking garage entrance doors and grilles interlocked to parking control equipment.
3. Division 10 Section "Signage or Post and Panel/Pylon Signage" for exterior parking-related signs.
4. Division 28 Section "Intrusion Detection" for integrating parking control equipment with building intrusion detection system.
5. Division 28 Section "Perimeter Security Systems" for integrating parking control equipment with site security control system.
6. Division 32 Section "Asphalt Paving" for asphalt driveway and approach paving.
7. Division 32 Section "Concrete Paving" for concrete driveway and approach paving.

1.3 SYSTEM DESCRIPTION

- A. Parking Control System: Intended to be used for the following types of parking management:
1. Occupant Parking: Unlimited access, with access gained by access control card.

1.4 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 parking

PARKING CONTROL EQUIPMENT

CAM 17-0530-1
EXHIBIT 1B
Page 421 of 600

FIRE STATION 54

PROJECT 10914

control equipment. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

- B. Shop Drawings: For parking control equipment. 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. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For parking control equipment to include in emergency, operation, and maintenance manuals.
- B. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.7 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. Gate Arms: Two breakaway gate arms for each gate installed, complete with accessory components.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain parking control equipment from single source from single manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

FIRE STATION 54

PROJECT 10914

- D. Preinstallation Conference: Conduct conference at Project site – 3211 NE 32nd Street.
1. Inspect and discuss electrical roughing-in, equipment bases, and other preparatory work specified elsewhere.
 2. Verify that equipment operation is consistent with system description.
 3. Review sequence of operation for each type of parking control equipment.
 4. Review coordination of interlocked equipment specified in this Section and elsewhere.
 5. Review required testing, inspecting, and certifying procedures.

1.9 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
1. Provide 30 days' notice to City to allow scheduling and access to system and to allow CITY to upgrade computer equipment if necessary.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
1. Sheet: ASTM B 209.
 2. Extruded Shapes: ASTM B 221.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, commercial quality, with G60 coating designation; mill phosphatized.
- D. Stainless-Steel Sheet: ASTM A 666, Type 304.
- E. Anchorages: Anchor bolts, hot-dip galvanized according to ASTM A 153/A 153M and ASTM F 2329.

2.2 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

FIRE STATION 54

PROJECT 10914

1. Color and Gloss: As indicated by manufacturer's designations, Match Architect's sample, As selected by Architect from manufacturer's full range.

2.3 STEEL FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with the following:
 1. ASTM A 123/A 123M for iron and steel parking control equipment.
 2. ASTM A 153/A 153M and ASTM F 2329 for iron and steel hardware for parking control equipment.
- B. Galvanized-Steel and Steel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.4 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 1. Run grain of directional finishes with long dimension of each piece.
 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including equipment bases; accurate placement, pattern, and orientation of anchor bolts; critical dimensions; and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical systems to verify actual locations of connections before parking control equipment installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Excavation for Traffic Controllers: Saw cut existing pavement for recessed traffic controllers and hand-excavate recesses to dimensions and depths and at locations as required by traffic controller manufacturer's written instructions and as indicated on Drawings.

FIRE STATION 54

PROJECT 10914

3.3 INSTALLATION

- A. General: Install parking control equipment as required for a complete and integrated installation.
 - 1. Rough-in electrical connections according to requirements specified in Division 26 Sections.
- B. Automatic Barrier Gates: Anchor cabinets to concrete bases with anchor bolts or expansion anchors and mount barrier gate arms.
 - 1. Install barrier gates according to UL 325.
- C. Vehicle Loop Detectors: Bury and seal wire loop at locations indicated on Drawings according to manufacturer's written instructions. Connect to parking control equipment operated by detector.
- D. Traffic Controllers: Anchor controllers to recessed concrete bases, driveway surfaces with anchor bolts or expansion anchors.
- E. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- F. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. 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.
- D. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Parking control equipment will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

FIRE STATION 54

PROJECT 10914

3.5 ADJUSTING

- A. Adjust parking control equipment to function smoothly and lubricate as recommended by manufacturer.
- B. Confirm that locks engage accurately and securely without forcing or binding.
- C. After completing installation of exposed, factory-finished parking control equipment, inspect exposed finishes and repair damaged finishes.

3.6 PROTECTION

- A. Remove barrier gate arms during the construction period to prevent damage, and install them immediately before Substantial Completion.

3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City's maintenance personnel to adjust, operate, and maintain parking control equipment.

END OF SECTION 111200

FIRE STATION 54

PROJECT 10914

**SECTION 114000
FOOD SERVICE 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. This Section includes equipment for foodservice facilities indicated on the Drawings.
- B. City-Furnished Equipment: Where indicated, City will furnish equipment items. Contractor to install items. Contractor to provide all cords and electrical/mechanical tie-ins for appliances including vent kits for dryer(s).
- C. Related Sections include the following:
1. Division 03 Section "Cast-in-Place Concrete" for the following:
 - a. Equipment bases.
 - b. Requirements for slab depressions.
 - c. Requirements for reinforcement.
 2. Division 05 Section "Metal Fabrications" for equipment supports.
 3. Division 06 Section "Interior Architectural Woodwork" for custom casework and countertops.
 4. Division 07 Section "Roof Accessories" for roof curbs and equipment supports.
 5. Division 09 Section "Tiling" for floor finishes in walk-in refrigeration units.
 6. Division 22 and 23 Sections for supply and exhaust fans; exhaust ductwork; service roughing-ins; drain traps; atmospheric vents; valves, pipes, and fittings; fire-extinguishing systems; and other materials required to complete foodservice equipment installation.
 7. Division 23 Section "Air Curtains" for air curtains protecting foodservice facility entranceways.
 8. Division 23 Section "Commercial Kitchen Hoods" for ventilation hoods.
 9. Division 26 and 28 Sections for connections to fire alarm systems, wiring, disconnect switches, and other electrical materials required to complete foodservice equipment installation.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
1. Manufacturer's model number.
 2. Options, accessories, and components that will be included for Project.
 3. Clearance requirements for access and maintenance.
 4. Utility service connections for water, drainage, power, and fuel; include roughing-in dimensions.
- B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

FIRE STATION 54

PROJECT 10914

- C. Coordination Drawings: For foodservice facilities.
 1. Indicate locations of foodservice equipment and connections to utilities.
 2. Key equipment using same designations as indicated on Drawings.
 3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of support for equipment; and utility service characteristics.
 4. Include details of seismic bracing for equipment.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each factory-applied color finish required, in manufacturer's standard sizes.
- F. Operation and Maintenance Data: For foodservice equipment to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 1. Product Schedule: For each foodservice equipment item, include the following:
 - a. Designation indicated on Drawings.
 - b. Manufacturer's name and model number.
 - c. List of factory-authorized service agencies including their addresses and telephone numbers.
- G. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF/ANSI standards.
- B. BISSC Standards: Provide bakery equipment that complies with BISSC's "Sanitation Standards for the Design and Construction of Bakery Equipment and Machinery."
 1. Provide BISSC-certified equipment.
- C. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards and that are UL certified for compliance and labeled for intended use.
- D. Steam Equipment: Provide steam-generating and direct-steam heating equipment that is fabricated and labeled to comply with ASME Boiler and Pressure Vessel Code.
- E. Regulatory Requirements: Install equipment to comply with the following:
 1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
 2. NFPA 54, "National Fuel Gas Code."
 3. NFPA 70, "National Electrical Code."
 4. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."
- F. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

FIRE STATION 54

PROJECT 10914

1.5 PROJECT CONDITIONS

- A. Field Measurements: Indicate measurements on Coordination Drawings.

1.6 COORDINATION

- A. Coordinate foodservice equipment layout and installation with other work, including lighting fixtures, HVAC equipment, and fire-suppression system components.
- B. Coordinate location and requirements of utility service connections.
- C. Coordinate size, location, and requirements of the following:
 1. Overhead equipment supports.
 2. Equipment bases.
 3. Floor depressions.
 4. Insulated floors.
 5. Floor areas with positive slopes to drains.
 6. Floor sinks and drains serving foodservice equipment.
 7. Roof curbs, equipment supports, and penetrations.
 8. Exhaust hoods and equipment

1.7 WARRANTY

- A. Refrigeration Compressor Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.
 1. Failure includes, but is not limited to, inability to maintain set temperature.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Products: Subject to compliance with requirements, provide one of the products specified.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 5. Basis-of-Design Product: The design for foodservice equipment item is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 FABRICATED EQUIPMENT

- A. Materials:

FOOD SERVICE EQUIPMENT

FIRE STATION 54

PROJECT 10914

1. Stainless Steel: ASTM A 666, with No. 4 finish (directional satin finish) on exposed surfaces.
 2. Galvanized Steel: ASTM A 653/A 653M, **G90** coating designation; commercial-quality, cold-rolled steel that is zinc coated by the hot-dip process and chemically treated.
- B. Stainless-Steel Sink: Located in the kitchen area as shown in the drawings.
1. Basis-of-Design Product: Double sink as per plan or a comparable product by one of the following:
 - a. Two- compartment sink to be no deeper than 6" to accommodate disposal unit underneath. Faucet shall be gooseneck. (See plumbing drawings).
 2. Products:
 3.
 - a. Elkay
 - b. Kohler
 - c. Moen
 4. Description: Two-compartment sink.
 5. Construction: Welded stainless steel, sound deadened.
 - a. Bowls: Stainless steel, Type 304, **0.0781-inch** specified thickness.
 - b. Integral Drainboards: Stainless steel, Type 304, **0.0781-inch** specified thickness.
 - c. Body: Stainless steel, Type 304, **0.0781-inch** specified thickness.
 6. Splash:
 - a. Back: As per drawing, plumbing spec, and manufacturer's standard.
 - b. Side: As per drawing, plumbing spec, and manufacturer's standard.
 7. Legs and Feet: Stainless-steel tubing legs with adjustable bullet feet.
 8. Options and Accessories:
 - a. Faucets and Spouts: Goose neck spouts and sprayer as called for in plumbing specifications
 - b. Prerinse Faucet:
 - c. Vacuum breaker.
 - d. Leverwaste with overflow.
 - e. Basket strainer.
 - f. Continuous waste.
 - g. Scrap trough.
 - h. Control bracket for food waste disposer controls.
 - i. Scrap block and hole.
 - j. Stainless-steel pot rack.
 9. Fabrication: Prepare sink for installation of the following equipment items:
 - a. Heater.
 - b. Food Waste Disposer: Weld disposer cone or collar into sink.
 - c. Undercounter dishwasher.
 - d.
- C. Stainless-Steel Hand Sink: per drawing
1. Basis-of-Design Product: Stainless-Steel hand sink or a comparable product by one of the following:
 2. Products:
 - a. Elkay
 - b. Kohler
 - c. Moen
 3. Description: hand sink.
 4. Material: Stainless steel, Type 304, **0.0500-inch** specified thickness.

FIRE STATION 54

PROJECT 10914

5. Operation: ADA approved Handle
6. Faucet and Spout: gooseneck spout
7. Options and Accessories:
 - a. Chrome-plated tail piece and P trap, **NPS 1-1/2**, with **0.045-inch** minimum wall thickness.
 - b. Strainer basket with metal post.
 - c. Liquid soap dispenser, splash mounted.
 - d. Liquid soap and towel dispenser.
 - e. Towel dispenser.
 - f. Tubular wall supports.
 - g. Skirt assembly for support.
 - h. Side splashes.

2.3 FOOD WASTE MACHINES

- A. Food Waste Disposal Unit: Under sink model – City provided Contractor to install and coordinate.
 1. Basis-of-Design Product: Under sink heavy duty disposal unit or a comparable product by one of the following:
 - a. GE continuous feed disposal, GFC-1020V
 2. Description: 1 hp, Heavy Duty use, and the following:
 - a. Stainless-steel and or Corrosion-resistant housing.
 - b. Continuous type feed system
 - c. Anti jam automatic reversing action
 - d. Dishwasher connection option.
 - e. Stainless-steel sink collar/connector.
 - f. Control Panel:
 - 1) Auto reversing
 - 2) Stainless-steel mounting bracket.
 3. Electrical Service: Equip unit for connection to service indicated on Drawings 120v, 60 Hz, 7.0 A.
 4. Contractor provide cord and all electrical/mechanical/plumbing tie-ins.

2.4 COOKING EQUIPMENT

- A. Range/Oven: as show on drawing and specified in this section. – City provided Contractor to install and coordinate provide startup.
 1. Basis-of-Design Product: 60" wide, six (6) open burners, 24" broiler/griddle with two (2) 26" ovens with spark ignition system or a comparable product by one of the following:
 - a. U.S. Range, Performer S Series 60" Broiler/Griddle Range, Model No. GFE60-6R24RR
 2. Available Products by:
 3.
 - a. U.S. Range
 4. Top Configuration:
 - a. Open-Burner Unit:
 - 1) Standard Burners: Six at 28,000 BTUs (min. each)
 - b. Griddle: Flat 14,000 BTUs
 - c. Radiant Broiler: 14,000 BTUs
 5. Base Configuration:
 - a. Standard Ovens: Two
 - b. Storage Base: under ovens (2)

FOOD SERVICE EQUIPMENT

FIRE STATION 54

PROJECT 10914

6. Options and Accessories:
 - a. High back shelf.
 - b. Stainless-steel sides.
 - c. Stainless-steel back.
 - d. Legs for curb base.
 - e. Toe Base: 4 inches high.
 - f. Casters:
 - g. Oven Racks: two for each oven.
 - h. Stainless-steel legs
 - i. Spark ignition system
 - j. Contractor to provide stainless steel backsplash behind range full height and width.
 7. Electrical Service: Equip unit for connection to service indicated on Drawings. This will include spark ignition system and hood. Contractor to install and complete the system.
 8. Gas Service: Natural gas.
- B. Microwave Oven: as per drawings – City provided Contractor to install and coordinate.
1. Basis-of-Design Product: GE Profile Model #PEB2060SMSS heavy duty/use microwave with rotating cooking tray.
 2. Products:
 - a. GE Profile Model # PEB2060SMSS
 3. Description: 1200-W cooking power.
 4. Electrical Service: Equip unit with plug and cord for 120-V service.
- C. Coffee Urn: – City provided Contractor to install and coordinate.
1. Basis-of-Design Product: Min 40 cup capacity coffee maker or a comparable product by one of the following:
 2. Products:
 - a. Cuisinart
 - b. Faberware
 - c. Hamilton Beach
 3. Description: Single urn.
 - a. Capacity: min 40 cups
 - b. Type: Electric heated.
 - c. Agitator: Automatic or Push button.
 - d. Spray Arm: With or Without bypass.
 - e. Timer: Digital
 4. Options and Accessories:
 - a. Fill/Dispense:
 - b. Multiple Faucet:
 - c. Filtering: Permanent, stainless-steel, woven-wire cloth
 - d. Finish: Stainless-Steel
 5. Electrical Service: Equip unit for connection to service indicated on Drawings.

2.5 SELF-CONTAINED REFRIGERATION EQUIPMENT

- A. [Refrigerator] [Freezer]: Stand-up model with French door top area used for refrigeration and bottom freezer drawer. – City provided Contractor to install and coordinate.
1. Basis-of-Design Product: GE Profile Energy Star 28.6 Cu. Ft. Stainless-Steel French Door Bottom-Freezer Drawer Refrigerator Model # PFE29PSDSS or a comparable product by one of the following:

FIRE STATION 54

PROJECT 10914

2. Products:
 - a.
 - b. GE Profile
 3. Description: Reach-in type.
 - a. Exterior Finish: Stainless steel.
 - b. Interior Finish: Manufacturer's standard.
 - c. Doors: Half length as per make
 4. Options and Accessories:
 - a. Casters.
 - b. Stainless-steel handle
 - c. Glass Shelves: 4 min.
 - d. Digital Temperature controls
 - e. Ice maker and water dispenser- Contractor to make all water and power connections.
 5. Electrical Service: Equip unit with plug and cord for 120v, 60hZ, 15 A
- B. Ice-Making Machine: as located on the drawings – City provided Contractor to install and coordinate.
1. Basis-of-Design Product: Manitowoc Ice Maker:
 - a. Manitowoc S-Series 450 Ice Cube Machine placed on top of Ice Bin
 2. Description: Freestanding unit.
 - a. Production: Ice cubes
 - b. Capacity: 450 **lb.** per 24-hour period.
 3. Options and Accessories: – City provided Contractor to install and coordinate.
 - a. Storage Bin: Manitowoc B-400 Bin to have the S-450 unit placed on top
 - 1) Storage Capacity: 290 **lb.**
 - b. Stainless-steel stand and legs.
 - c. Water filter.
 - d. AuCS- SI 161– Auto Cleaning System to be factory installed.
 - e. (2) 32oz white scoops
 - f. Artic Pure Water filter System
 4. Electrical Service: Equip unit for connection to supplied outlet as per drawings; 115/60/1 standard, (208-230/60/1 also available), min. circuit ampacity: Air-cooled: 13.6 amps, Water-cooled: 12.9 amps, Max fuse size: Air-cooled, Water-cooled, Remote: 20 amps. HACR-type circuit breaker can be used in place of fuses.

2.6 WARE WASHING EQUIPMENT

- A. Ware washing Machine: Under counter dishwashing machine – City provided Contractor to install and coordinate.
1. Basis-of-Design Product: GE Profile Stainless Interior built-in Dishwasher with hidden controls Model No. PDWT480RSS or a comparable product by one of the following:
 2. Available Products:
 - a. GE Profile
 3. Description: Dishwasher. – City provided Contractor to install and coordinate.
 - a. GE Profile Stainless Interior built-in Dishwasher with hidden controls Model No. PDWT480RSS
 4. Options and Accessories:
 - a. Stainless-steel finish
 - b. Auto temperature/sensing
 - c. Built-in food disposer

FIRE STATION 54

PROJECT 10914

- d. 6 wash levels
- 5. Electrical Service: Equip unit for connection to service indicated on Drawings

2.7 MISCELLANEOUS MATERIALS

- A. Installation Accessories, General: NSF certified for end-use application indicated.
- B. Elastomeric Joint Sealant: ASTM C 920; Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.
 - 1. Public Health and Safety Requirements:
 - a. Sealant is certified for compliance with NSF standards for end-use application indicated.
 - b. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.
 - 2. Cylindrical Sealant Backing: ASTM C 1330, Type C, closed-cell polyethylene, in diameter larger than joint width.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.
 - 1. Connect equipment to utilities.
 - 2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.
- B. Complete equipment assembly where field assembly is required.
 - 1. Provide closed butt and contact joints that do not require a filler.
 - 2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish.
- C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and requirements of authorities having jurisdiction.
- D. Install cabinets and similar equipment on concrete bases in a bed of sealant.
- E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.
- F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

- A. After completing installation of equipment, repair damaged finishes.
- B. Clean and adjust equipment as required to produce ready-for-use condition.
- C. Protect equipment from damage during remainder of the construction period.

FIRE STATION 54

PROJECT 10914

3.3 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City's maintenance personnel to adjust, operate, and maintain foodservice equipment. Refer to Division 01 Section "Demonstration and Training." Contractor will coordinate and schedule with the City.

END OF SECTION 114000

FIRE STATION 54

PROJECT 10914

**FOOD SERVICE CABINETRY
SECTION 114100****PART 1 GENERAL****1.1 WORK INCLUDED**

- A. Stainless steel cabinets.
- B. Cabinet hardware and accessory items.
- C. Stainless steel countertops and sinks.

1.2 QUALITY ASSURANCE

- A. Manufacturer/Fabricator Qualifications: Firm with minimum five years experience in successfully producing stainless steel cabinetry similar to that indicated for this Project, with sufficient production capacity to produce required units without causing delay in the Work.
- B. Installer Qualifications: Installation of stainless steel cabinetry shall be performed by a firm that can demonstrate three years successful experience in installing stainless steel cabinetry similar to that required for this project.

1.3 SUBMITTALS

- A. Submit the following in accordance with Section 01340.
- B. Shop Drawings: Shall be of sufficient scale and detail to determine compliance with these specifications, including the following:
 - 1. Elevations and plan views of the required work, fully dimensioned: 1/4" = 1'-0".
 - 2. Size and type of framing materials, Sections: 3" = 1'-0".
 - 3. All cabinet hardware & miscellaneous items required to complete this work.
 - 4. Type & quality of finishes.
 - 5. Show all details, specifications and finishes proposed for this work.

1.4 DELIVERY, HANDLING, STORAGE

- A. Protect cabinetry during transit, delivery, storage, and handling to prevent damage and deterioration.
- B. Do not deliver cabinet work until painting, wet work, grinding, and similar operations have been completed in installation areas.

1.5 GUARANTEE/WARRANTY

- A. Provide a written guarantee for making good or replacing, at no cost to the City, Food Service Cabinetry specified herein which exhibit defects in material and workmanship within a minimum period of 1 year from date of Project Completion.

FIRE STATION 54

PROJECT 10914

PART 2 PRODUCTS

2.1 CABINET MATERIALS

- A. Cabinets: Type 304 stainless steel, 18 gage.
- B. Shelving: Type 304 stainless steel, 16 gage. Shelves to be adjustable and removable.
- C. Countertops and backsplash: Type 304 stainless steel, 14 gage with bullnose front.
- D. Sink: Type 304 stainless steel, 14 gage.
 - 1. Welded integral with countertop.
 - 2. Double sink, 19x20x14 with cove corners (provide gooseneck faucet). Holes to accommodate specified faucet.
 - 3. Single sink at ADA Island shall be no deep then required to meet ADA under sink clearance.
- E. Hardware: To be supplied and installed by the cabinet fabricator.
 - 1. Hinges: Heavy duty stainless steel, number and spacing to meet manufacturer's recommendations.
 - 2. Door and drawer pulls: Full length, integral with doors and drawers.
 - 3. Latches: Magnetic.
 - 4. Drawer slides and rollers: Stainless steel, ball bearing.
- F. Construction: All seams, joints and connections shall be welded and ground smooth so as to be undetectable. Base cabinets to be set on closed base designed to accept base material specified on drawings.
- G. Drawers: Type 304 stainless steel, 16 gage; Drawer slides and rollers: Stainless steel, ball bearing; for drawers sizes see drawings.
- H. Contractor shall supply and install all stainless steel outlet plates to match stainless steel countertops and backsplashes.

PART 3 EXECUTION

3.1 PREPARATION

- A. Deliver inserts and anchoring devices to be built into substrates well in advance of time substrates are to be built.
- B. Factory-cut openings to extent possible to receive hardware, electrical work, and similar items.

3.2 INSTALLATION

- A. Shim as required with concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level. Comply with approved shop drawings.

FIRE STATION 54

PROJECT 10914

- B. Install cabinet hardware to ensure smooth and correct operation. Cabinet hardware and its installation shall comply with "The Americans with Disabilities Act".
- C. Anchorage: Secure finish work to grounds, stripping and blocking with concealed fasteners.
- D. Contractor to coordinate size and locations of appliances including providing installation.
- E. Scratched or dented stainless steel will not be accepted and must be replaced.

3.3 ADJUSTMENT AND CLEANING

- A. Repair damaged and defective work to eliminate defects functionally and visually; where not possible to repair, replace work. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.

3.4 PROTECTION

- A. Protect cabinets and other woodwork items during remainder of construction period, in a manner acceptable to manufacturer and Installer.

END OF SECTION 114100

FIRE STATION 54

PROJECT 10914

**SECTION 122113
HORIZONTAL LOUVER BLINDS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Contractor to provide and install Horizontal Louver Blinds at all exterior window locations.

1.2 SUMMARY

- A. Section Includes:
 - 1. Horizontal louver blinds with polymer slats.
- B. Related Requirements:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting horizontal louver blinds and accessories.

1.3 ALLOWANCES

- A. Horizontal louver blinds are part of this project and bid.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show fabrication and installation details for horizontal louver blinds.
 - 1. Manual Operators: Include details of installation in headrails and sill.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches long.
- D. Samples for Initial Selection: For each type and color of horizontal louver blind.
 - 1. Include similar Samples of accessories involving color selection.
- E. Samples for Verification: For each type and color of horizontal louver blind indicated.
 - 1. Slat: Not less than 12 inches long.
 - 2. Tapes: Full width, not less than 6 inches long.
 - 3. Horizontal Louver Blind: Full-size unit, not less than 16 inches wide by 24 inches long.

HORIZONTAL LOUVER BLINDS

122113 - 1
CAM 17-0531
EXHIBIT 1B
Page 439 of 600

FIRE STATION 54

PROJECT 10914

4. Valance: Full-size unit, not less than 12 inches wide.

F. Window-Treatment Schedule: For horizontal louver blinds. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of horizontal louver blind.

B. Product Test Reports: For each type of horizontal louver blind, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For horizontal louver blinds to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Horizontal Louver Blinds: Full-size units equal to 5 percent of quantity installed for each size, color, texture, pattern, and gloss indicated, but no fewer than two units.

1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

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

3. Horizontal blinds shall meet Sustainable Design requirements for this project.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver horizontal louver blinds in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install horizontal louver blinds until construction and wet and finish work in spaces, including painting, is complete and dry and ambient temperature

HORIZONTAL LOUVER BLINDS

122113 - 2
CAM 17-0531
EXHIBIT 1B
Page 440 of 600

FIRE STATION 54

PROJECT 10914

and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

- B. Field Measurements: Where horizontal louver blinds are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Source Limitations: Obtain horizontal louver blinds from single source from single manufacturer.

2.2 HORIZONTAL LOUVER BLINDS, POLYMER SLATS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Levolor (Faux wood Slat) Contract; a Newell Rubbermaid company or comparable product by one of the following:
 - 1. Comfortex Window Fashions.
 - 2. Hunter Douglas Contract.
 - 3. Levolor Contract; a Newell Rubbermaid company.
- C. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- D. Slats: Polymers that are lead free, UV stabilized, integrally colored, opaque, and will not crack or yellow; antistatic, dust-repellent treated.
 - 1. Formulation: Permanently flexible, extruded PVC.
 - 2. Width: 2 inches.
 - 3. Thickness: 0.125 inch.
 - 4. Spacing: Manufacturer's standard.
 - 5. Profile/Style: Faux wood Slat.
 - 6. Features:
 - a. Lift-Cord Rout Holes: Minimum size required for lift cord and located near back (outside) edge of slat to maximize slat overlap and minimize light gaps between slats.
- E. Headrail: Formed steel or extruded aluminum; long edges returned or rolled. Headrail fully encloses operating mechanisms on three sides and ends.

FIRE STATION 54

PROJECT 10914

1. Capacity: Standard one blind with max of two blinds per headrail in extra wide windows.
 2. Manual Lift Mechanism:
 - a. Lift-Cord Lock: Variable; stops lift cord at user-selected position within full operating range.
 - b. Operator: Extension of lift cord(s) through lift-cord lock mechanism to form cord pull.
 3. Manual Tilt Mechanism: Enclosed worm-gear mechanism and linkage rod that adjusts ladders.
 - a. Tilt: Full.
 - b. Tilt: One-direction, positive stop or lockout limited at an angle of 20 degrees from horizontal, both directions.
 - c. Operator: Clear-plastic wand
 - d. Over-Rotation Protection: Manufacturer's detachable operator or slip clutch to prevent over rotation of gear.
 4. Manual Lift-Operator and Tilt-Operator Lengths: Manufacturer's standard full length of blind when blind is fully closed.
 5. Manual Lift-Operator and Tilt-Operator Locations: Manufacturer's standard right side and left side of headrail, respectively unless otherwise indicated.
- F. Bottom Rail: Secures and protects ends of ladders and lift cords.
1. Type: Manufacturers standard Formed-steel, formed pvc, or extruded-aluminum tube, with plastic or metal capped ends.
- G. Lift Cord: Manufacturer's standard braided cord.
- H. Ladders: Evenly spaced across headrail at spacing that prevents long-term slat sag.
1. Type: Braided cord.
- I. Valance: Manufacturer's standard.
- J. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.
1. Type: Overhead inside window frame area.
 2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.
- K. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
- L. Colors, Textures, Patterns, and Gloss:
1. Slats: As selected by Architect from manufacturer's full range.

FIRE STATION 54

PROJECT 10914

2. Components: Provide rails, cords, ladders, and materials exposed to view matching or coordinating with slat color unless otherwise indicated.

2.3 HORIZONTAL LOUVER BLIND FABRICATION

- A. Product Safety Standard: Fabricate horizontal louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch per side or 1/2 inch total, plus or minus 1/8 inch. Length equal to head-to-sill dimension of opening in which blind is installed less 1/4 inch, plus or minus 1/8 inch.
 2. Outside of Jamb Installation: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 1. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
- D. Mounting and Intermediate Brackets: Designed for removal and reinstallation of blind without damaging blind and adjacent surfaces, for supporting blind components, and for bracket positions and blind placement indicated.
- E. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to brackets and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
- F. Color-Coated Finish:
 1. Metal: For components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
 2. PVC: Thru color as selected by the architect of manufacturer's standard factory finish complying with manufacturer's written specifications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.
 1. Proceed with installation only after unsatisfactory conditions have been corrected.

HORIZONTAL LOUVER BLINDS

122113 - 5
CAM 17-0531
EXHIBIT 1B
Page 443 of 600

FIRE STATION 54

PROJECT 10914

3.2 INSTALLATION

- A. Install horizontal louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.
 - 1. Locate so exterior slat edges are not closer than 1 inch from interior faces of glass and not closer than 1/2 inch from interior faces of glazing frames through full operating ranges of blinds.
 - 2. Install mounting and intermediate brackets to prevent deflection of headrails.
 - 3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

3.3 ADJUSTING

- A. Adjust horizontal louver blinds to operate free of binding or malfunction through full operating ranges.

3.4 CLEANING AND PROTECTION

- A. Clean horizontal louver blind surfaces after installation according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer and that ensures that horizontal louver blinds are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged horizontal louver blinds that cannot be repaired in a manner approved by Architect before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City's maintenance personnel to adjust, operate, and maintain systems.

END OF SECTION 122113

FIRE STATION 54

PROJECT 10914

**SECTION 124813
ENTRANCE FLOOR MATS AND FRAMES**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following:
1. Roll-up mats in surface-mounted frames.
 2. Entrance mats in recessed frames.
- B. Related Sections include the following:
1. Division 03 Section "Cast-in-Place Concrete" for slab depression grouting and filling for recessed mats and frames.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Show the following:
1. Items penetrating floor mats and frames, including the following:
 - a. Door control devices.
 2. Divisions between mat sections.
 3. Perimeter floor moldings.
 4. Custom Graphics: Scale drawing indicating colors.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated.
1. Floor Mat: 12-inch-square, assembled sections of floor mat.
 2. Tread Rail: 12-inch-long Sample of each type and color.
 3. Frame Members: 12-inch-long Sample of each type and color.
- E. Maintenance Data: For floor mats and frames to include in maintenance manuals.

FIRE STATION 54

PROJECT 10914

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain floor mats and frames through one source from a single manufacturer.
- B. Accessibility Requirements: Provide installed floor mats that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." Sections 302 and 303 in ICC A117.1.

1.5 PROJECT CONDITIONS

- A. Field Measurements: Indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. Coordinate size and location of recesses in concrete with installation of finish floors to receive floor mats and frames.

PART 2 - PRODUCTS**2.1 ROLL-UP MATS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 1. American Floor Products Company, Inc.
 2. ARDEN Architectural Specialties, Inc.
 3. Balco, Inc.
 4. J. L. Industries, Inc.
 5. Matco International.
 6. Pawling Corporation; Architectural Products Division.
 7. Reese Enterprises, Inc.
- D. Roll-up, Vinyl-Rail Hinged Mats: Vinyl-acrylic tread rails 1-1/2 inches wide by 3/8 inch thick, with slotted or perforated aluminum hinges.
 1. Tread Inserts: Ribbed-design-surface, resilient vinyl.
 2. Colors, Textures, and Patterns of Inserts: As selected by Architect from manufacturer's full range.
 3. Rail Color: Aluminum. As selected by Architect from manufacturer's full range.
 4. Mat Size: As indicated.

- E. Recessed Frames:

ENTRANCE FLOOR MATS AND FRAMES

CAM 17405P3 - 2
 EXHIBIT 1B
 Page 446 of 600

FIRE STATION 54

PROJECT 10914

1. Extruded Aluminum: ASTM B 221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 2. Color: Dark bronze- As selected by Architect from manufacturer's full range.
 3. Architectural Bronze: ASTM B 455, Alloy UNS No. C38500.
- F. Structural Performance: Provide roll-up mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
1. Uniform floor load of 300 lbf/sq. ft.
 2. Wheel load of 350 lb per wheel.

2.2 ENTRANCE MATS (RECESSED)

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following:
1. American Floor Products Company, Inc.
 2. ARDEN Architectural Specialties, Inc.
 3. Balco, Inc.
 4. Matco International.
 5. Pawling Corporation; Architectural Products Division.
 6. Reese Enterprises, Inc.
- D. Resilient Link Mats: 3/8-inch-thick, reversible rubber-tire link mats with galvanized spring stainless-steel wire link rods, vulcanized edge-nosing trim, steel-reinforced end trim, and links consisting of rectangular units or continuous strips in a heel-proof, close-weave pattern with openings between links not exceeding 1/8 inch wide by 1 inch long.
1. Color: Aluminum - As selected by Architect from manufacturer's full range.
 2. Mat Size: As indicated 10'x6'. See drawings
- E. Nuway Mats: Nylon-reinforced, 1/2-inch-wide by 7/16-inch-thick, vulcanized laminated rubber strips alternating with 9/16-inch-wide, profile shapes assembled on 0.1055-inch-diameter, galvanized steel wire, 1-1/2 inches o.c. Fibered surface unbuffed on rubber strips for exterior installations.
1. Semiopen construction incorporating a 1/8-inch-thick, PVC spacer on each wire between each profile shape and rubber strip to allow dirt, grit, and water to drop through.
 2. Profile Shape Finish: As per manufacture's range selected by Architect.
 3. Color: Aluminum - As selected by Architect from manufacturer's full range.
 4. Mat Size: As indicated 10'x6'. See drawings
- F. Recessed Frames:
1. Extruded Aluminum: ASTM B 221, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 2. Color: Aluminum- As selected by Architect from manufacturer's full range.

FIRE STATION 54

PROJECT 10914

2.3 CONCRETE FILL AND GROUT MATERIALS

- A. Provide concrete grout and fill equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.

2.4 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Surface-Mounted Frames: As indicated for permanent surface-mounted installation, complete with corner connectors, splice plates or connecting pins, and postinstalled expansion anchors.
- C. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
 - 1. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
- D. Coat surfaces of aluminum frames that will contact cementitious material with manufacturer's standard protective coating.

2.5 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. 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.
- D. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
- E. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
- F. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I,

ENTRANCE FLOOR MATS AND FRAMES

CAM 1740591 - 4
EXHIBIT 1B
Page 448 of 600

FIRE STATION 54

PROJECT 10914

integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, minimum recess depth, and other conditions affecting installation of floor mats and frames.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.
 - 1. For installation in terrazzo flooring areas, provide allowance for grinding and polishing of terrazzo without grinding surface of recessed frames. Coordinate with other trades as required.
 - 2. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
 - 3. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.
- B. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.
 - 1. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.3 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124813

FIRE STATION 54

PROJECT 10914

**SECTION 129300
SITE FURNISHINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. Section Includes:
1. Bicycle racks.
 2. Bollards.
- B. Related Requirements:
1. Division 03 Section "Cast-in-Place Concrete" for installing pipe sleeves cast installing anchor bolts cast in concrete footings.
 2. Division 31 Section "Earth Moving" for excavation for installing concrete footings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
1. Product Data for Credit: 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: Chain-of-custody certificates indicating that wood components of site furnishings 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.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Samples for Verification: For each type of exposed finish, not less than 6-inch-long linear components and 4-inch-square sheet components.
1. Include small samples of bicycle rack.
- F. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

SITE FURNISHINGS

129300 - 1
CAM 17-0531
EXHIBIT 1B
Page 450 of 600

FIRE STATION 54

PROJECT 10914

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For site furnishings.
 - 1. Wood Preservative Treatment: Include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.6 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.

PART 2 - PRODUCTS**2.1 BICYCLE RACKS (as indicated on the drawing)**

- A. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. See drawing.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Dero Bike Rack Co. or comparable product by one of the following:
 - 1. BRP Enterprises, Inc.
 - 2. Canterbury International.
 - 3. Creative Pipe, Inc.
 - 4. Dero Bike Rack Co.
 - 5. DuMor Inc.
 - 6. Huntco Supply, LLC.
 - 7. L. A. Steelcraft.
 - 8. Thomas Steele; Division of Trilary, Inc.
 - 9. Urban Accessories, Inc.
- C. Bicycle Rack Construction:
 - 1. Frame: Stainless steel.
 - a. Pipe Tubing OD: Not less than 1-5/8 inches.
 - b. Locking Bars: Solid round bar, not less than 1 inch in diameter.
 - 2. Style: Double-side parking & Bollard As indicated.
 - a. Overall Height: As indicated.

SITE FURNISHINGS

129300 - 2
CAM 17-0531
EXHIBIT 1B
Page 451 of 600

FIRE STATION 54

PROJECT 10914

- b. Overall Width: As indicated.
 - c. Overall Depth: As indicated.
 - d. Capacity: Designed to accommodate no fewer than two bicycles.
- 3. Security: Designed to lock wheel and frame.
 - 4. Installation Method: Bolted to cast-in anchor bolts As indicated.
- D. Stainless-Steel Finish: No. 4.

2.2 BOLLARDS (at Apparatus Bay entrances and (at protected areas i.e. gaslines))

- A. Products: Subject to compliance with requirements, provide the following available products that may be incorporated into the Work include, but are not limited to, the following:
- 1. See drawings
- B. Basis-of-Design Product: Subject to compliance with requirements, provide [ero Bike Rack Co. see drawings or comparable product by one of the following:
- 1. BRP Enterprises, Inc.
 - 2. Canterbury International.
 - 3. Creative Pipe, Inc.
 - 4. Dero Bike Rack Co.
 - 5. DuMor Inc.
 - 6. Huntco Supply, LLC.
 - 7. L. A. Steelcraft.
 - 8. Thomas Steele; Division of Trilary, Inc.
 - 9. Urban Accessories, Inc.
- C. Bollard Construction:
- 1. Pipe OD: Not less than 4-1/2 inches see drawings.
 - a. Steel: Schedule 80 pipe.
 - 2. See drawings for bollard locations and details.
 - 3. Installation Method: As indicated.
- D. Steel Finish: Galvanized, Color coated: field painted.
- 1. Color: "Hazard yellow"

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
- 1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211.
 - 2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221.
 - 3. Structural Pipe and Tube: ASTM B 429/B 429M.
 - 4. Sheet and Plate: ASTM B 209.
 - 5. Castings: ASTM B 26/B 26M.

SITE FURNISHINGS

FIRE STATION 54

PROJECT 10914

- B. Steel and Iron: Free of surface blemishes and complying with the following:
1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53/A 53M, or electric-resistance-welded pipe complying with ASTM A 135/A 135M.
 3. Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M.
 4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500/A 500M; zinc coated internally and externally.
 5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
 6. Perforated Metal: From steel sheet not less than nominal thickness; manufacturer's standard perforation pattern.
 7. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
 8. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
 9. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.
- C. Stainless Steel: Free of surface blemishes and complying with the following:
1. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
 2. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
 3. Tubing: ASTM A 554.
 - 4.
- D. Anchors, Fasteners, Fittings, and Hardware: Stainless steel; commercial quality.
1. Angle Anchors: For inconspicuously bolting legs of site furnishings to on below-grade substrate; one per leg extent as indicated Insert extent.
 2. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; two per unit extent as indicated on Drawings Insert extent.
- E. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.
- F. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- G. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil thick.
 2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

FIRE STATION 54

PROJECT 10914

2.4 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWWA M4 to cut surfaces.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.5 GENERAL FINISH REQUIREMENTS

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

2.6 ALUMINUM FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.7 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 directional finishes with long dimension of each piece.
 - 2. Dull Satin Finish: No. 6.

FIRE STATION 54

PROJECT 10914

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and securely anchored positioned at locations indicated on Drawings.
- D. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
- E. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.
- F. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

END OF SECTION 129300

SITE FURNISHINGS

129300 - 6
CAM 17-0531
EXHIBIT 1B
Page 455 of 600

FIRE STATION 54

PROJECT 10914

**SECTION 140500
FIRE POLES****PART 1 - GENERAL****1.1 WORK INCLUDED**

- A. Section includes solid brass fire poles where indicated on the Drawings.

1.2 SUBMITTALS

- A. Submit shop drawings and manufacturer's catalog data to Architect for approval prior to ordering. Include plans, elevations, details, details of installation and relationship to adjoining work.
- B. Provide calculations by a Florida Professional structural engineer showing that fire poles as designed and fabricated will support anticipated live and dead loads.

1.3 QUALITY ASSURANCE

- A. Provide fire poles that meet all applicable provisions of the Florida Building Code and the Florida Fire Prevention Code, latest editions including local amendments.

PART 2 - PRODUCTS**2.1 MANUFACTURER**

- A. Provide brass fire poles as manufactured by Brassfinders, or equivalent manufacturer.
- B. Required Salient Features include the following:
 - 1. 3-inch diameter brass tubing with 0.50 wall thickness; 12-foot lengths only
 - 2. Steel liner
 - 3. 3" x 7" heavy-duty floor flange standard with the manufacturer
 - 4. 3" x 5-1/2" heavy-duty wall flanges standard with the manufacturer
 - 5. "Landing pad" located at the bottom of the pole(s)
- C. Provide aluminum safety gates.
 - 1. 1½" diameter tubing
 - 2. Aluminum wired mesh gates
 - 3. Aluminum latches and hinges
 - 4. Railing and gate to be installed in accordance with manufacturer's specifications.

FIRE STATION 54

PROJECT 10914

PART 3 - EXECUTION**3.1 INSPECTION**

- A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.2 INSTALLATION

- A. Install fire poles in accordance with manufacturer's published instructions and approved shop drawings.

END OF SECTION 140500

FIRE STATION 54

PROJECT 10914

SECTION 142400 HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes hydraulic passenger elevators.
- B. Related Sections include the following:
1. Division 03 Section "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 2. Division 04 Section "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
 3. Division 05 Section "Structural Steel Framing" for the following:
 - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - b. Divider beams and Hoist beams.
 - c. Structural-steel shapes for subsills that are part of steel frame.
 4. Division 05 Section "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Divider beams and Hoist beams.
 - c. Structural-steel shapes for subsills.
 - d. Pit ladders.
 - e. Cants in hoistways made from steel sheet.
 5. Division 05 Section "Pipe and Tube Railings" for railings between adjacent elevator pits.
 6. Division 05 Section "Decorative Metal" for combination units that contain hall push-button stations.
 7. Division 09 Section "Tiling" for finish flooring in elevator cars.
 8. Division 09 painting Sections for field painting of hoistway entrance doors and frames.
 9. Division 10 Section "Wire Mesh Partitions" for guards between adjacent elevator pits.
 10. Division 26 Sections for electrical service for elevators to and including disconnect switches at machine room door and standby power source, transfer switch, and connection from auxiliary contacts in transfer switch to controller.
 11. Division 27 Section "Communications Horizontal Cabling" for telephone service for elevators.
 12. Division 28 Section "Access Control" for security access system equipment used to restrict elevator use.

HYDRAULIC ELEVATORS

CAM 17-0501 - 1
EXHIBIT 1B
Page 458 of 600

FIRE STATION 54

PROJECT 10914

13. Division 28 Section "Fire Detection and Alarm" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.
 14. Division 31 Section "Earth Moving" for excavating well hole to accommodate cylinder assembly.
 15. Division 31 Section "Earth Moving" for disposition of excavated material from cylinder well hole.
- C. Allowances: Provide finished passenger elevator cars under the Elevator Car Allowance specified in Division 01 Section "Allowances." Allowance includes furnishing and installing the following:
1. Car wall finishes including trim and Handrails.
 2. Car floor finishes.
 3. Car ceiling finishes.
 4. Car door finishes and Car door sills.
 5. Car light fixtures.
 6. Cutouts and other provisions for installing elevator signal equipment in cars.
- D. Unit Prices: Rock excavation for cylinder well holes will be paid for under the unit price indicated in the Contract and as specified in Division 01 Section "Unit Prices."

1.3 DEFINITIONS

- A. Definitions in 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.

1.4 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:
1. Car enclosures and hoistway entrances.
 2. Operation, control, and signal systems.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station and standby power operation control panel. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Initial Selection: For finishes involving color selection.

FIRE STATION 54

PROJECT 10914

- D. Samples for Verification: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.
- E. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- F. Qualification Data: For Installer.
- G. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- H. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- I. Warranty: Special warranty specified in this Section.
- J. Continuing Maintenance Proposal: Service agreement specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain elevators, including electric traction passenger elevators specified in another Division 14 Section, through one source from a single manufacturer.
 - 1. Provide major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.
- C. Regulatory Requirements: Comply with ASME A17.1 and elevator design requirements for earthquake loads in ASCE 7.
 - 1. Effective peak velocity acceleration (A_v) for Project's location is greater than or equal to 0.10, but less than 0.20 (seismic risk zone 2).
 - 2. Project's seismic design category is B.
 - 3. Elevator importance factor is 1.5.
- D. Accessibility Requirements: Comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." 407 in ICC A117.1.
- E. Fire-Rated Hoistway Entrance Assemblies: Door and frame 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 at as close to neutral pressure as possible according to NFPA 252.

FIRE STATION 54

PROJECT 10914

1.6 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 written recommendations to prevent damage, deterioration, or soiling.

1.7 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Furnish well casing and coordinate delivery with related excavation work.
- C. Coordinate sequence of elevator installation with other work to avoid delaying the Work.
- D. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

1.8 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.
 - 1. Warranty Period: One year from date of Substantial Completion.

1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide one year's full maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.
 - 2. Include 24-hour-per-day, 7-day-per-week emergency callback service.
 - a. Response Time: Two hours or less.
- B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to City, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

FIRE STATION 54

PROJECT 10914

- C. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to City with terms, conditions, and obligations as set forth in, and in the same form as, "Draft of Elevator Maintenance Agreement" at end of this Section, starting on date initial maintenance service is concluded.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Otis Elevator Co.
 2. Schindler Elevator Corp.
 3. ThyssenKrupp Elevator.

2.2 SYSTEMS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard preengineered elevator systems and as required for complete system.
- B. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide either of the following:
1. Pump, with fan-cooled squirrel-cage induction motor, mounted on oil tank with vibration isolation mounts. Enclose pump in prime-painted steel enclosure lined with 1-inch-thick, glass-fiber insulation board.
 2. Submersible pump, with submersible squirrel-cage induction motor, suspended inside oil tank from vibration isolation mounts.
 3. Provide motor with wye-delta or solid-state starting.
 4. Provide variable-voltage variable-frequency motor control.
- C. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
- D. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.
1. Provide dielectric couplings at cylinder units.
 2. Casing for Underground Piping: PVC pipe complying with ASTM D 1785, joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
- E. Hydraulic Fluid: Nontoxic, readily biodegradable, fire-resistant fluid made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Hydraulic fluid is approved by elevator manufacturer for use with elevator equipment.

FIRE STATION 54

PROJECT 10914

1. Product: Subject to compliance with requirements, provide "Hydro Safe" by Hydro Safe Oil Division, Inc.
- F. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Section.
- G. Protective Cylinder Casing: PVC or HDPE pipe casing complying with ASME A17.1, of sufficient size to provide not less than 1-inch clearance from cylinder and extending above pit floor. Provide means to monitor casing effectiveness to comply with ASME A17.1.
- H. Corrosion Protective Filler: A nontoxic, petroleum-based gel formulated for filling the space between hydraulic cylinder and protective casing. Filler is electrically nonconductive, displaces or absorbs water, and gels or solidifies at temperatures below 60 deg F.
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. Hydro Safe Oil Division, Inc.; No-Ox-Id Liquid Elevator Casing Filler E-800.
 - b. Union-Gard, a division of Dome Services L.L.C.; Union-Gard 160.
- I. Car Frame and Platform: Welded steel units.
- J. Guides: Provide either roller guides or sliding guides at top and bottom of car and counterweight frames. If sliding guides are used, provide guide-rail lubricators or polymer-coated, nonlubricated guides.

2.3 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation system indicated.
- B. Single-Car Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
1. Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at the elevator machine room. Manual operation causes automatic operation to cease.
 2. Standby-Powered Lowering: On activation of standby power, if car is at a floor it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to a preselected floor, opens its doors, and shuts down. If car is below the preselected floor, it is lowered to the next lower floor, opens its doors, and shuts down.
 3. Standby-Powered Lowering: On activation of standby power, car is lowered to the lowest floor, opens its doors, and shuts down.
 4. Battery-Powered Lowering: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to a preselected floor, opens its doors, and shuts down. If car is below the preselected floor, it is

FIRE STATION 54

PROJECT 10914

- lowered to the next lower floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
5. Battery-Powered Lowering: When power fails, car is lowered to the lowest floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
 6. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.
 7. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted.
- C. Group Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators and elevator groups where indicated:
1. Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. Only one car is moved upward at a time, with priority given to loaded cars. If a car cannot be returned after two attempts, it is removed from the system. When all cars have been returned or removed from the system, one car is automatically placed in service. If car selected for service cannot operate within 60 seconds, the system removes car from service and places another car in service. Cars can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at the elevator machine room Manual operation causes automatic operation to cease.
 2. Standby Power Operation: On activation of standby power, cars are returned to lowest floor and parked with doors open. If a car cannot be returned, it is removed from the system. One car is selected for service on standby power by a switch located at the elevator machine room.
 3. Standby-Powered Lowering: On activation of standby power, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered to a preselected floor, open their doors, and shut down. Cars that are below the preselected floor are lowered to the next lower floor, open their doors, and shut down.
 4. Standby-Powered Lowering: On activation of standby power, cars are lowered to the lowest floor, open their doors, and shut down.
 5. Battery-Powered Lowering: If power fails, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered to a preselected floor, open their doors, and shut down. Cars that are below the preselected floor are lowered to the next lower floor, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
 6. Battery-Powered Lowering: When power fails, cars are lowered to the lowest floor, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
 7. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.
 8. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted.
 9. Priority Service: Service is initiated by a keyswitch, card reader, and remote switch at designated floors. One elevator is removed from group operation and directed to the floor where service was initiated. On arriving at the floor, elevator opens its doors and parks and a lighted sign directs passengers to exit elevator. Car is placed in operation by selecting a floor and pressing door close button or by operating keyswitch to put car

FIRE STATION 54

PROJECT 10914

- in independent service. After responding to floor selected or being removed from independent service, car is returned to group operation. If car is not placed in operation within a preset time after being called, it is returned to group operation.
10. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.
 11. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car will respond only to car calls, not to hall calls.
- D. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
1. Card-Reader Operation: System uses card readers at car control stations and hall push-button stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Contractor to coordinate with City of Fort Lauderdale Fire Department to allow space as indicated for card reader in car and or provided stripe-swipe card reader integral with each car control station.
 - a. Security access system equipment is specified in Division 28 Section "Access Control."
 - b. Security access system equipment is not in the Contract.
 2. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car control stations and hall push-button stations. Key is removable only in deactivated position.
 3. Keypad Operation: Allows each landing to be restricted or unrestricted. When a restricted landing button is pressed, a "Restricted Floor" lamp lights and remains lit until landing access code has been entered into a keypad or predetermined time period has elapsed. Car calls for restricted landings do not register until landing access code is entered into keypad within predetermined time period after landing button is pressed.
 - a. Access codes are programmed at each car operating panel using a security keyswitch. Keypad operation can be activated and deactivated by security keyswitch at main landing.
 4. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes car to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.

2.4 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.

FIRE STATION 54

PROJECT 10914

- B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.5 FINISH MATERIALS

- A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 - 1. Textured Stainless-Steel Sheet: Product with coined embossed texture rolled into exposed surface.
 - a. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, by final manufacturer selected.
 - b. Product: Subject to compliance with requirements, provide, by final manufacturer selected.
 - c. Metal surface is satin polished after rolling.
- E. Stainless-Steel Bars: ASTM A 276, Type 304.
- F. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- G. Bronze Plate and Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal).
- H. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).
- I. Bronze Tubing: ASTM B 135, Alloy UNS No. C23000 (red brass, 85 percent copper).
- J. Aluminum Extrusions: ASTM B 221, Alloy 6063.
- K. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500 or No. C77600.
- L. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGL for flat applications.

2.6 CAR ENCLOSURES

- A. General: Provide steel-framed car enclosures with nonremovable wall panels, with removable car roof, access doors, power door operators, and ventilation.
 - 1. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
 - 2. Provide finished car including materials and finishes specified below.

FIRE STATION 54

PROJECT 10914

3. Refer to "Allowances" Paragraph, in Part 1 "Summary" Article, for items to be provided under the Elevator Car Allowance. Provide items not included in the Elevator Car Allowance as needed for finished car including materials and finishes specified below.

B. Materials and Finishes: Provide manufacturer's standards, but not less than the following:

1. Subfloor: Underlayment grade, exterior plywood, 5/8-inch nominal thickness.
2. Floor Finish: Division 09 Section 093000 Tiling color as selected by Architect from manufacturer's full range.
3. Enameled-Steel Wall Panels: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
4. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
5. Bronze Wall Panels: Flush, hollow-metal construction; fabricated from bronze sheet.
6. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to with manufacturer's standard protective edge trim. Panels have a flame-spread index of 25 or less, when tested according to ASTM E 84. Plastic-laminate color, texture, and pattern as selected by Architect from plastic-laminate] or elevator manufacturer's full range.
7. Fabricate car with recesses and cutouts for signal equipment.
8. Fabricate car door frame integrally with front wall of car.
9. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
10. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
11. Bronze Doors: Flush, hollow-metal construction; fabricated by laminating bronze sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
12. Plastic-Laminate Doors: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim matching return panels. Plastic-laminate color, texture, and pattern as selected by Architect from plastic-laminate elevator manufacturer's full range.
13. Sight Guards: Provide sight guards on car doors.
14. Sills: Extruded metal, with grooved surface, 1/4 inch thick.
15. Luminous Ceiling: LED light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
16. Metal Metallic-Finish, Plastic-Laminate Ceiling: Flush panels, with incandescent downlights in the center of four low-voltage downlights in each panel. Align ceiling panel joints with joints between wall panels.
17. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.

2.7 HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.

FIRE STATION 54

PROJECT 10914

1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
- B. Materials and Fabrication: Provide manufacturer's standards, but not less than the following:
1. Steel Subframes: Formed from cold-rolled or hot-rolled steel sheet with factory-applied enamel finish or corrosion-inhibiting primer. Fabricate to receive applied finish as indicated.
 2. Stainless-Steel Frames: Formed from stainless-steel sheet.
 3. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet or by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 4. Plastic-Laminate Doors: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim matching door frames. Plastic-laminate color, texture, and pattern as selected by Architect from plastic-laminate elevator manufacturer's full range.
 5. Sight Guards: Provide sight guards on doors matching door edges.
 6. Sills: Extruded metal, with grooved surface, 1/4 inch thick.
 7. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.8 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers or LEDs.
- B. Car Control Stations: Provide manufacturer's standard recessed or semirecessed car control stations. Mount in return panel adjacent to car door, unless otherwise indicated.
- C. Swing-Return Car Control Stations: Provide car control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.
 1. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
 2. Provide "No Smoking" sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- D. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

FIRE STATION 54

PROJECT 10914

- E. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet telephone jack in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 Section "Fire Detection and Alarm."
- F. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
1. Include travel direction arrows if not provided in car control station.
- G. Hall Push-Button Stations: Provide one hall push-button station at each landing for each single elevator or group of elevators, but not less than one station for each four elevators in a group.
- H. Hall Push-Button Stations: Provide hall push-button stations at each landing as indicated.
1. Provide manufacturer's standard wall-mounted units.
 2. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 3. Equip units with buttons for calling elevator and for indicating desired direction of travel.
 4. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 28 Section "Fire Detection and Alarm."
- I. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide one of the following:
1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
 2. Units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.
 3. Units mounted in both jambs of entrance frame.
 4. Units mounted in both car door jambs; may be used only for single.
- J. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
1. At manufacturer's option, audible signals may be placed on car.
- K. Hall Position Indicators: Provide illuminated, digital-display-type position indicators, located above hoistway entrance at ground floor. Provide units with flat faceplate for mounting and with body of unit recessed in wall.
1. Integrate ground-floor hall lanterns with hall position indicators.
- L. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed.
- M. Fire Command Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

FIRE STATION 54

PROJECT 10914

- N. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station, unless otherwise indicated.

2.9 ELEVATORS

A. Elevator Description:

1. Group Number: 1
2. Elevator Number(s): 1 as shown on Drawings.
3. Type: Under-the-car single cylinder.
4. Type: Holeless, beside-the-car, telescoping, single cylinder.
5. Rated Load: 2100 lb.
6. Rated Speed: 100 fpm.
7. Operation System: Single automatic operation.
8. Auxiliary Operations:
 - a. Standby power operation.
 - b. Standby-powered lowering.
 - c. Battery-powered lowering.
 - d. Automatic dispatching of loaded car.
 - e. Nuisance call cancel.
 - f. Priority service at all floors.
 - g. Loaded-car bypass.
9. Security Features: Keyswitch operation.
10. Dual Car Control Stations: Provide two car control stations; equip only one with required keyswitches, if any.
11. Car Enclosures:
 - a. Inside Width: for side wall to side wall. **SEE SHOP DRAWINGS FOR INSIDE WIDTH.**
 - b. Inside Depth: dimensions from back wall to front wall (return panels). **SEE SHOP DRAWINGS FOR INSIDE DEPTH.**
 - c. Inside Height: dimension to underside of ceiling. **SEE SHOP DRAWINGS FOR INSIDE HEIGHT.**
 - d. Front Walls (Return Panels): stainless steel, No. 4 finish with integral car door frames.
 - e. Car Fixtures: Satin stainless steel, No. 4 finish
 - f. Side and Rear Wall Panels: Plastic laminate and Satin stainless steel, No. 4 finish.
 - g. Reveals: Satin stainless steel, No. 4 finish
 - h. Door Faces (Interior): Satin stainless steel, No. 4 finish and Plastic laminate.
 - i. Door Sills: Aluminum, mill finish
 - j. Ceiling: Luminous ceiling and Satin stainless steel, No. 4 finish
 - k. Handrails: 1-1/2 inches round satin stainless steel, No. 4 finish at rear of car.
 - l. Floor: for Manufacturers see Division 9 Section 093000 Tiling.
 - m. Floor prepared to receive resilient tile (specified in Division 09 Section "Resilient Tile Flooring").

FIRE STATION 54

PROJECT 10914

- n. Floor recessed and prepared to receive porcelain tile specified in Division 09 Section "Tiling".
 - o. Floor Thickness, Including Setting Materials: as per manufacturer's requirement above plywood subfloor.
12. Hoistway Entrances:
- a. Width: **SEE SHOP DRAWINGS FOR WIDTH.**
 - b. Height: **SEE SHOP DRAWINGS FOR HEIGHT.**
 - c. Type: Single-speed side sliding.
 - d. Fire-Protection Rating: 1-1/2 hours with 30-minute temperature rise of 450 deg F.
 - e. Frames at First Floor Satin stainless steel, No. 4 finish
 - f. Frames at Other Floors: Satin stainless steel, No. 4 finish
 - g. Doors at First Floor: Satin stainless steel, No. 4 finish and Plastic laminate.
 - h. Doors at Other Floors: Satin stainless steel.
 - i. Sills at First Floor: Aluminum, mill finish
 - j. Sills at Other Floors: Aluminum, mill finish
13. Hall Fixtures at First Floor: Satin stainless steel, No. 4 finish.
14. Hall Fixtures at Other Floors: Satin stainless steel, No. 4 finish.
15. Additional Requirements:
- a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.
 - b. Provide blanket hooks and one complete set of full-height protective blankets.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
 - 1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Excavation for Cylinder: Drill well hole in elevator pit to accommodate installation of cylinder; comply with applicable requirements in Division 31 Section "Earth Moving."
- B. Provide waterproof well casing to retain walls of well hole.

FIRE STATION 54

PROJECT 10914

- C. Install cylinder in protective casing within well hole. Before installing protective casing, remove water and debris from well hole and provide permanent waterproof seal at bottom of well casing.
 - 1. Fill void space between protective casing and cylinder with corrosion protective filler.
 - 2. Align cylinders and fill space around protective casing with fine sand.
- D. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between protective casing and pit floor with 4 inches of nonshrink, nonmetallic grout.
- E. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.
- F. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- G. Sound Isolation: 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 elevator system.
- H. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cemented fittings.
- I. Install piping above the floor, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.
- J. Lubricate operating parts of systems as recommended by manufacturers.
- K. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- L. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.
- M. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- N. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - 2. Place hall lanterns either above or beside each hoistway entrance.
 - 3. Mount hall lanterns at a minimum of 72 inches above finished floor.

FIRE STATION 54

PROJECT 10914

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. Advise City, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

3.4 PROTECTION

- A. Temporary Use: Limit temporary use for construction purposes to one elevator. Comply with the following requirements for elevator used for construction purposes:
 - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - 2. Provide strippable protective film on entrance and car doors and frames.
 - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - 5. Do not load elevators beyond their rated weight capacity.
 - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - 7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. 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 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City's maintenance personnel to operate, adjust, and maintain elevator(s). Refer to Division 01 Section "Demonstration and Training."
- B. Check operation of elevator with City's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.
- C. Check operation of elevator with City's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 142400

FIRE STATION 54

PROJECT 10914

**SECTION 211223
FIRE PROTECTION SYSTEM PIPING, FITTINGS AND VALVES**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including Bid Manual, General and Supplementary Conditions apply to this Section.
- B. The contractor shall fully comply with all stages of construction including special coordination requirements.

1.2 SECTION INCLUDES

Pipe, fittings and connections to sprinkler.

1.3 REFERENCES

- 1. ASME B16.1
- 2. ASME B16.3
- 3. ASME B16.5
- 4. NFPA 13 - Latest Edition
- 5. NFPA 14 - Latest Edition
- 6. NFPA 101 – Latest Edition
- 7. NFPA 130 – Latest Edition
- 8. NFPA 416 - Latest Edition
- 9. UL 262
- 10. UL 312
- 11. UL 405

1.4 SUBMITTALS

- A. Submit under provisions of Shop Drawings, Product Data and Samples
 - 1. Product Data
 - 2. Samples
 - 3. Manufacturer's Certificate of the Product
 - 4. Manufacturer's Installation Instructions

1.5 QUALITY ASSURANCE

- A. Installation of entire system shall be accomplished by a manufacturer of approved sprinkler equipment, his representative or licensee, who is now or has been engaged in the installation of automatic sprinkler systems for the past five years.

1.6 REGULATORY REQUIREMENTS

- A. Conform to Factory Mutual standards
- B. Conform to Underwriter's Laboratories listings

FIRE PROTECTION SYSTEM-PIPING-FITTINGS AND VALVES

GAM 17-0531
211223-1
EXHIBIT 1B
Page 474 of 600

FIRE STATION 54

PROJECT 10914

- C. Conform to Global Risk Consultants requirements
- D. Sprinkler Systems: Conform work to NFPA 13.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Refer to Material and Equipment: Transport, handle, store, and protect products.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.8 EXTRA MATERIALS

- A. Refer to Contract Closeout
- B. Refer to Operation and Maintenance Data.

PART 2 - PRODUCTS

2.1 Materials used shall be free of Asbestos, PCP and other carcinogenic materials.

2.2 All materials shall be new and of highest quality, made in the U.S.A.

2.3 SUBSTITUTIONS

- A. All reference to manufacturers or supplier's model numbers and other pertinent information are supplied to establish minimum standards of performance, function and quality. Equivalent equipment (FM approved) may be substituted for that specified. The submitted equipment shall equal or exceed the quality, performance, functions and features of the specified equipment. The supplier of the non specified equipment must obtain approvals as required by Substitutions and Product Options.

2.4 GENERAL

- A. All protection equipment and devices shall be UL listed and FMRC approved for the service required and shall be installed in conformance with NFPA 13. The electrical installation shall conform with the National Electrical Code (NEC). Hose threads shall conform with local fire bureau standards if so applicable.

2.5 PIPING

- A. Pipe (1½-inch and smaller) for new fire sprinkler systems shall be new, designed for 175 psi working pressure, conforming to ASTM specifications and shall have the manufacturer's name or brand along with the applicable ASTM standard permanently marked on each length of pipe. Pipe shall be schedule 40 black steel pipe in accordance with ASTM A-53 and installed with screwed joints. Minimum pipe diameter is 1-inch.
- B. Pipe (2-inch and larger) for new fire sprinkler systems shall be new, designed for 175 psi working pressure, conforming to ASTM specifications and shall have the manufacturer's name or brand along with the applicable ASTM standard permanently marked on each

FIRE STATION 54

PROJECT 10914

length of pipe. Pipe shall be schedule 10 black steel pipe with roll groove joints.

2.6 FITTINGS**A. Joining of Piping on Sprinkler Systems.**

1. Schedule 40 black steel pipe shall be joined by 150 lbs. black malleable iron screwed fittings in accordance with ANSI-B16.3.
2. Schedule 10 black steel pipe shall be joined by roll grooved couplings and mechanical fittings shall be malleable iron, 250 psi working pressure, in accordance with ASTM-A 47. Roll grooved pipe couplings shall be tested and approved by Factory Mutual and listed by Underwriter's Laboratories.

2.7 PIPE HANGERS AND SUPPORTS

- A. Spacing and arrangement shall conform to NFPA-13. Contractor shall install hangers and supports to adequately support the lines without interfering with their inherent flexibility and as required to prevent sagging or vibration, and to brace vertical risers.
- B. Hangers shall be wrought iron clevis type, UL listed and FM approved.
- C. Pipe rests shall be saddle type. UL listed and FM approved.
- D. Riser clamps shall be used for vertical pipe supports. UL listed and FM approved.
- E. Vertical pipe shall be supported at every floor and base of riser clamped securely to the building structure.
- E. Contractor shall furnish and place all inserts, bolts and expansion shields before concrete is poured. Explosion type fasteners are not permitted on property.

2.8 FIRE HOSE OUTLETS

Hose outlet valves shall be 2-1/2 inch angle type with 1-1/2 inch reducers, cast brass with red handle, UL listed, FM approved, and rated for a working pressure of 300 psi or greater. Hose valve threads shall conform to the requirements of the Fire Department requirements.

2.9 FIRE VALVE CABINETS

- A. Hose valve cabinets: Cabinet to be fire rated where applicable and equipped with portable fire extinguisher as per NFPA-10 (Universal Dry Chemical Extinguisher, 2A:10 BC, max. height of hose valve above finished floor of 5'-0"). UL listed and FM approved. Provide "FIRE HOSE AND FIRE EXTINGUISHER" decal on door.
- B. Control valve cabinets: Same requirements for hose valve cabinets, except cabinet shall not be equipped with portable fire extinguisher. There is also no height requirement for control valves. UL listed and FM approved. Provide "SPRINKLER VALVE" decal on door. Execution shall be in accordance with part 3 of section 10522- fire extinguishers, cabinets and accessories.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Ream pipe ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Painting:
 - 1. Paint all aboveground fire protection piping red.
 - 2. Give all exposed iron work, hangers, supports, and anchors, two coats of asphalt base aluminum paint.
 - 3. Remove all dirt, rust, scale, and grease from surfaces to be painted.
 - 4. Sprinkler heads shall not be painted. Sprinkler head cover plates to be painted only by the manufacturer to maintain the UL rating of the assembly.
 - 5. Apply protective coating of coal tar primer and enamel to all pipe threads.

3.2 INSTALLATION

- A. Install piping in accordance with NFPA 13 for sprinkler systems.
- B. Route piping in orderly manner plumb and parallel to building structure. Maintain gradient.
- C. Install piping to conserve building space, to not interfere with use of space and other work.
- D. Group piping whenever practical at common elevations.
- E. Sleeve pipes passing through partitions, walls, and floors.
- F. Seal all new sprinkler pipe penetrations through fire rated walls with UL approved fire rated penetration assemblies.
- G. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- H. All items provided shall be compatible with approved fire alarm system.
- I. Flushing:
 - 1. Contractor shall flush all connections to existing systems, and new or modified work, in accordance with NFPA requirements. Flushing of all parts of the new work shall be accomplished before sprinkler heads are installed.
 - 2. Any debris not removed by flushing operations shall be removed by the contractor prior to sprinkler head installation.
- J. Testing:

FIRE STATION 54

PROJECT 10914

1. All fire protection piping shall be hydrostatically tested by the contractor at a minimum of 200 psig for a period of 2 hours. Portions of systems normally subjected to working pressure in excess of 150 psi shall be tested at a pressure of 50 psi in excess of the normal working pressure. Piping shall be flushed in accordance with NFPA 13. Piping above suspended ceilings shall be inspected before testing. The alarms and other devices shall be tested by the Contractor. The water flow alarms shall be tested by flowing water through the test and drain assembly. The Contractor shall submit a signed and dated certificate with request for a formal inspection and tests similar to that specified in NFPA 13 when all connections have been made and tests have been completed.
2. Personnel necessary to be present at all fire systems acceptance testing are the following; Installing Contractor, Manufacturer's Representative, Building and Zoning Mechanical and Electrical Inspector, Fire Department's Fire Inspector and, Risk Management Representative, and Insurance Carrier Representative.
3. After testing, all leaks in the system shall be repaired, and all defective work shall be removed and replaced in a satisfactory manner. Tests shall be repeated until work is deemed satisfactory by the above personnel in 3.02.J.2.
4. All concealed work must remain uncovered until the required tests have been completed.
5. All tests shall be performed in accordance with the applicable provisions of NFPA 13 and shall include use of NFPA Forms 85A and 85B.

END OF SECTION 211223

FIRE STATION 54

PROJECT 10914

**SECTION 211313
WET PIPE FIRE SPRINKLER SYSTEM**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including Bid Manual, General and Supplementary Conditions apply to this Section.
- B. The contractor shall fully comply with all stages of construction including special coordination requirements.
- C. Fire protection sprinkler system design shall meet the following requirements:
 - 1. Factory Mutual Research Corporation
 - 2. Underwriter's Laboratories
 - 3. Global Risk Consultants
 - 4. Florida Building Code – Latest edition
 - 5. National Fire Protection Association
 - 6. The Authority Having Jurisdiction

1.2 SECTION INCLUDES

- A. Wet-pipe sprinkler system
- B. System design, installation, and certification

1.3 REFERENCES

- A. NFPA 13 – Latest Edition
- B. NFPA 101 – Latest Edition
- C. NFPA 416 – Latest Edition
- D. NFPA 130 – Latest Edition

1.4 SUBMITTALS

- A. Submit under provisions of Shop Drawings, Product Data and Samples:
 - 1. Product Data
 - 2. Samples
 - 3. Hydraulic Calculations
 - 4. Shop Drawings
 - 5. Manufacturer's Certificate of the Product
 - 6. Manufacturer's Installation Instructions

WET PIPE FIRE SPRINKLER SYSTEM

211313 - 1
CAM 17-0531
EXHIBIT 1B
Page 479 of 600

FIRE STATION 54

PROJECT 10914

1.5 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Project Record Documents

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Operating and Maintenance Data

1.7 QUALIFICATIONS

Installation of entire system shall be accomplished by manufacturers of approved sprinkler, their representatives or licensees, who are now or have been engaged in the installation of automatic sprinkler systems and standpipe systems for the past five years.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Refer to Materials and Equipment: Transport, handle, store, and protect products.
- B. Deliver materials to Project site in original manufacturer's unopened cartons and containers each bearing names of product and manufacturer, Project identification and shipping and handling instructions.

1.9 WARRANTY

- A. The Contractor shall warrant all items, supplied by him and specified herein, to be free from all defects and perform the specified functions when used for their intended purposes. Any item found to be defective within one (1) year from final system acceptance will be repaired, corrected or replaced (parts and labor), as appropriate, at no cost to the owner.

1.10 EXTRA MATERIALS

Contractor shall furnish and install a sprinkler head metal storage container with lock and key containing extra heads, release devices and head wrench in the quantities specified in NFPA 13 in the fire pump room.

1.11 QUALITY ASSURANCE

- A. The design, materials, equipment, installation, inspection, and testing of the automatic sprinkler systems shall be in strict accordance with the required and advisory provisions of NFPA 13 and NFPA 72.
- B. The sprinkler systems shall be designed to provide the required water supply discharge densities as defined by NFPA 13 and the Factory Mutual requirements. Factory Mutual Insurance required discharge densities and/or application areas are presented where they exceed NFPA 13 values. Hydraulic calculations shall be based on the following criteria and shall be in accordance with NFPA 13.
 - 1. Sprinkler systems hazard groups and densities.

FIRE STATION 54

PROJECT 10914

Ordinary hazard group I:
wet pipe systems
0.15 gpm/sq-ft over 2,500 sq-ft

2. Inside and outside hose stream allowance.

A water allowance of 500 gpm shall be added for inside and outside hose streams to the sprinkler requirement for ordinary hazard occupancies at the connection to the distribution main.

Remote hydraulic design basis areas shall be 1500 sq-ft with the dimension parallel to the branch line at least 1.2 times the square-root of the area.

The automatic sprinkler system hydraulic calculations shall be based on the following criteria and shall be in accordance with NFPA 13 and/or NFPA 14 as amended by the SBC.

3. Verify the following water supply flow test with the Fire Department:
- a. Static pressure: 50 psi
 - b. Residual pressure: 35 psi
 - c. Flow: 1100 gpm
4. Verify by means of hydraulic calculations that velocities in fire sprinkler piping shall not exceed 20 feet per second at a maximum design flow rate within each system.
- C. All devices and equipment shall be UL listed and FM approved.
- D. Cutout disks, which are created by cutting holes in the walls of pipe for non-threaded pipe connections, shall be wired near the pipe where they originated. They shall be displayed for 6 months after the sprinkler system is completed.
- E. All sprinkler heads which protect the lowest landing of stairway enclosures shall be installed with listed sprinkler head guards.

PART 2 - PRODUCTS

- 2.1 Materials used shall be free of Asbestos, PCP and other carcinogenic materials.
- 2.2 All materials shall be new and of highest quality, made in the U.S.A.

2.3 SUBSTITUTIONS

All reference to manufacturers or supplier's model numbers and other pertinent information are supplied to establish minimum standards of performance, function and quality. Equivalent equipment (FM approved) may be substituted for that specified. The submitted equipment shall equal or exceed the quality, performance, functions and features of the specified equipment. The supplier of the non specified equipment must obtain approvals as required by Specification for Substitutions and Product Options.

FIRE STATION 54

PROJECT 10914

2.4 GENERAL

All protection equipment and devices shall be UL listed and FMRC approved for the service required and shall be installed in conformance with NFPA 13. The electrical installation shall conform to the National Electrical Code (NEC). Hose threads shall conform to local fire bureau standards if so applicable.

2.5 SPRINKLER HEADS

- A. All sprinkler heads shall be UL listed and FM approved, quick response sprinkler heads and with a temperature of 155°F, "K" factor of 5.60.
- B. Approved corrosion-proof sprinkler heads shall be installed in areas subject to corrosive atmospheres or exposed to weather.

PART 3 - EXECUTION**3.1 PRE-CONSTRUCTION MEETING**

- A. Convene minimum one week prior to commencing any work of this section.
- B. Notify design professional, construction manager, and other coordinating trade representatives in a timely manner to attend the meeting.

3.2 INSTALLATION

- A. Workmanship shall be of the highest quality, conforming to the best standard practices of this trade and as stipulated by the applicable codes and regulations as herein specified.
- B. The work shall be carefully laid out in advance and no excessive cutting of construction shall be permitted.
- C. The sprinkler systems shall be installed so that no part shall interfere with doors, windows, heating, air conditioning, plumbing or electrical equipment.
- D. Sprinkler piping shall be installed so that the system may be drained. Sprinkler pipes may be installed level. Trapped piping should be drained by auxiliary drains.
- E. Ductwork, greater than four feet in width in areas required to be sprinklered, shall be provided with sprinklers above and below the ductwork.
- F. Identification Signs. Attach properly lettered approved metal signs conforming to NFPA No. 13 to each valve and alarm device. Permanently affix hydraulic sprinkler design data nameplates to the riser of each system.

3.3 DAMAGE

The contractor shall be responsible for any damage to the work by others, to the building, property, and materials of others caused by leaks in the fire protection systems equipment, damage from unplugged or disconnected pipes and/or fittings, and shall pay for the necessary replacement and/or repair for work and/or items damaged during the installation and testing periods of these systems.

FIRE STATION 54

PROJECT 10914

3.4 TESTING AND INSPECTION**A. General.**

Reports of any testing during installation shall be forwarded to the Owner's representative.

B. Formal Inspection and Tests.

The Owner, Owner's representative, insurance company representatives, Global Risk Consultants and the local Fire Department will witness formal tests and approve all systems before they are accepted. The request for formal inspection shall be submitted at least 15 days prior to the date the inspection is to take place. An experienced technician regularly employed by the sprinkler installer shall be present during the inspection. At the inspection, any or all of the required tests shall be repeated as directed. Defects in the work provided by the contractor shall be corrected and additional tests performed until it has been demonstrated that the systems comply with all contract requirements. All appliances, equipment, electricity, instruments, connecting devices, and personnel for the tests shall be furnished by the Contractor. The Owner will furnish water for the tests.

C. Acceptance.

Acceptance of the automatic sprinkler work shall be based upon the inspection and tests of the completed installation by representatives of the authorities having jurisdiction and the Owner's representative.

END OF SECTION 211313

FIRE STATION 54

PROJECT 10914

**SECTION 212201
FM-200 FIRE SUPPRESSION SYSTEM**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

- A. The Contract Documents are fire protection engineering documents as defined under Florida Statutes, Chapter 61G15-32 amended 03-26-09, and are intended to demonstrate the engineering parameters of the fire protection system.
- B. The Contractor shall furnish all labor, equipment and material for preparation of working drawings and complete installation of the clean agent fire suppression system with automatic detection and control as indicated on the Drawings and specified herein.
- C. Work includes piping, valves, control panel, nozzles, alarms, detectors, agent storage tanks, hangers, supports, restraints, spare parts, equipment, identification signage and related work.
- D. Work includes preparing system working drawings and hydraulic calculations. Hydraulic calculations shall be by manufacturer's Flow Calculation Program for an Engineered System.
- E. All work shall be performed by a State Licensed Fire Protection Contractor.

1.3 SUBMITTALS

- A. The Contractor shall submit shop drawings (layout or working drawings) on equipment, controls, accessories, fabrication work, and certified tests in accordance with the requirements of Section 01340 - Shop Drawings, Product Data and Samples.
- B. Prepare and submit a complete set of detailed working drawings and hydraulic calculations as defined by NFPA 2001, Chapter 5. These working drawings shall be submitted to the Engineer with the hydraulic calculations. Drawings and hydraulic calculations shall also be submitted to the Authority Having Jurisdiction (AHJ) and Owner's insurance underwriter. The drawings shall include but not limited to the following:

FIRE STATION 54

PROJECT 10914

1. Drawings shall be coordinated with the mechanical and electrical drawings, and the reflected ceiling plans. The Contractor shall locate the heads so as to avoid interference with lighting, air ducts and air outlets. Locations for mechanical and electrical items shall have priority over sprinkler piping and head locations. Where sprinkler heads are to be installed on modular ceiling panels, heads shall be located in the center of the ceiling panel. Where heads are to be installed in drywall or plaster ceilings, they shall be arranged in a symmetrical pattern with the other heads and ceiling mounted light fixtures and HVAC grilles as acceptable to the Engineer.
2. Plan and Elevation Drawings shall have a scale of not less than 1/4"=1'-0" detailing the location of all agent storage tanks, nozzle locations and sizes, pipe runs including pipe sizes and lengths, control panels, detectors, manual pull stations, abort stations, audible and visual alarms.
3. Auxiliary details and information for maintenance panels, door holders, special room sealing requirements, room-pressure relief requirements and equipment shutdown.
4. Separate layout, or drawings, shall be provided for each level, (i.e.; room, under floor, and above ceiling) and for mechanical and electrical work.
5. A separate layout or drawing shall show isometric details of agent storage containers, mounting details, proposed pipe runs and sizes, and symbol legend.
6. Electrical layout drawings shall show the location of all devices and include point-to-point conduit runs and a description of the method(s) used for detector mounting. Provide field wiring and conduit sizes.
7. Provide an internal control panel wiring diagram which shall include power supply requirements and field wiring termination points.
8. Separate drawing providing symbol electrical and control symbol legend to identify symbols used.
9. Annunciator wiring schematics and dimensioned display panel illustration shall be provided.
10. Complete UL listed hydraulic flow calculations shall be provided for all Clean Agent Systems. Calculation sheet(s) must include the manufacturer's name and UL listing number verification. The individual sections of pipe and each fitting to be used, as shown on the isometrics, shall be identified and included in the calculation. Total agent discharge time shall be shown and detailed by zone. Total required agent storage capacity shall be shown.
11. Provide calculations for the battery stand-by power supply taking into consideration the power requirements of all alarms, initiating devices and auxiliary

FIRE STATION 54

PROJECT 10914

components under full load conditions.

12. A complete sequence of operation shall be submitted detailing all alarm devices, shutdown functions, remote signaling, damper operation, time delay and agent discharge for each zone or system.
- C. Operation and Maintenance Manuals: Provide complete operation and maintenance instruction manuals prior to Owner training and final system acceptance. All aspects of system operation and maintenance shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written description of the system, sequence of operation and drawing(s) illustrating control logic and equipment used in the system. Checklist and procedures for emergency situations, troubleshooting techniques, maintenance operations and procedures shall be included in the manual.

FIRE STATION 54

PROJECT 10914

- D. **As-Built Drawings:** Upon completion of each system, the installing Contractor shall provide as-built drawings in accordance with Division 1. The drawings shall show installation details including all equipment locations (i.e.; control panel(s), agent containers, detectors, alarms, manuals and abort stations) as well as piping and conduit routing details. Show all room or facility modifications, including door and/or damper installations completed.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to the Project Site under the provisions of Division 1.
- B. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- C. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.
- D. Protect openings in casing and seal them with plastic wrap to keep dirt and debris. Protect from entry of dirt and debris with pipe caps or plugs. All pipes shall be either capped or plugged until installed.

1.5 MANUFACTURER'S INSTRUCTIONS

- A. Installation of all equipment shall be in accordance with manufacturer's data.
- B. All changes from the installation procedures in manufacturers' data shall be submitted for approval in accordance with the requirements for shop drawings.
- C. Keep all manufacturers' data provided in a secure manner at the job site at all times. Catalog and index this data for convenient reference.
- D. Manufacturers' data shall be available for the information of the Owner, Engineer and the use of other trades.
- E. Turn over all data to the Owner through the Owner's representative at completion of the Work and final testing.
- F. Submit all instruction books and manuals in accordance with Division 1.

1.6 CODES, PERMITS AND STANDARDS

- A. The Contractor shall obtain and pay for all permits (unless specifically excluded under Division 1 requirements) and shall comply with all laws and codes that apply to the Work.
- B. The Contractor shall be responsible for all added expense due to his choice of equipment, materials or construction methods.

FIRE STATION 54

PROJECT 10914

- C. All work and materials shall be in full accordance with the latest State rules and regulations or publications including those of the State Fire Marshall, the Florida Mechanical and Energy Codes, and all local codes. Nothing in the Plans and/or Specifications shall be construed to permit work not conforming to the above codes, rules and regulations.
- D. All equipment, materials and installations shall conform to the requirements of the most recent edition with latest revisions, supplements and amendments of the following, as applicable.
1. Florida Building Code (2007) edition.
 2. National Fire Protection Association:
 - a. NFPA No. 2001-Clean Agent Fire Extinguishing Systems (2004) edition.
 - b. NFPA No. 70-National Electrical Code (2008) edition.
 - c. NFPA No. 72-Standard for Protective Signaling (2010) edition.
 3. State and local codes, ordinances and statutes.
 4. Underwriters Laboratories (UL).
 5. Americans with Disabilities Act of 1990 [ADA], including changes made by the ADA Amendments Act of 2008 (P.L. 110-325).
 6. Requirements of the Authority Having Jurisdiction (AHJ).
 7. Others as listed below.

1.7 QUALITY ASSURANCE

- A. All material and equipment shall be the latest design, new, not deteriorated, and the first quality standard product of manufacturers regularly engaged in the production of such material and equipment.
- B. When two or more units of the same class of material or equipment are required, they shall be products of a single manufacturer.
- C. All work shall be performed in a neat and workmanlike manner by workers skilled in their respective trades, and all materials and equipment shall be installed as recommended by the manufacturers and in accordance with specified codes and standards.
- D. Manufacturer:
1. The manufacturer of the suppression system hardware and detection components shall be ISO 9000 registered.
 2. The name of the manufacturer shall appear on all major components.
 3. All devices and equipment shall be UL listed and/or FM approved.
 4. Locks for all cabinets shall be keyed alike.
- E. Installer:
1. The installing Contractor shall be trained by the equipment supplier to layout, install, test and maintain fire suppression systems.

FIRE STATION 54

PROJECT 10914

2. The installing contractor shall be an experienced firm regularly engaged in the installation of automatic Clean Agent, or similar, fire suppression systems in strict accordance with all applicable codes and standards.
3. The installing Contractor must have a minimum of five (5) years experience in the layout, installation and testing of Clean Agent, or similar, fire suppression systems. A list of systems of similar nature and scope shall be provided on request. The installing Contractor shall maintain, or have access to, a Clean Agent recharging station. The installing Contractor shall provide proof of his/her ability to recharge the largest Clean Agent system within 24 hours after a discharge. Include the amount of bulk agent storage available.
4. The installing Contractor shall be an authorized stocking distributor of the Clean Agent system equipment so that immediate replacement parts are available from inventory.
5. The installing Contractor shall show proof of emergency service available on a twenty-four-hour-a-day, seven-day-a-week basis.

PART 2 - PRODUCTS**2.1 GENERAL**

- A. Provide materials and equipment which are standard products of a manufacturer regularly engaged in the manufacture of such products and that essentially duplicate items that have been in satisfactory use for at least five (5) years prior to bid opening.
- B. Provide materials and equipment that have been tested by Underwriters Laboratories, Inc. (UL) and are listed and/or approved by Factory Mutual (FM). Where the terms "listed" or "approved" appear in this specification, such shall mean UL and/or FM.

2.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. The system shall be a total flood CLEAN-AGENT Suppression System. Furnish piping offsets, fittings, and any other accessories as required to provide a complete installation and to eliminate interferences with other construction. Install system over and under ducts, piping and platforms when such equipment can negatively affect or disrupt the discharge pattern and coverage. The system shall be designed and installed in accordance with NFPA 2001.
- B. The system shall provide a CLEAN-AGENT minimum design concentration of 7.2% by volume for Class A and Class C hazards, in all areas and/or protected spaces, at the minimum anticipated temperature of 60°F and the maximum anticipated temperature of 80°F. System design shall not exceed 10.5% for normally occupied spaces with provisions for room evacuation before agent release.
- C. Clean Agent discharge time shall not exceed ten (10) seconds.
- D. The system shall be complete in all ways. It shall include all mechanical and electrical installation, all detection and control equipment, agent storage

FIRE STATION 54

PROJECT 10914

containers, CLEAN-AGENT, discharge nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, caution/advisory signs, functional checkout and testing, training and all other operations necessary for a functional, UL Listed and/or FM approved CLEAN-AGENT Suppression System.

- E. Provide two (2) inspections during the first year of service. Inspections shall be made at 6-month intervals commencing when the system is first placed into normal service.
- F. The General Contractor shall be responsible for sealing and securing the protected spaces against agent loss and/or leakage during the 10-minute "hold" period.
- G. The system(s) shall be actuated by photoelectric detectors installed for maximum area coverage of 250 square feet per detector in protected spaces. If the airflow is one air change per minute, photoelectric detectors shall be installed for maximum area coverage of 125 square feet per detector in accordance with NFPA No. 72.
- H. Detectors shall be Cross-Zoned detection requiring two detectors to be in alarm before release.
- I. The pipe system layout shall be verified by the system manufacturer's calculation program prior to installing the system.

2.3 SEQUENCE OF OPERATION FOR EACH PROTECTED AREA

- A. Alarm Phase I: When any one (1) detector, within the protected space, goes into alarm the following shall occur:
 - 1. Bell(s) shall sound the first alarm tone.
 - 2. Alarm contacts shall alarm the Building Fire Alarm System.
- B. Alarm Phase II: Actuation of any other 2nd detector, within the protected space, the following shall occur:
 - 1. Horn/Strobe(s) shall sound the second alarm tone (non-silenceable 60-pulse-per-second).
 - 2. Begin the 30-second discharge countdown.
 - 3. Appropriate air handlers/fans shall shut down and damper(s) close.
- C. Alarm Phase III: Agent Discharge:
 - 1. After the 30-second time delay has expired the initiator shall be activated to release the fire-extinguishing agent.
 - 2. Upon discharge, discharge warning visual strobes shall activate continuously at all entrances to the protected area.
 - 3. The non-silenceable second alarm tone shall become a non-silenceable continuous discharge tone.
- D. Manual Station Operation:

FIRE STATION 54

PROJECT 10914

- 1 Manual discharge devices shall be provided in the protected space at all of the exits.
- 2 When a manual release station is activated the following shall operate:
 - a. Alarm contacts shall activate the Building Fire Alarm.
 - b. The Clean Agent Cylinders shall discharge.
 - c. The horn/strobes shall sound a non-silenceable continuous discharge tone.
 - d. The discharge strobes shall activate.
 - e. The appropriate air handlers/fans shall shutdown and damper(s) close.
4. Labeling: Locate engraved label adjacent to each manual pull station indicating area protected, and that actuation will cause discharge of fire extinguishing agent.

E. System Abort Station Operation:

1. When an abort station is activated the following shall occur:
 - a. The 30-second delay (which is activated by (2) alarms in the protected space) shall be interrupted. The time shall be reset back to its original value of 30 seconds and hold there until the abort button is released, at which time the system resumes its countdown to discharge. The activation of a manual release station shall override the abort function (even if the abort is active), which shall result in immediate discharge of the Clean Agent.
2. Each switch shall be permanently labeled "System Abort". These stations shall be located at each protected space exit.

2.4 TROUBLE OPERATION DESCRIPTION

- A. Trouble Conditions: The system shall provide the following sequence of operation for any trouble condition:
1. Display a custom message identifying the device in trouble.
 2. Record the event in the system control panel's nonvolatile RAM memory buffer for post event recall and analysis.
 3. Send a trouble signal via dry contact closure to the building fire alarm control panel.

2.5 SIGNS AND NAMEPLATES

- A. All equipment shall have a nameplate that identifies the manufacturer's name, address, type or style, model or serial number, and catalog number.
- B. Signs shall be provided to comply with NFPA 2001 and the recommendations of CLEAN-AGENT equipment supplier.
1. At each horn/strobe within the protected space: "WARNING, when Alarm Sounds Vacate at Once Extinguishing Agent Being Released"
 2. At each strobe outside the protected space: "CAUTION, When Light Is

FIRE STATION 54

PROJECT 10914

- Flashing Agent Has Discharged”
3. At each door entering the protected space: “Keep Door Closed Area Protected By Clean Agent Fire Suppression System”
 4. Release sign: This sign shall identify each system release station associated with the system.
 5. Abort sign: This sign shall identify each system abort station associated with the system.
 6. Signs shall be red with engraved white lettering. Lettering shall be at least 3/16 inch high.
- C. Pipe Markers: Pipe Markers shall comply with the most recent ANSI / ASME A13.1 2007 Standard. Markers shall be rated for both indoor and outdoor applications. Marker shall completely wrap around the pipe. Safety red background with white letters: “Clean Agent Fire Suppression”.

2.6 CLEAN-AGENT AGENT STORAGE AND DISTRIBUTION

- A. Each system shall have its own supply of clean agent.
- B. The system layout can be modular, central storage, or a combination of both layout criteria.
- C. Each supply shall be located within the hazard area, or as near as possible, to reduce the amount of pipe and fittings required for the system.
- D. The clean agent shall be stored in standard agent storage containers. Containers shall be UL Listed and FM Approved and meet DOT requirements. Containers shall be painted red. Containers shall be super-pressurized with dry nitrogen to an operating pressure of 360 psig @ 70°F. Containers shall be of high-strength low alloy steel construction and conform to NFPA 2001.
- E. Containers shall be actuated by a resettable electric actuator with mechanical override located at each agent container or connected bank of cylinders. Non-resettable or explosive devices shall not be permitted.
- F. Each container shall have a pressure gage and low pressure switch to provide visual and electrical supervision of the container pressure. The low-pressure switch shall be wired to the control panel to provide an audible and visual “Trouble” alarms in the event the container pressure drops below 247 psig. The pressure gage shall be color coded to provide an easy, visual indication of container pressure.
- G. Each container shall have a pressure relief provision that automatically operates before the internal pressure exceeds 750 psig. Design, fabricate, certify, and stamp cylinders in accordance with ASME Section VIII.
- H. Agent storage containers shall be floor mounted and shall include bracket/strap assemblies designed to withstand 1,000 pounds thrust for 10 seconds.
- I. Engineered discharge nozzles shall be provided within the manufacturer’s guidelines to distribute the CLEAN-AGENT throughout the protected spaces. The

FIRE STATION 54

PROJECT 10914

nozzles shall be designed to provide proper agent quantity and distribution.

1. Nozzles shall be available in 1/2 inch through 2 inch pipe sizes. Each size shall be available in 180° and 360° distribution patterns.
 2. Ceiling plates shall be used with the nozzles to conceal pipe entry holes through ceiling tiles.
 3. Nozzles shall have custom orifice sizing.
 4. Nozzles shall be UL Listed and FM Approved.
- ↓
- Distribution piping and fittings shall be installed in accordance with the Manufacturer's requirements, NFPA 2001 and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using accepted practices and quality procedures. All piping shall be adequately supported and anchored at all directional changes and nozzle locations.
1. Provide pipe and fittings with no burst pressure less than 600 psig operating pressure.
 2. Provide check valves in manifold piping systems.
 3. All piping must be solidly anchored to walls, building structure, etc., for support and thrust block. Piping support shall be in accordance with ASME B31.1 with allowance for fire extinguishing agent thrust forces, and thermal expansion and contraction.
 4. Distribution piping shall be galvanized Schedule 40 steel pipe, ASTM A53, Grade B, ERW in sizes up to eight (8) inches. Fittings shall be threaded or grooved, galvanized 300lb malleable iron conforming to ASTM A197. All piping must be reamed, blown clear, and swabbed with appropriate solvents to remove burrs, mill varnish, and cutting oil before assembly. The piping network shall be free of particulate matter and oil residue before installation of nozzles. Pipe dope shall be used for screwed fittings, and shall be applied to male threads.

2.7 CONTROL PANEL

- A. System control panel shall process all input signals, sequence the level of alarms, and provide outputs to the extinguishing agent storage containers. Auxiliary outputs and dry contacts shall be available to shut down fans, activate dampers, and annunciate to remote devices.
- B. The system shall have standby batteries and charger for continuous operation of system function to provide a minimum of 24 hours of emergency power plus ten (10) minutes of alarm. The control panel shall provide automatic battery switch-over upon failure of primary power supply.
- C. Control Panel shall be UL listed.
- D. Input Voltage: 110/120 VAC, 60 Hz. Provide power supply surge suppression.
- E. Control panel shall be Pyro-Chem Model Autopulse 542R Agent Releasing Control Unit, or approved equal.

2.08 SMOKE DETECTORS

FIRE STATION 54

PROJECT 10914

- A. Smoke detectors shall be System Sensor 100 Series, Model 2151 photoelectric type, or approved equal.

2.09 AGENT RELEASE STATION

- A. Agent release stations shall be NOTIFIER Model NBG-12LR and 12LRA, or approved equal.

2.10 CLEAN AGENT

- A. The agent shall be FM-200; HFC 227ea, heptafluoropropane. The physical and chemical properties shall conform to the requirements of NFPA 2001.

2.11 MANUFACTURER

1. PYRO-CHEM. Factory Authorized Contractor: United Fire Protection, Inc. 12001 31st Ct. N, St. Petersburg, FL 33716. 888-822-5544
2. Kidde Fire Systems.
3. FIKE Corporation.
4. Or approved equal.

2.12 PIPE HANGERS AND SUPPORTS

- A. All pipe hangers and supports shall be manufactured to comply with the latest edition of MSS-SP-58. Products shall conform to ANSI/ASME Code for Pressure Piping, B31.1; UL; FM; and Metal Framing Manufacturers Association, MFMA-2.
- B. Manufacturer:
 1. TOLCO.
 2. Bee-Line.
 3. ERICO.
 4. Or approved equal.
- C. Material: Hangers and accessories shall be galvanized steel to G90 specification.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Comply with applicable requirements of NFPA 2001, NFPA 70 and NFPA 72.
- B. The system shall be installed by the manufacturer or its authorized representative as indicated and in accordance with the approved shop drawings and manufacturer's installation instructions and recommendations.
- C. Installation shall not be started until the submittal is approved by the Engineer and AHJ.
- D. Install escutcheons on pipes passing through walls, partitions, floors and ceiling.

FIRE STATION 54

PROJECT 10914

- E. Install control panels, wiring and conduit in accordance with Division 16 requirements.
- F. Securely support piping in accordance with ASME B31.1 with allowance for fire extinguishing agent thrust forces and thermal expansion and contraction.
- G. Use grooved mechanical couplings and fasteners only in accessible locations. Roll groove piping only.
- H. Install unions downstream of valves and at equipment or apparatus connections. Identify in accordance with NFPA 2001 requirements. Place pipe marker label wherever piping changes direction and minimum 20 feet on straight runs.
- I. Secure cylinders as indicated on Drawings. For each system provide same size cylinders containing equal amount of agent.
- J. In rooms with suspended ceiling tiles, clip or retain tiles within 4-foot radius of nozzles to prevent lifting during discharge.
- K. Make final connections between equipment and system wiring under direct supervision of factory trained representative of manufacturer.
- L. Install engraved plastic instruction plate, detailing emergency procedures, at control panel and at each manual discharge and abort switch location. At control panel identify control logic units, contacts, and major circuits with permanent nameplates.
- M. Fire-seal all penetrations through fire rated walls, ceilings and floors.
- N. Pack and caulk air tight all penetrations through non fire rated walls, ceiling and floors.
- O. Locate discharge nozzle approximately 6 inches below dropped ceiling and/or structural ceiling and 6 inches below raised floors. Avoid interference with other piping and equipment.
- P. Locate remote manual releases at one or more doors to protect area where indicated. Locate dead man abort switch adjacent.
- Q. Route piping in orderly manner, concealed, plumb and parallel to building structure, and maintain gradient. Install piping to conserve building space, and not interfere with use of space and other work.

3.2 TESTING AND MAINTENANCE

- A. Contractor shall provide all necessary instrumentation, tools, ladders, and labor etc. to complete all tests and adjustments.
- B. All tests described and referenced in these specifications shall be performed by the Contractor in the presence of the Authority Having Jurisdiction and the Owner's representative. Provide 48 hour notice before calling for final acceptance test.

FIRE STATION 54

PROJECT 10914

Contractor shall be solely responsible for the protection and safeguarding of his work and shall provide every protection against accidents, injury, and damage to persons and property.

- D. Tests shall demonstrate that the operation and installation requirements of this specification have been met. Submit certified copies of tests in accordance with Article 1.03.A.
1. Functional Tests: Tests shall determine that the entire control system functions as designed. All circuits shall be tested including automatic discharge, manual discharge, and equipment shutdown and alarm devices. In addition, supervision of each circuit shall be tested.
 2. Design Review Test: Take field measurements of the room and field calculate the amount of clean agent required to reach the design criteria, and match against the contents of the clean agent storage containers.
 3. Pressurization Test: Conduct a door fan test to determine the overall containment capacity of the clean agent protected area, and equivalent leakage area of the room. The room shall be fan tested in accordance with NFPA 2001 Annex C. A retention time of at least 10 (ten) minutes shall be achieved. The Contractor shall be an authorized user of the fan test equipment. The calibrated fan unit shall be used to pressurize or depressurize the area with all air conditioning shutdown and dampers closed, and monitor airflow versus pressure data. The results shall be used to calculate a pass or non-pass conclusion. A manufacturer-approved testing unit and program shall be used for this test.
 4. Piping Test and Review: Make a field verification of the piping network and match against the layout drawing and manufacturer's flow calculation program. All significant variations will require recalculation of the piping system.
 - a. A distribution piping and valve, prior to nozzle installation pressurization test shall be conducted that requires 150 psig to be held for 10 minutes with no more than 5 percent pressure drop. Inspect joints using soap water solution or halide torch or lamp, replace and retest as require.
 - b. A "puff" test using dry nitrogen shall be conducted. Caps shall be placed over all discharge nozzles and adequate pressure shall be supplied o demonstration that all of the caps will blow off indicating that the pipes are free of obstructions.
 5. Upon completion of installation provide final checkout inspection by factory- trained representative of manufacturer to ascertain proper system operation. Leave system in a fully commissioned and automatic readiness state with circuitry energized and supervised.
 6. Submit original copies of tests, indicating that factory trained technical representatives of the manufacturer have inspected and tested

FIRE STATION 54

PROJECT 10914

systems and are satisfied with methods of installation, connections and operations.

3.3 TRAINING AND INSPECTIONS

- A. Training Requirements: Provide complete system operation training of at least four hours for Owner's maintenance personnel in accordance with Division 1.
- B. Fire Suppression System Inspections:
 - 1. Provide two inspections of the system during the one-year warranty period. The first inspection shall be six months after system acceptance and the second after 12 months. Inspections shall include the determination of agent container weight and pressure and that the mechanical systems are in proper working order.
 - 2. Inspections shall include a complete checkout of the control and alarm system and test that all interlocking systems are functioning properly.
 - 3. Documents certifying satisfactory system conditions shall be submitted upon completion of each inspection.

3.4 CLEANING

- A. Clean dirt and marks and other debris from exterior of work and building surfaces weekly. Remove debris and waste material resulting from installation weekly.

3.5 GUARANTEE

- A. All components, parts, and assemblies shall be guaranteed against defects in materials and workmanship for a period of one (1) year. The period of such warranties shall start on the date the particular equipment is placed in use by the Owner with corresponding start-up certification provided by the Authority Having Jurisdiction as specified herein, provided that the equipment demonstrates satisfactory performance during the thirty day operational period after the equipment startup. If the equipment does not perform satisfactorily during the thirty day operational period, the start of the warranty period will be delayed until the equipment demonstrates proper operation. The Contractor shall repair or replace without charge to the Owner any part of system which is defective or showing undue wear within the guarantee period, or replace the parts with new parts if the mechanical performance is unsatisfactory; furnishing all parts, materials, labor, etc., necessary to return the system to its specified performance level.

END OF SECTION 212201

FIRE STATION 54

PROJECT 10914

**SECTION 220108
BASIC PIPING MATERIALS AND METHODS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General Conditions, Special Provisions apply to work of this section.

1.2 SUMMARY

- A. This Section specifies piping materials and installation methods common to more than one section of Division 22 and includes joining materials, piping specialties, and basic piping installation instructions.
- B. Related Sections:
1. Division 22 "Basic Mechanical Requirements" section applies to the work at this Section.
 2. Piping materials and installation methods peculiar to individual systems are specified within their respective system specification sections of Division 22.
 3. Valves are specified in a separate section and in individual piping system sections of Division 22.
 4. Supports and Anchors are specified in a separate section of Division 22.
 5. Mechanical Identification is specified in a separate section of Division 22.
 6. Fire Barrier Penetration Seals specified in Division 22 Section: "Basic Mechanical Materials and Methods".

1.3 SUBMITTALS

- A. Refer to General Conditions, Special Provisions, Division 1 Sections and Basic Mechanical Requirements for administrative and procedural requirements for submittals.
- B. Product Data: Submit product data on the following items:
1. Escutcheons
 2. Dielectric Unions and Fittings
 3. Mechanical Sleeve Seals
 4. Strainers
- C. Quality Control Submittals:
1. Submit welders' certificates specified in Quality Assurance below.

1.4 QUALITY ASSURANCE

- A. Welder's Qualifications: All welders shall be qualified in accordance with ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing

FIRE STATION 54

PROJECT 10914

Qualifications.

- B. Welding procedures and testing shall comply with ANSI Standard B31.1.0 - Standard Code for Pressure Piping, Power Piping, and The American Welding Society, Welding Handbook.
- C. Soldering and Brazing procedures shall conform to ANSI B9.1 Standard Safety Code for Mechanical Refrigeration.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Provide factory-applied plastic end-caps on each length of pipe and tube. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.
- B. Protect stored pipes and tubes. Elevate above grade and enclose with durable, waterproof wrapping. When stored inside, do not exceed structural capacity of the floor.
- C. Protect flanges, fittings, and specialties from moisture and dirt by inside storage and enclosure, or by packaging with durable, waterproof wrapping.
- D. Contractor is responsible for obtaining a "hot work permit" from Fire and/or Building Department to perform welding indoors. Comply with latest requirements.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Manufacturer uniformity: conform with the requirements specified in Division 1.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering piping materials and specialties which may be incorporated in the work include, but are not limited to, the following:
 - 1. Pipe Escutcheons:
 - a. Chicago Specialty Mfg. Co.
 - b. Sanitary-Dash Mfg. Co.
 - c. Grinnell
 - 2. Dielectric Waterway Fittings:
 - a. Epco Sales, Inc.
 - b. Victaulic Company of America
 - 3. Dielectric Unions:
 - a. Eclipse, Inc.
 - b. Perfection Corp.
 - c. Watts Regulator Co.

4. Strainers:
 - a. Armstrong Machine Works.
 - b. Hoffman Specialty ITT; Fluid Handling Div.
 - c. Metraflex Co.
 - d. Spirax Sarco.
 - e. Trane Co.
 - f. Victaulic Co. of America. (low pressure applications only)
 - g. Watts Regulator Co.
5. Mechanical Sleeve Seals:
 - a. Thunderline Corp.

2.2 PIPE AND FITTINGS

- A. Refer to the individual piping system specification sections in Division 22 for specifications on piping and fittings relative to that particular system.

2.3 JOINING MATERIALS

- A. Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code and with ASME B31.1 Power Piping Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.
- B. Brazing Materials: Comply with Section IX, ASME Boiler and Pressure Vessel Code and ASME Code for Power Piping Section B31.1 for brazing filler metal materials appropriate for the materials being joined.
- C. Soldering Materials: Refer to individual piping system specifications for solder appropriate for each respective system.
- D. Gaskets for Flanged Joints: Gasket material shall be full-faced for cast-iron flanges and raised-face for steel flanges. Select materials to suit the service of the piping system in which installed and which conform to their respective ANSI Standard (A21.11, B16.20, or B16.21). Provide materials that will not be detrimentally affected by the chemical and thermal conditions of the fluid being carried.

2.4 PIPING SPECIALTIES

- A. Escutcheons: Chrome-plated, stamped steel, hinged, split-ring escutcheon, with set screw. Inside diameter shall closely fit pipe outside diameter or outside of pipe insulation where pipe is insulated. Outside diameter shall completely cover the opening in floors, walls, or ceilings.
- B. Unions: Malleable-iron, Class 150 for low pressure service and class 250 for high pressure service; hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.
- C. Dielectric Unions: Provide dielectric unions with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged), which

effectively isolate dissimilar metals, prevent galvanic action, and stop corrosion.

- D. Dielectric Waterway Fittings: electroplated steel or brass nipple, with an inert and non-corrosive, thermoplastic lining.
- E. Y-Type Strainers: Provide strainers full line size of connecting piping, with ends matching piping system materials. Screens shall be 20 mesh monel for pipes 2 inches and smaller. For pipes 2 1/2 inches through 4 inches use 1/16 inch perforations on 304 SS screen; pipes 6 inches and over use 1/8 inch perforation on 304 SS screen, with 3/64" perforations at 233 per square inch.
 - 1. Provide strainers with 150 psi working pressure rating for low pressure applications.
 - 2. Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
 - 3. Threaded Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 - 4. Flanged Ends, 2-1/2" and Larger: Cast-iron body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 - 5. Butt Welded Ends, 2-1/2" and Larger for Low Pressure Application: Schedule 40 cast carbon steel body, bolted screen retainer with off-center blowdown fitted with pipe plug.
 - 6. Grooved Ends, 2-1/2" and Larger: Tee pattern, ductile-iron or malleable-iron body and access end cap, access coupling with EDPM gasket.
- F. Sleeves:
 - 1. Sheet-Metal Sleeves: 10 gage, galvanized sheet metal, round tube closed with welded longitudinal joint.
 - 2. Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A53, Grade A.
- G. Mechanical Sleeve Seals: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and sleeve, connected with bolts and pressure plates which cause rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ream ends of pipes and tubes, and remove burrs. Bevel plain ends of steel pipe.
- B. Remove scale, slag, dirt, and debris for both inside and outside of piping and fittings before assembly.

3.2 INSTALLATIONS

- A. General Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location, routing and arrangement of the piping systems. Location and arrangement of piping layout take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated. Refer to individual system specifications for requirements of drawing submittals.
- B. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated otherwise.
- C. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.
- D. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted, unless expressly indicated on the Drawings.
- E. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Provide space to permit insulation applications, with 1" clearance outside the insulation. Allow sufficient space above removable ceiling panels to allow for panel removal.
- F. Locate groups of pipes parallel to each other, spaced to permit applying full insulation and servicing of valves.
- G. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4" ball valve, and short 3/4" threaded nipple and cap.
- H. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals. Pipe sleeves smaller than 6" shall be steel; pipe sleeves 6" and larger shall be sheet metal.
- I. Fire Barrier Penetrations: Where pipes pass through fire rated walls, partitions, ceilings, or floors, the fire rated integrity shall be maintained.

3.3 FITTINGS AND SPECIALTIES

- A. Use fittings for all changes in direction and all branch connections.
- B. Remake leaking joints using new materials.
- C. Install strainers on the supply side of each control valve, pressure reducing or regulating valve, solenoid valve, and elsewhere as indicated.
- D. Install unions adjacent to each valve and at the final connection to each piece of equipment and plumbing fixture having 2" and smaller connections, and elsewhere as indicated.
- E. Install Flanges in piping 2-1/2" and larger, where indicated, adjacent to each valve, and at the final connection to each piece of equipment. Provide flanges

compatible with valves, equipment and fittings as to class, rated pressure and working dimensions.

- F. Install dielectric fittings to connect piping materials of dissimilar metals in wet piping systems.

3.4 JOINTS

A. Steel Pipe Joints:

1. Pipe 2" and Smaller: Thread pipe with tapered pipe threads in accordance with ANSI B2.1. Cut threads full and clean using sharp dies. Ream threaded ends to remove burrs and restore full inside diameter. Apply pipe joint lubricant or sealant suitable for the service for which the pipe is intended on the male threads at each joint and tighten joint to leave not more than 3 threads exposed.
2. Pipe Larger Than 2":
 - a. Weld pipe joints (except for exterior water service pipe) in accordance with ASME Code for Pressure Piping, B31.
 - b. Weld pipe joints of exterior water service pipe in accordance with AWWA C206.
 - c. Install flanges on all valves, apparatus, and equipment. Weld pipe flanges to pipe ends in accordance with ASME B31.1.0 Code for Pressure Piping. Clean flange faces and install gaskets. Tighten bolts to torque specified by manufacturer of flange and flange bolts, to provide uniform compression of gaskets.

B. Non-ferrous Pipe Joints:

1. Brazed and Soldered Joints: For copper tube and fitting joints, braze joints in accordance with ANSI B31.1.0 - Standard Code for Pressure Piping, Power Piping and ANSI B9.1 - Standard Safety Code for Mechanical Refrigeration.
2. Thoroughly clean tube surface and inside surface of the cup of the fittings, using very fine emory cloth and prior to making soldered or brazed joints. Wipe tube and fittings clean and apply flux. Flux shall not be used as the sole means for cleaning tube and fitting surfaces.

- C. Joints for other piping materials are specified within the respective piping system sections.

3.5 FIELD QUALITY CONTROL

- A. Testing: Refer to individual piping system specification sections.

END OF SECTION 220108

FIRE STATION 54

PROJECT 10914

**SECTION 220109
BASIC MECHANICAL MATERIALS AND METHODS**

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General Conditions, Special Provisions apply to this Section.
- B. Requirements specified in the Section "Basic Mechanical Requirements" apply to this Section.

1.2 SUMMARY

- A. This Section includes limited scope general construction materials and methods for application with mechanical installations as follows:
 - 1. Miscellaneous metals for support of mechanical materials and equipment.
 - 2. Joint sealers for sealing around mechanical materials and equipment; and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.
 - 3. Access panels and doors in walls, ceilings, and floors for access to mechanical materials and equipment.

1.3 SUBMITTALS

- A. General: Submit the following in accordance with General Conditions, Special Provisions and Division 1 Specification Sections.
- B. Product data for the following products:
 - 1. Access panels and doors.
 - 2. Joint sealers.
- C. Welder certificates, signed by Contractor, certifying that welders comply with requirements specified under "Quality Assurance" article of this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer for the installation and application joint sealers, access panels, and doors.
- B. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel".
- C. Fire-Resistance Ratings: Where a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in the UL "Building Materials Directory" for rating shown.
 - 1. Provide UL Label on each fire-rated access door.

FIRE STATION 54

PROJECT 10914

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver joint sealer materials in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.
- B. Store and handle joint sealer materials in compliance with the manufacturers' recommendations to prevent their deterioration and damage.

1.6 PROJECT CONDITIONS

- A. Conditions Affecting Selective Demolition: The following project conditions apply:
 - 1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
 - 2. Locate, identify, and protect mechanical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
 - 3. Maintain and protect existing building services which transit the area affected by selective demolition.
- B. Environmental Conditions: Apply joint sealers under temperature and humidity conditions within the limits permitted by the joint sealer manufacturer. Do not apply joint sealers to wet substrates.

PART 2 - PRODUCTS**2.1 MECHANICAL EQUIPMENT NAMEPLATE DATA**

- A. Nameplate: For each piece of power operated mechanical equipment provide a permanent operational data nameplate indicating manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliance, and similar essential data. Locate nameplates in an accessible location. Equipment identification to comply with Section 220553.

2.2 MISCELLANEOUS METALS

- A. Steel plates, shapes, bars, and bar grating: ASTM A 36.
- B. Cold-Formed Steel Tubing: ASTM A 500.
- C. Hot-Rolled Steel Tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, Schedule 40, seamless, welded.
- E. Non-shrink, Nonmetallic Grout: Premixed, factory- packaged, non-staining, non-

FIRE STATION 54

PROJECT 10914

corrosive, nongaseous grout, recommended for interior and exterior applications.

- F. Fasteners: Zinc-coated, type, grade, and class as required.

2.3 JOINT SEALERS

- A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.
- B. Elastomeric Joint Sealers: Provide the following types:
1. One-part, non-acid-curing, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for masonry, glass, aluminum, and other substrates recommended by the sealant manufacturer.
 2. One-part, mildew-resistant, silicone sealant complying with ASTM C 920, Type S, Grade NS, Class 25, for uses in non-traffic areas for glass, aluminum, and nonporous joint substrates; formulated with fungicide; intended for sealing interior joints with nonporous substrates; and subject to in-service exposure to conditions of high humidity and temperature extremes.
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. One-Part, Nonacid-Curing, Silicone Sealant:
 1. "Chem-Calk N-Cure 2000", Bostic Construction Products Div.
 2. "Dow Corning 790", Dow Corning Corp.
 3. "Silglaze N SCS 2501", General Electric Co.
 4. "Silpruf SCS 2000", General Electric Co.
- C. Fire-Resistant Joint Sealers: Two-part, foamed-in- place, silicone sealant formulated for use in through- penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire-rated walls and floors. Sealants and accessories shall have fire- resistance ratings indicated, as established by testing identical assemblies in accordance with ASTM E 814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.
1. Products: Subject to compliance with requirements, provide UL listed product(s) of one of the following manufacturers:

"Hilti Corp."
 "3M Ceramic Materials Department".

2.4 ACCESS DOORS

- A. Steel Access Doors and Frames: Factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation. Joints

FIRE STATION 54

PROJECT 10914

and seams shall be continuously welded steel, with welds ground smooth and flush with adjacent surfaces. Slot ceiling manufacturers to provide their standard access doors.

- B. Locking Devices: Flush, screwdriver-operated cam locks.
- C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Bar-Co., Inc.
 - 2. J.L. Industries.
 - 3. Karp Associates, Inc.
 - 4. Milcor Div. Inryco, Inc.
 - 5. Nystrom, Inc.

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 installation and application of joint sealers and access panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION FOR JOINT SEALERS

- A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.
- B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

3.3 SELECTIVE DEMOLITION

- A. General: Demolish, remove, de-mount, and disconnect abandoned mechanical materials and equipment indicated to be removed and not indicated to be salvaged or saved.
- B. Materials and Equipment to be Salvaged: Remove, de-mount, and disconnect existing mechanical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the Maintenance Department for storage. Dispose of equipment and materials not wanted by The Maintenance Department.
- C. Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.
- D. Mechanical Materials and Equipment: Demolish, remove, de-mount, and disconnect the following items:

FIRE STATION 54

PROJECT 10914

1. Inactive and obsolete piping, fittings and specialties, equipment, ductwork, controls, fixtures, and insulation.
 - a. Piping and ducts embedded in floors, walls, and ceilings may remain if such materials do not interfere with the new installations. Remove materials above accessible ceilings. Drain and cap piping and ducts allowed to remain.
2. Perform cutting and patching required for demolition in accordance with Division 1 Section "Cutting and Patching".

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGE

- A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor mechanical materials and equipment.
- B. Field Welding: Comply with AWS "Structural Welding Code".

3.5 APPLICATION OF JOINT SEALERS

- A. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around mechanical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.6 INSTALLATION OF ACCESS DOORS

- A. Set frames accurately in position and securely attached to supports, with face panels plumb and level in relation to adjacent finish surfaces.
- B. Adjust hardware and panels after installation for proper operation.

3.7 SHUT DOWNS

- A. All shutdown of existing operational systems shall be coordinated with Engineering. Request for shutdowns shall be submitted not less than five working days prior to shutdown date and shall include a "Plan of Action". The Contractor shall procure the necessary shutdown forms from Engineering.
- B. Requests for utilities clearances shall be obtained not less than five working days prior to drilling or digging and shall be coordinated with Engineering. The Contractor shall procure the necessary Underground Utilities Clearance forms from Engineering.

END OF SECTION 220109

FIRE STATION 54

PROJECT 10914

**SECTION 220500
PLUMBING PIPING**

PART 1 - GENERAL

- A. Related Sections
1. 22 0510 Plumbing Specialties
 2. 22 0640 Plumbing Fixtures
- B. Reference Standards: American Society for Testing and Materials (ASTM):
1. A74-96 Specification for Cast Iron Soil Pipe and Fittings.
 2. B32-96 Specification for Solder Metal.
 3. B88-96 Specification for Seamless Copper Water-Tube.
 4. B306-96 Specification for Copper Drainage Tube (DWV).
 5. C564-95a Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- C. Submit properly identified manufacturer's literature before starting work.
- D. Shop Drawings:
1. Pipe and Fittings: Manufacturer's name and mill reports.
 2. Expansion Joints: Catalog cuts.
 3. Dielectric Unions: Catalog cuts.

1.1 COMPONENTS

1. Sanitary Sewer Piping, Above Grade.
 - a. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - (1) Fittings: Cast iron.
 - (2) Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
 - b. Copper Tube: ASTM B306, DWV.
 - (1) Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper, or ASME B16.32, solvent.
 - (2) Joints: ASTM B32, solder, Grade 50B.
2. Water Piping, Above Grade.
 - a. Copper Tubing: ASTM B88, Type L hard drawn.
 - (1) Fittings: ASME B16.18 cast copper alloy or ASME B16.22, wrought copper and bronze, solder joint, pressure type.
 - (2) Joints: ASTM B32, solder, grade 95 Tin - Antimony.

FIRE STATION 54

PROJECT 10914

3. Sanitary Vent Piping.
 - a. Smaller than 2":
 - (1) Service weight hubless cast iron with cast iron fittings, or:
 - (2) Copper, Type L, DWV wrought copper fittings.
 - b. 2" and larger:
 - (1) Service weight hubless cast iron.
4. Flanges, Unions, and Couplings.
 - a. Pipe Size 3" and Under:
 - (1) Copper tube and pipe: Class 150 bronze unions with soldered joints.
 - b. Pipe Size Over 3":
 - (1) Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
 - c. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.
5. Valves.
 - a. Provide products complying with requirements of this section from one of the following manufacturers. Model numbers are listed to establish a level of quality only. Products of other manufacturers may be provided subject to compliance with requirements of this section and Section 01630 - Substitutions and Product Options.
 - (1) Nibco.
 - (2) Milwaukee.
 - (3) Stockham.
 - (4) Hammod.
 - (5) Watts.
 - b. Ball Valves.
 - (1) Up To and Including 2":
 - (a) Manufacturer/Model:
 - (1) Nibco, Model S-595-Y-66.
 - (2) Milwaukee, Model BA-3505.
 - (3) Hammond, Model 8613.
 - (b) MSS SP-110, Class 150 PSIG, bronze body, full port, 316 stainless steel trim, blowout-proof stem, TFE seats, solder ends.
 - c. Gate Valves.

FIRE STATION 54

PROJECT 10914

- (1) 2-1/2" and 3".
 - (a) Manufacturer/Model:
 - (1) Nibco, Model T-134/S-134.
 - (2) Milwaukee, Model 1150.
 - (3) Stockham, Model B-122/B-124.
 - (4) Hammond, Model IB641/IB648.
 - (b) MSS SP-80, Class 150 PSIG, bronze body, bronze trim, rising stem, solid wedge disc, threaded bonnet, solder or screw ends, malleable iron hand wheel.
- d. Gate Valves.
 - (1) 4" and larger:
 - (a) Manufacturer/Model:
 - (1) Nibco, Model F-617-O.
 - (2) Stockham, Model G-623.
 - (3) Hammond, Model IR114OUL.
 - (b) MSS SP-70, Class 125 PSIG, iron body, bronze trim, OS & Y, bolted bonnet, solid wedge, flanged ends.

1.2 INSTALLATION

- A. Run piping as indicated in Construction Documents subject to modifications as required to suit field conditions, to avoid interference with other trades, and for proper, convenient, and accessible locations to parts of the piping system.
- B. Run piping in wall chases, recesses, pipe shafts, and hung ceilings where provided.
 - 1. Do not run water piping in floor fill.
 - 2. Run piping as high as possible under building, above ceilings, and close to slabs.
 - 3. Do not permanently close, furr in, or cover piping before examination and final tests.
- C. Run piping straight and where concealed as direct as possible with risers erected plumb and true.
 - 1. Install piping with minimum 1-inch clearance between finished pipe coverings and adjacent work.
 - 2. Support piping from structure above, maintaining maximum headroom available.
- D. Do not run piping in telephone rooms, electrical equipment rooms/closets, transformer vaults or rooms containing related equipment, or close to or above control panels, switchboards and electric motors except required branch piping to pumps.
- E. Provide control valves where noted or required for complete regulating control of

FIRE STATION 54

PROJECT 10914

- systems, plumbing fixtures, and equipment. Provide valves in accessible locations or accessible through access panels.
- F. Fittings, Valves, and Hangers on Chrome Plated Piping: Chrome plated finish to match.
- G. Provide reducing fittings for changes in pipe sizes. Bushings will not be allowed.
- H. Provide extra heavy pipe for nipples where unthreaded pipe is less than 1-1/2".
1. Do not use close nipples. Use saddle nipples.
 2. Provide galvanized iron sleeves for pipes passing through roof slabs, interior floors, ceilings, walls, or partitions.
- I. Expansion Swings:
1. Make adequate provisions for proper expansion and contraction of piping and for piping passing through building expansion joints.
 2. Make branch connections from risers with ample swing or offset to avoid strain on fittings or short pipe lengths. Anchor horizontal runs of pipe over 50 feet in length to walls or supporting structure about midway of run to allow expansion evenly divided toward ends.
 3. Provide sufficient number of elbow swings or accepted expansion joints to allow proper expansion and contraction of mains and risers.
- J. Pipe Slopes:
1. Lay horizontal soil and waste pipes, unless otherwise noted on drawings, to:
 - a. 1/8" per foot minimum for pipe 3 inches and larger
 - b. 1/4" per foot minimum for pipe less than 3 inches
 - c. Horizontal vent lines shall have a minimum grade back to the stacks or vertical lines and shall run as direct and free from bends as possible.
- K. Exposed Piping:
1. Install horizontal runs maximum 4 inches below adjacent structure and run parallel or perpendicular to walls, ceilings, beams, and columns unless otherwise noted on Construction Documents.

1.3 CLEANING AND ADJUSTING

- A. Clean fixtures, equipment, piping, and exposed work.
1. Show traps, wastes, and supplies free and unobstructed.
 2. Plated, polished bronze, or painted surfaces bright and clean.
- B. After installation, adjust valves, faucets, and automatic control devices for quiet operation. Balance system as required for proper operation.
- C. Disinfection: After cleaning and testing domestic water system, disinfect by

introducing a solution of calcium hypochlorite with 50 parts per million of chlorine.

1. Open and close all valves while system in being chlorinated. After disinfecting agent has been applied for 24 hours, test for residual chlorine at ends of pipe.
2. If less than 5 ppm is indicated, repeat process until it is equal to or greater than 5 ppm or according to AWWA C601 Standards.

1.4 TESTS

- A. Furnish necessary instruments, test equipment, and personnel required to perform tests and remove test equipment and drain pipes after tests have been made and accepted.
- B. After portions of mechanical work are completed and ready for testing, give 48 hours notice to A/E and perform tests in A/E presence.
- C. Tests may be made of isolated portions of piping to facilitate the general progress of installation.
 1. Revisions subsequently made in piping system shall require retesting of such affected portions of piping systems.
 2. Subject piping and connections to a hydrostatic or pneumatic pressure test before painting, installation of insulation or concealment.
 3. Sanitary and Storm
 - a. Apply a water test to all parts of drainage systems before pipes are concealed or fixtures set in place.
 - b. Close openings of each system to be tested tightly except highest openings above roof and fill entire system with water up to overflow point of highest opening.
 - c. Subject systems to not less than 10 feet of hydrostatic head, except uppermost 10 feet of piping directly below opening.
 - 1) Water shall remain in the systems for not less than 60 minutes after which time no leaks occur at any point and no lowering of water level at overflow point is visible.
 4. Water Supply Piping:
 - a. Apply a pressure test to water system before piping is concealed or insulated and before fixtures and equipment are connected.
 - b. Apply a hydrostatic pressure of not less than 200 psig for 2 hours, with no leaks occurring in the system.
 - 1) Water used for tests shall be obtained from a potable source of supply.

END OF SECTION 220500

FIRE STATION 54

PROJECT 10914

**SECTION 220510
PLUMBING SPECIALTIES**

PART 1 - GENERAL

A. Related Section:

1. 22 0500 Plumbing Piping
2. 22 0640 Plumbing Fixtures

B. REFERENCE STANDARDS

American Society for Testing and Materials (ASTM):

C. Submit properly identified manufacturer's literature before starting work.

D. Submit Shop Drawings/catalog cuts for the following:

1. Drains.
1. Cleanouts.
2. Shock Absorbers.
3. Unions and Flanges.
4. Hangers and Inserts.
5. Trap Resealers.
6. Vacuum Breakers.
7. Gages and Thermometers.
8. Strainers.
9. Firestop Devices.
10. Water Hammer Arrestors.

1.1 COMPONENTS

1. Provide products complying with requirements of this section from one of the following manufacturers. Model numbers are listed to establish a level of quality only. Products of other manufacturers may be provided subject to compliance with requirements of this section and Section 01630 - Substitutions and Product Options.
 - a. Josam.
 - b. Zurn.
 - c. Wade.
 - d. Smith.
 - e. Central Brass.
 - f. Woodford.
 - g. Chicago.
 - h. Ames.
 - i. Febco.
 - j. Watts Regulator Company.

FIRE STATION 54

PROJECT 10914

2. Floor Drains.
 - a. Toilet Rooms:
 - (1) Manufacturer/Model:
 - (a) Josam, Model 30000-65-50-X.
 - (b) Zurn, Model Z-415-S-IC-P.
 - (c) Wade, Model 1103G6.
 - (2) Coated cast iron floor drain, 2 piece body, double drainage flange, invertible non-puncturing flashing collar, weepholes, bottom outlet, inside caulk connection, and adjustable satin Nikaloy 6" x 6" super-flo strainer and security screws.
3. Cleanouts.
 - a. Wall:
 - (1) Manufacturer/Model: (Wall Type):
 - (a) Josam, Model 58890-15-20.
 - (b) Zurn, Model Z1460-8-VP.
 - (c) Wade, Model W-8470-R-179.
 - (2) Round stainless wall access secured cover, center vandal-proof screw and raised head bronze tapped plug.
 - b. Finished Floor:
 - (1) Manufacturer/Model:
 - (a) Josam, Model 58640-15/58490.
 - (b) Zurn, Model Z1460-VP/Z144.
 - (c) Smith, Model S-4730-U/S4450.
 - (2) Cast Nickaloy access square frame, anchor lugs, satin smooth finish, vandal-proof screws/bronze plug in a cast iron clean-out ferrule.
 - c. Unfinished Floor:
 - (1) Manufacturer/Model:
 - (a) Josam, Model 58460A-6-2-15.
 - (b) Wade, Model W8240-S-2-179.
 - (c) Smith, Model S-4333-S-PB-U.
 - (2) Cast iron floor clean-out, internal bronze plug, scoriated bronze square top with vandal-proof screws.

FIRE STATION 54

PROJECT 10914

4. Trap Primer Valves.
 - a. Precision Plumbing Products, Inc., Model Rite time , with distribut
 - b. Brass body primer, 1/2" connections, distribution unit with copper reservoir, brass fittings, clear plastic inspection cover, wall mounting brackets furnished.

5. Hose Bibbs.
 - a. Interior, Exposed Under Lavatory:
 - (1) Manufacturer/Model:
 - (a) Chicago, Model 293.
 - (b) Woodford, Model 21P-1/2.
 - (c) Central Brass, Model 576-1/2.
 - (2) 1/2" inlet, cast brass body, polished chrome plated, wall flange, tee key, hose thread end.
 - b. Provide a ball valve for shut-off control of each hose bibb, mounted directly above the bibb. This valve is not required for hose bibbs in toilet rooms that have shut-off valves on potable cold water supply.

6. Water Hammer Arrestors.
 - a. Manufacturer/Model:
 - (1) Josam 75000.
 - (2) Zurn Industries, Inc., Model Z-1700.
 - (3) Sioux Chief Mfg. Model 6.
 - b. Stainless steel shell, elastomeric bellows, pressurized argon charge, sized per PDI-WH 201 at each branch of cold and hot water.

7. Vacuum Breakers.
 - a. Hose Bibb Vacuum Breaker: Watts Regulator Co., Model No. 8A non-removable type.
 - b. Atmospheric Type: Watts Regulator Co., Model No. 288A.

1.2 Pipe Hangers and Supports:

1. Provide hangers, supports, and supplementary steel as specified for different applications.
2. Insert, Hangers, Rods, and Clamps: Figure numbers used refer to Grinnell. Fee and Mason or Elcen Metal Products are also accepted manufacturers.

FIRE STATION 54

PROJECT 10914

a. Inserts:

- 1) Universal Concrete Insert: Fig.282.
- 2) CB Junior Concrete Insert: Fig.279.
- 3) Wedge Type Concrete Insert: Fig.281.
- 4) Expansion Case: Fig.117.

b. Hangers: Adjustable clevis type.

- 1) Cast Iron Pipe: Fig.590.
- 2) Copper Tubing: Fig.CT-65.
- 3) Insulated Steel Pipe: Fig.300.
- 4) Uninsulated Steel Pipe: Fig.146.

c. Clamps:

- 1) V.F.S. beam clamp with weldless eyenut, Fig.292, clamp size 1, rod size 3/4".
- 2) C-clamp with retaining clip, Fig.87.
- 3) I-beam clamp, Fig.131.
- 4) Universal side I beam clamp, Fig.225.
- 5) C-clamp, copper finish, Fig.CT88.

d. Rods: Galvanized with continuous thread, Fig.146.

e. Riser Clamps:

- 1) Black Steel, Fig.261.
- 2) Plastic coated, Fig.261C
- 3) Copper finish, Fig.CT121.

3. Horizontal Steel:

<u>Pipe Size</u>	<u>Rod Diameter</u>	<u>Clamp or Hanger Maximum Spacing</u>
Up to 1-1/4"	3/8"	8 feet
1-1/2 and 2 inches	3/8"	10 feet
2-1/2 and 3 inches	1/2"	12 feet
4 and 5 inches	5/8"	12 feet
6 inches	3/4"	15 feet
8 inches & larger	1 inch	15 feet

4. Horizontal Copper Piping:

<u>Pipe</u>	<u>Rod Diameter</u>	<u>Clamp or Hanger Maximum Spacing</u>
Up to 1 inch	3/8"	6 feet
1-1/4 and 1-1/2"	3/8"	6 feet
2 inches	3/8"	8 feet
2-1/2"	1/2"	8 feet
3 and 4 inches	1/2"	8 feet

FIRE STATION 54

PROJECT 10914

5. Horizontal Cast Iron Piping:

<u>Pipe Size</u>	<u>Rod Diameter</u>	<u>Maximum Spacing</u>
Up to 4 inches	1/2"	5 feet
4 inches	5/8"	5 feet
6 inches and larger	3/4"	5 feet

6. Wall Support:

- a. U-clamps as accepted.
- b. Unistrut supports.

7. Vertical Support: Steel riser clamps.

8. Unions and Flanges.

- a. Copper Pipe 2-1/2" and Smaller: Bronze unions.
- b. Copper Pipe 3" and Larger: Bronze flanged connections Class 150 PSIG.
- c. Dielectric Unions or Flanges:
 - (1) Meet dimensional requirements and tensile strength of pipe unions or flanges according to Federal Specification WW-U-531D.
 - (2) Suitable for required operating pressures and temperature conditions.
 - (3) Provide metal connections on both ends. Ends shall be threaded or soldered to match adjacent piping.
 - (4) Separate metal parts at union to prevent current flow between dissimilar metals.

9. Escutcheons.

- a. Provide escutcheons securely in place on exposed pipes where they pass through walls, partitions, floors and ceiling of finished areas.
- b. Interior Walls, Partitions, and Ceilings: Solid or stamped chrome plated brass or stainless steel, one piece or split patten.
- c. Floors and Exterior: Solid cast brass, rough chrome plated or cast nickel bronze alloy, one piece or split pattern.

PART 2 - EXECUTION**2.1 INSTALLATION**

- A. Provide drains and cleanouts as scheduled on drawings.
- B. Cleanouts:
 1. Place pipe cleanouts at the foot of each soil and waste stack in sanitary system and place pipe cleanouts in horizontal runs not to exceed 50 foot spacing.

FIRE STATION 54

PROJECT 10914

2. Install access covers as specified.
- C. Interior Flush Cleanouts:
1. Flush cleanouts with recessed sockets (without access covers) may be used in non-finished areas such as equipment rooms, storage rooms, and the like, if top of hub is installed in level position and top of clean out plug is flush with the concrete floor.
- D. Inserts:
1. Use inserts for suspending hangers from reinforced concrete slabs or beams when possible.
 2. Provide flush inserts at concrete to be a finished surface.
- E. Sleeves:
1. Seal space between pipe or duct and surrounding floor, wall, or ceiling construction with noncombustible insulation and tight fitting metal caps on both sides with caulking.
 - a. Pipe through Floors: Form from 18 gage galvanized sheet metal.
 - b. Pipes through Beams, Walls, Fireproofing, Footings, and Potentially Wet Floors: Form from steel plate or 18 gage galvanized sheet metal.
 2. Size sleeves to allow movement caused by expansion.
 3. Seal and fireproof penetrations.
- F. Pipe Hangers and Supports:
1. Provide adjustable hangers, inserts, brackets, rolls, clamps, and supplementary steel as required for proper support of pipe lines.
 - a. Design hangers to allow for expansion and contraction of pipe lines. Size to allow pipe covering to run continuously through hangers. Allow for proper anchoring and movement of all hot lines.
 - b. Install hangers to allow 1/2" minimum clear space between finished covering and adjacent work.
 - c. Place a hanger within 1 foot of each horizontal elbow.
 - d. Use hangers with 1-1/2" minimum vertical adjustment after piping is erected.
 - e. Provide multiple or trapeze hangers if several pipes can be installed in parallel and at the same elevation.
 - f. Support riser piping independently of connected horizontal piping when practical.
 - g. Piping shall not be supported by equipment.
 - h. Coordinate location of hangers with light fixtures.
 - i. Wire brush steel or iron supports and prepare surfaces ready for painting specified under Section 09900. Prime coat exposed non galvanized hangers and supports.

FIRE STATION 54

PROJECT 10914

- j. Provide copper plated hangers and supports for copper piping or provide sheet lead packing between hanger or support and piping. Dissimilar metal contact is not allowed.
 2. Horizontal Cast Iron Pipe: Place hangers within 18 inches of hub or joint.
 3. Hubless Joints: Provide support at every other joint. Support each joint when length between supports exceeds 4 feet.
 4. Trapeze Clamp or Hangers:
 - a. Secure pipes supported by trapeze clamp or hangers and not mounted on pipe rolls to trapeze with pipe clamps or U-bolts.
 - b. Place clamp or hangers at each change of direction.
 - c. Place clamp or hangers within 1 foot of valves and other appurtenances in horizontal piping.
 - d. Place clamp or hangers maximum 3 feet from end of each branch runout.
 5. Special Supports: Clamps, hangers, and supports required by equipment manufacturers shall be installed according to equipment manufacturer's recommendations.
 6. Plumbers tape, straps, chain, wire hangers, or perforated bar are not allowed for hanging pipe.
- G. Water Hammer Arresters:
1. Supply Piping: Provide a water hammer arrester for each fixture supply including hot and cold water. Do not provide air chambers where water hammer arresters are installed.
- H. Unions and Flanges: Provide at connections of equipment and at strainers and control valves.
- I. Escutcheons: Fit and firmly secure escutcheons to pipes passing through finished floors, ceilings and walls.

END OF SECTION 220510

FIRE STATION 54

PROJECT 10914

**SECTION 220529
SUPPORTS & ANCHORS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General Conditions, Special Provisions apply to work of this section.
- B. Requirements of the following Sections apply to this section:
 - 1. "Basic Mechanical Requirements".
 - 2. "Basic Mechanical Materials and Methods".
 - 3. "Basic Piping Materials and Methods".

1.2 SUMMARY

- A. This section includes the following:
 - 1. Horizontal-piping hangers and supports.
 - 2. Vertical-piping clamps.
 - 3. Hanger-rod attachments.
 - 4. Building attachments.
 - 5. Saddles and shields.
 - 6. Spring hangers and supports.
 - 7. Miscellaneous materials.
 - 8. Equipment supports.

1.3 DEFINITIONS

- A. Terminology used in this section is defined in MSS SP-90.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with General Conditions, Special Provisions and Division 1 specification sections.
- B. Product data, including installation instructions for each type of support and anchor.

Submit pipe hanger and support schedule showing Manufacturer's figure number, size, location, and features for each required pipe hanger and support.
- C. Product certificates signed by the manufacturer of hangers and supports certifying that their products meet the specified requirements.
- D. Welder certificates signed by Contractor certifying that welders comply with requirements specified under "Quality Assurance" Article.

FIRE STATION 54

PROJECT 10914

- E. Assembly-type shop drawings for each type of support and anchor, indicating dimensions, weights, required clearances, and methods of assembly of components.
- F. Maintenance data for supports and anchors for inclusion in Operating and Maintenance Manual.

1.5 QUALITY ASSURANCE

- A. Qualify welding processes and welding operators in accordance with AWS D1.1 "Structural Welding Code - Steel".
 - 1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- B. Regulatory Requirements: Comply with The South Florida Building Code pertaining to product materials and installation of supports and anchors.
- C. NFPA Compliance: Hangers and supports shall comply with NFPA standard No. 13 when used as a component of a fire protection system.
- D. UL and FM Compliance: Hangers, supports, and components shall be listed and labeled by UL and FM where used for fire protection piping systems.

PART 2 - PRODUCTS**2.1 MANUFACTURED UNITS**

- A. Hangers and support components shall be factory fabricated of materials, design, and manufacturer complying with MSS SP-58.
 - 1. Components shall have galvanized coatings where installed for piping and equipment that will not have field-applied finish.
 - 2. Pipe attachments shall have nonmetallic coating for electrolytic protection where attachments are in direct contact with copper tubing.
- B. Thermal Hanger Shield Inserts: Insert and shield shall cover entire circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

2.2 MISCELLANEOUS MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Cement Grout: Portland cement (ASTM C 150, Type I or Type III) and clean uniformly graded, natural sand (ASTM C 404, Size No. 2). Mix ratio shall be 1.0 part cement to 3.0 parts sand, by volume, with minimum amount of water required for placement and hydration.

FIRE STATION 54

PROJECT 10914

- C. Pipe Alignment Guides: Factory fabricated, of cast semi-steel or heavy fabricated steel, consisting of bolted two-section outer cylinder and base with two-section guiding spider that bolts tightly to pipe. Length of guides shall be as recommended by manufacturer to allow indicated travel. Pipe alignment guides shall be equivalent to Grinnell Figure 256 or Carpenter & Patterson Fig. 1007.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine substrates and conditions under which supports and anchors are to be installed. Do not proceed with installing until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

- A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure in compliance with MSS SP-69 and SP-89. Arrange for grouping of parallel runs of horizontal piping supported together on field-fabricated, heavy-duty trapeze hangers where possible. Install supports with maximum spacing complying with MSS SP-69. Where piping of various sizes is supported together by trapeze hangers, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers. All pipes supported by trapeze assembly shall be individually secured to trapeze.
- B. Install building attachments within concrete or to structural steel. Space attachments within maximum piping span length indicated in MSS SP-69. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten insert to forms. Where concrete with compressive strength less than 2,500 psi is indicated, install reinforcing bars through openings at top of inserts.
- C. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories. Provide nuts on hanger rods above and below connection point at clevis type hangers.
- D. Field-Fabricated, Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS D-1.1.
- E. Support fire protection systems piping independently from other piping systems.
- F. Install hangers and supports to allow controlled movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion bends.
- G. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

FIRE STATION 54

PROJECT 10914

- H. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes, and so that maximum pipe deflections allowed by ASME B31.1 Power Piping Code is not exceeded.
- I. Insulated Piping: Comply with the following installation requirements.
 - 1. Clamps: Attach clamps, including spacers (if any), to piping with clamps installed outside insulation; do not exceed pipe stresses allowed by ASME B31.9.
 - 2. Saddles: Install protection saddles MSS Type 39 where insulation without vapor barrier is indicated. Fill interior voids with segments of insulation that match adjoining pipe insulation.
 - 3. Shields: Install protective shields MSS Type 40 on cold and chilled water piping that has vapor barrier. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

<u>NPS</u>	<u>LENGTH</u>	<u>THICKNESS</u>
1/4 THROUGH 3-1/2	12	0.048
4	12	0.060
5 & 6	18	0.060
8 THROUGH 14	24	0.075
16 THROUGH 24	24	0.105

- 4. Thermal Hanger Shields: Install where appropriate with insulation of same thickness as piping.

3.3 INSTALLATION OF ANCHORS

- A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B31.1 and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and install anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.1 and with AWS Standards D1.1.
- C. Where expansion compensators are indicated, install anchors in accordance with expansion unit manufacturer's written instructions to control movement to compensators.
- D. Anchor Spacings: Where not otherwise indicated, install anchors at ends of principal pipe runs, at intermediate points in pipe runs between expansion loops and bends. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

FIRE STATION 54

PROJECT 10914

3.4 INSTALLATION OF PIPE ALIGNMENT GUIDES

- A. Install pipe alignment guides on piping that adjoins expansion joints and elsewhere as indicated. Guides in accordance with ASME B31.1 Power Piping Code.
- B. Anchor to building substrate.

3.5 EQUIPMENT SUPPORTS

- A. Fabricate structural steel stands to suspend equipment from structure above or support equipment above floor.
- B. Grouting: Place grout under supports for piping and equipment.

3.6 METAL FABRICATION

- A. Cut, drill, and fit miscellaneous metal fabrications for pipe anchors and equipment supports. Install and align fabricated anchors in indicated locations.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Finish welds at exposed connections so that no roughness shows after finishing, and so that contours welded surfaces to match adjacent contours.

3.7 ADJUSTING

- A. Hanger Adjustment: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Touch-Up Painting: Immediately after erection of anchors and supports, clean field welds and abraded areas of shop paint and paint exposed areas with same material as used for shop painting to comply with SSPC-PA-1 requirements for touch-up of field-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- C. For galvanized surfaces: Clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

FIRE STATION 54

PROJECT 10914

- D. All supplemental steel exposed to outdoors shall be galvanized steel or standard steel de-rusted and painted with minimum dry film thickness of 2.0 mils of zinc rich compound.

END OF SECTION 220529

SECTION 220553
IDENTIFICATION FOR PLUMBING PIPING AND 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

- B. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Valve tags.

1.3 SUBMITTALS

- A. Submittals in this article are defined in Division 01 Section "Submittal Procedures" as "Action Submittals."
- B. Product Data: For each type of product indicated.
- C. Samples: For color, letter style, and graphic representation required for each identification material and device.
- D. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- E. Valve numbering scheme.
- F. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS**2.1 EQUIPMENT LABELS**

- A. Metal Labels for Equipment:
1. Material and Thickness: Aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 4. Fasteners: Stainless-steel rivets.
 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 2. Letter Color: White.
 3. Background Color: Yellow.
 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semi rigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

FIRE STATION 54

PROJECT 10914

- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.3 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping as specified by Architect.
- B. Locate pipe labels where piping is exposed in garage and machine rooms.

END OF SECTION 220553

FIRE STATION 54

PROJECT 10914

**SECTION 22 0640
PLUMBING FIXTURES****PART 1 - GENERAL****A. RELATED SECTIONS:**

1. 22 05 00 Plumbing Piping
2. 22 05 10 Plumbing Specialties

B. SUBMITTALS

Submit Shop Drawings for the following:

1. Fixtures: Catalog cuts with rough-in dimensions identified as designated in fixture schedule, riser diagrams, and as specified.

1.1 COMPONENTS**A. Provide products complying with requirements of this section from one of the following manufacturers. Model numbers are listed to establish a level of quality only. Products of other manufacturers may be provided subject to compliance with requirements of this section and Section on Substitutions and Product Options.**

- 1) American Standard.
- 2) Eljer.
- 3) Kohler.
- 4) Sloan Royal.
- 5) Zurn.
- 6) Coyne and Delany.
- 7) Josam.
- 8) J.R. Smith.
- 9) Wade.
- 10) Symmons.
- 11) Speakman
- 12) Cambridge Brass.
- 13) Delta.
- 14) Elkay.
- 15) Halsey Taylor.
- 16) Oasis.
- 17) Sunroc.
- 18) Just.
- 19) Bemis.
- 20) Beneke.
- 21) Olsonite.
- 22) Moen.
- 23) Chicago Faucet Company.
- 24) Truebro.

B. QUALITY ASSURANCE

Certification: Submit a letter, signed jointly by the manufacturer of the product and the

PLUMBING FIXTURES

22 0640-1
CAM 17-0531
EXHIBIT 1B
Page 530 of 600

FIRE STATION 54

PROJECT 10914

installer of the product, attesting that no lead is contained in any piece of equipment or in the piping connections that could contaminate water, drinks, or food by contact.

C. Plumbing Fixtures

1. See Schedule on Plans.

PART 2 - EXECUTION

2.1 INSTALLATION

A. INSPECTION

Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected.

B. EQUIPMENT AND FIXTURE CONNECTIONS

Provide necessary material and labor to connect fixtures and equipment having plumbing connections including fixtures and equipment specified and furnished in other sections.

C. Supply Pipe Cut-off Valves:

1. Equip supply pipes to each item of equipment or fixture (except faucets furnished with an integral stop) with a cutoff valve to enable isolation of the item of equipment or fixture for repair and maintenance without interfering with operation of other items of equipment or fixtures.
2. Supply Pipe Support: Anchor supply piping to all items of equipment or fixtures to prevent movement.
3. Templates: Furnish templates and rough opening dimensions to fabricators of countertops and case work for location and sizes of openings for faucets and sink.

D. Fixture installation heights above finished floor as follows.

1. Water Closets
 - a) Standard: 15" to top of bowl rim.
 - b) Accessible: 18" to top of seat.
2. Water Closet Flush Valves:
 - a) Standard: 11" minimum above bowl rim.
 - b) Recessed: 10" minimum above bowl rim.
3. Urinal:
 - a) Standard: 22" to top of bowl rim.

FIRE STATION 54

PROJECT 10914

- b) Accessible: 17" to top of bowl rim.
- 4. Lavatory:
 - a) Standard: 22" to top of basin rim.
 - b) Accessible: 34" to top of bowl rim.
- 5. Drinking Fountain:
 - a) Standard Adult: 40" to top of basin rim.
 - b) Accessible: 36" to top of spout.
- 6. Shower Heads:
 - a) Adult Male: 69.5" to bottom of head.
 - b) Adult Female: 64.5" to bottom of head.
- 7. Service Sinks
 - a) Standard: 27.25" to top of basin rim.
- 8. Sinks
 - a) Maximum: 34" to top of basin rim.

E. Fixture Rough-In.

	<u>HOT</u>	<u>COLD</u>	<u>WASTE</u>	<u>VENT</u>
Water Closet: (Flush Valve)	N/A	1"	4"	2"
Urinal: (Flush Valve)	N/A	3/4"	2"	1-1/4"
Lavatory:	N/A	1/2"	1-1/2"	1-1/4"
Sink:	1/2"	1/2"	1-1/2"	1-1/4"
Service Sink:	1/2"	1/2"	3"	1-1/2"
Drinking Fountain:	N/A	1/2"	1-1/4"	1-1/4"
Shower:	1/2"	1/2"	2"	1-1/4"

END OF SECTION 220640

FIRE STATION 54

PROJECT 10914

**SECTION 22 1120
VALVES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General Conditions, Special Provisions apply to work of this section.
- B. Requirements of the following Sections apply to this section:
 - 1. "Basic Mechanical Requirements".
 - 2. "Basic Mechanical Materials and Methods".
 - 3. "Basic Piping Materials and Methods".

1.2 SUMMARY

- A. This Section includes general duty valves common to most mechanical piping systems.
- B. Special purpose valves are specified in individual piping system specifications.
- C. Valve tags and charts are specified in Section "MECHANICAL IDENTIFICATION".

1.3 SUBMITTALS

- A. General: Submit the following in accordance with General Conditions, Special Provisions and Division 22 Specification Sections.
- B. Product data, including body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1.4 QUALITY ASSURANCE

- A. American Society of Mechanical Engineers (ASME) Compliance: Comply with ASME B31.9 for building services piping and ASME B31.1 for power piping.
- B. Manufacturers Standardization Society of the Valve and Fittings Industry (MSS) Compliance: Comply with the various MSS Standard Practices referenced.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Preparation For Transport: Prepare valves for shipping as follows:
 - 1. Ensure valves are dry and internally protected against rust and corrosion.
 - 2. Protect valve ends against damage to threads, flange faces, and weld-end preps.

FIRE STATION 54

PROJECT 10914

3. Set valves in best position for handling. Set globe and gate valves closed to prevent rattling; set ball and plug valves open to minimize exposure of functional surfaces; set butterfly valves closed or slightly open; and block swing check valves in either closed or open position.
- B. Storage: Use the following precautions during storage:
1. Do not remove valve end protectors unless necessary for inspection; then reinstall for storage.
 2. Protect valves from weather. Store valves indoors. Maintain valve temperature higher than the ambient dew point temperature. If outdoor storage is necessary, support valves off the ground or pavement in watertight enclosures.
- C. Handling: Use a sling to handle valves whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels and stems as lifting or rigging points.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, those listed in valve schedule.

2.2 VALVE FEATURES, GENERAL

- A. Valve Design: Rising stem or rising outside screw and yoke stems.
1. Non-rising stem valves may be used where headroom prevents full extension of rising stems.
- B. Pressure and Temperature Ratings: As scheduled and required to suit system pressures and temperatures.
- C. Sizes: Same size as upstream pipe, unless otherwise indicated.
- D. Operators: Provide the following special operator features:
1. Handwheels, fastened to valve stem, for valves other than quarter turn.
 2. Lever handles, on quarter-turn valves 6-inch and smaller.
 3. Chain-wheel operators, for valves 2-1/2-inch and larger, installed 72 inches or higher above finished floor elevation. Extend chains to an elevation of 5'-6" above finished floor elevation.
- E. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation.
- F. Bypass and Drain Connections: Comply with MSS SP-45 bypass and drain connections.

FIRE STATION 54

PROJECT 10914

- G. End Connections: As indicated in the valve specifications.
1. Threads: Comply with ANSI B1.20.1.
 2. Flanges: Comply with ANSI B16.1 for cast iron, ANSI B16.5 for steel, and ANSI B16.24 for bronze valves.
 3. Solder-Joint: Comply with ANSI B16.18.
 - a. Caution: Where soldered end connections are used, use solder having a melting point below 840 deg F for gate, globe, and check valves; below 421 deg F for ball valves.
- H. All exposed components of valves to be mounted in exterior of building shall be stainless steel.

2.3 VALVE SCHEDULE

Acceptable Manufacturers are: Crane, Armstrong, Keystone, Stockham, Jamesbury, Milwaukee, Grinnell, Nibco or Mueller.

A. Gate Valves:

1. 2" and Smaller, Screwed: Class 125, 200 psi W.O.G., non-rising stem, screwed bonnet, solid wedge disc, bronze body & disc. Equal to Crane Figure Number 438.
2. 2" and Smaller, Brazed: Class 150, 300 psi CWP, non-rising stem, screwed bonnet, solid wedge disc, bronze body & disc. Equal to Crane Figure Number 1324.
3. Under 2", Socket Welded: Class 800, 1800 psi (-20F to 200F), O S & Y, bolted bonnet, solid wedge disc, carbon steel with stainless steel trim, full port. Equal to Grinnell/Anvil Figure Number 811. Consult with Engineering, prior to use.
4. 2-1/2" and Larger, Welded: Class 150, 260 psi working pressure (-20F to 200F), O S & Y, bolted bonnet, solid wedge disc, carbon steel with universal (13% chromium) trim. Equal to Crane Figure Number 47-1/2.
5. 2-1/2" and Larger, Flanged: Class 125, 200 psi W.O.G. (2-1/2" to 12"), 150 psi W.O.G. (14" and larger), non-rising stem, bolted bonnet, tapered solid wedge disc, iron body, bronze trim and disc. Equal to Crane Figure Number 461.

B. Globe Valves:

1. 2" and Smaller, Screwed: Class 125, 200 psi W.O.G., renewable disc and seat, bronze body, bronze disc. Equal to Crane Figure Number 1.
2. 2" and Smaller, Brazed: Class 125, 200 psi W.O.G., renewable disc and seat, bronze body, bronze disc. Equal to Crane Figure Number 1310.
3. Under 2", Socket Welded: Class 800, 1800 psi (-20F to 200F), O S & Y, bolted bonnet, renewable disc, carbon steel with stainless steel trim. Equal to Grinnell/Anvil Figure Number 830.
4. 2-1/2" to 14", Welded: Class 150, 260 psi working pressure (-20F to 200F), O S & Y, bolted bonnet, renewable disc and seat, carbon steel

FIRE STATION 54

PROJECT 10914

with universal (13% chromium) trim. Equal to Crane Figure Number 143-1/2.

5. 2-1/2" to 10", Flanged: Class 125, 200 psi W.O.G. renewable disc and seat, iron body, bronze disc. Equal to Crane Figure Number 351.

C. Ball Valves:

1. 2" and Smaller, Screwed: 600 CWP, regular/full port, bronze body, brass stem and chrome plated brass ball, steel handle. Equal to Crane Figure Number 9302 (regular port), F-9303 (full port).
2. 2" and Smaller, Soldered: 600 CWP, regular/full port, bronze body, brass stem and chrome plated brass ball, steel handle. Equal to Crane Figure Number 9322 (regular port), F-9323 (full port).
3. 2" and Smaller, Socket Welded: 1500 psi W.O.G. (standard port), 1000 psi (full port), carbon steel body and stem, chrome plated carbon steel ball, and cold rolled zinc plated steel handle. Equal to Grinnell Figure Number 3913 (standard port), 3914 (full port).

D. Swing Check Valves:

1. 2" and Smaller, Screwed: Class 150, 300 psi W.O.G., hinged support, replaceable bronze seat rings, bronze body, bronze trim and disc. Equal to Crane Figure Number 137.
2. 2" and Smaller, Brazed: Class 150, 300 psi W.O.G., hinged support, replaceable bronze seat rings, bronze body, bronze trim and disc. Equal to Crane Figure Number 137.
3. Under 2", Socket Welded: Class 800, 1800 psi (-20f to 200F), piston check valve, bolted cap, renewable disc and seat, carbon steel with stainless steel trim. Equal to Grinnell/Anvil Figure Number 841.
4. 2-1/2" to 24", Welded: Class 150, 260 psi working pressure (-20F to 200F), hinged support, bolted cap, replaceable disc, carbon steel with universal (13% chromium) trim. Equal to Crane Figure Number 147-1/2.
5. 2-1/2" and Larger, Flanged: Class 125, 200 psi W.O.G. (2-1/2" to 12"), 150 psi W.O.G. (14" and larger), hinged support, replaceable bronze seat rings, iron body, bronze trim and disc. Equal to Crane Figure Number 373.

E. Butterfly Valves:

1. Above ground:
 - a. Two (2) inch thru forty-eight (48) inch diameter: Lug body type, bubble tight shut-off, cast iron body, aluminum-bronze or 316 SS disc, Teflon upper and lower bushings. Valve shaft/stem to be 17-4 Ph or 416 Stainless Steel blow out proof. Manual shut-off/isolation valves are to be rated for 200 psi dead end service and control valves rated for 175 psi (minimum) dead end service. Valve seat shall be field replaceable phenolic backed Buna-N, cartridge type, mechanically retained in body. "Boot type" seats are not acceptable. Manual valves six (6) inch diameter and larger to have gear operators. Automatic/control valves to have

FIRE STATION 54

PROJECT 10914

pneumatic actuators sized to close against maximum system pressure with a 20% safety factor.

- b. Valves are to be installed with stem/shaft in the horizontal position.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine valve interior through the end ports for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks used to prevent disc movement during shipping and handling.
- B. Actuate valve through an open-close and close-open cycle. Examine functionally significant features, such as guides and seats made accessible by such actuation. Following examination, return the valve closure member to the shipping position.
- C. Examine threads on both the valve and the mating pipe for form (i.e., out-of-round or local indentation) and cleanliness.
- D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Check gasket material for proper size, material composition suitable for service, and freedom from defects and damage.
- E. Prior to valve installation, examine the piping for cleanliness, freedom from foreign materials, and proper alignment.
- F. Replace defective valves with new valves.

3.2 VALVE ENDS SELECTION

- A. Select valves with the following ends or types of pipe/ tube connections:
 - 1. Copper Tube Size, 2-Inches and Smaller: Solder ends.
 - 2. Steel Pipe Sizes, 2-Inches and Smaller: Threaded or grooved end.
 - 3. Steel Pipe Sizes, 2-1/2 Inches and Larger: Welded or flanged ends if approved by Engineering.

3.3 VALVE INSTALLATIONS

- A. General Application: Use gate, ball, and butterfly valves for shut-off duty; globe, ball, and butterfly for throttling duty. Refer to piping system specification sections for specific valve applications and arrangements.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves and unions for each fixture and item of equipment arranged to allow

FIRE STATION 54

PROJECT 10914

equipment removal without system shutdown. Unions are not required on flanged devices.

- D. Install three-valve bypass around each pressure reducing valve using throttling-type valves.
- E. Install valves in horizontal piping with stem at or above the center of the pipe.
- F. Install valves in a position to allow full stem movement.
- G. Installation of Check Valves: Install for proper direction of flow as follows:
 - 1. Swing Check Valves: Horizontal position with hinge pin level.
 - 2. Wafer Check Valves: Horizontal or vertical position, between flanges.
 - 3. Lift Check Valve: With stem upright and plumb.
- H. Valves Located Over Seven Feet Above Finished Floor: On each valve four (4) inches in diameter and larger, installed over seven (7) feet above the floor in equipment rooms, specify access platforms and/or catwalks to permit operation and periodic inspections/ maintenance. Provide chain operator for valve locations that will not permit the catwalks/ access platforms.
- I. Balancing Valves: Provide a combination shut-off and balancing valve at each air handling unit coil, pumps and any other consumer of chilled water. Valve shall have memory setting for balanced position, graduation scale, differential pressure taps and factory flow charts. Valves are to be equal to Bell & Gossett Circuit Setter calibrated balance valve or Tour & Anderson combination balancing and shut-off valve.

3.4 SOLDER CONNECTIONS

- A. Cut tube square and to exact lengths.
- B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket in same manner.
- C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.
- D. Open gate and globe valves to full open position.
- E. Remove the cap and disc holder of swing check valves having composition discs.
- F. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.
- G. Apply heat evenly to outside of valve around joint until solder will melt upon contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

FIRE STATION 54

PROJECT 10914

3.5 THREADED CONNECTIONS

- A. Note the internal length of threads in valve ends, and proximity of valve internal seat or wall, to determine how far pipe should be threaded into valve.
- B. Align threads at point of assembly.
- C. Apply appropriate tape or thread compound to the external pipe threads (except where dry seal threading is specified).
- D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.6 FLANGED CONNECTIONS

- A. Align flange surfaces parallel.
- B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.
- C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.7 FIELD QUALITY CONTROL

- A. Tests: After piping systems have been tested and put into service, but before final adjusting and balancing, inspect valves for leaks. Adjust or replace packing to stop leaks; replace valves if leak persists.

3.8 ADJUSTING AND CLEANING

- A. Cleaning: Clean mill scale, grease, and protective coatings from exterior of valves and prepare valves to receive finish painting or insulation.

END OF SECTION 221120

VALVES

221120 -7
CAM 17-0531
EXHIBIT 1B
Page 539 of 600

SECTION 221316
SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

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

1.2 SUMMARY

- A. This Section includes the following for soil, waste, and vent piping inside the building:
 - 1. Pipe, tube, and fittings.
 - 2. Special pipe fittings.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. LLDPE: Linear, low-density polyethylene plastic.
- D. NBR: Acrylonitrile-butadiene rubber.
- E. PE: Polyethylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. TPE: Thermoplastic elastomer.

1.4 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 5-foot head of water.
 - 2. Sanitary Sewer, Force-Main Piping: 50 psig.

1.5 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Field quality-control inspection and test reports.

1.6 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

- B. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping; "NSF-drain" for plastic drain piping; "NSF-tubular" for plastic continuous waste piping; and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service and Extra-Heavy class (es).
- B. Gaskets: ASTM C 564, rubber.

2.4 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
 - a. Manufacturers:
 - 1) ANACO.
 - 2) Fernco, Inc.
 - 3) Charlotte Pipe Co.
 - 4) Mission Rubber Co.
 - 5) Tyler Pipe; Soil Pipe Div.
 2. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
 - a. Manufacturers:
 - 1) ANACO.
 - 2) Clamp-All Corp.
 - 3) Charlotte Pipe Co.
 - 4) Mission Rubber Co.
 - 5) Tyler Pipe; Soil Pipe Div.
 3. Heavy-Duty, Shielded, Cast-Iron Couplings: ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve.

FIRE STATION 54

PROJECT 10914

- a. Available Manufacturers:
 - 1) MG Piping Products Co.
- C. Rigid, Unshielded Couplings: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 1. Manufacturers:
 - a. ANACO.

2.5 COPPER TUBE AND FITTINGS

- A. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
 - 1. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
- B. Hard Copper Tube: ASTM B 88, Types L and M, water tube, drawn temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 - 3. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
- C. Soft Copper Tube: ASTM B 88, Type L, water tube, annealed temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.

2.6 PVC PIPE AND FITTINGS

- A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
 - 1. PVC Socket Fittings: ASTM D 2665, socket type, made to ASTM D 3311, drain, waste, and vent patterns.
- B. Solvent Cement and Adhesive Primer:
 - 1. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.7 SPECIAL PIPE FITTINGS

- A. Flexible, Nonpressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 1. Available Manufacturers:
 - a. Dallas Specialty & Mfg. Co.
 - b. Fernco, Inc.
 - c. Logan Clay Products Company (The).
 - d. Mission Rubber Co.
 - e. NDS, Inc.
 - f. Plastic Oddities, Inc.

FIRE STATION 54

PROJECT 10914

- B. Shielded Nonpressure Pipe Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 1. Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Mission Rubber Co.
- C. Rigid, Unshielded, Nonpressure Pipe Couplings: ASTM C 1461, sleeve-type reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 1. Available Manufacturers:
 - a. ANACO.
- D. Pressure Pipe Couplings: AWWA C219 metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
 - 1. Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dresser, Inc.; DMD Div.
 - c. EBAA Iron Sales, Inc.
 - d. Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - e. JCM Industries, Inc.
 - f. Romac Industries, Inc.
 - g. Smith-Blair, Inc.
 - h. Viking Johnson.
 - 2. Center-Sleeve Material: Ductile iron.
 - 3. Gasket Material: Natural or synthetic rubber.
 - 4. Metal Component Finish: Corrosion-resistant coating or material.
- E. Expansion Joints: Two or three-piece, ductile-iron assembly consisting of telescoping sleeve(s) with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - 1. Manufacturers:
 - a. EBAA Iron Sales, Inc.
 - b. Romac Industries, Inc.
 - c. Star Pipe Products; Star Fittings Div.

PART 3 - EXECUTION**3.1 PIPING APPLICATIONS**

- A. Aboveground, soil waste and vent piping NPS 2" up to 6" and smaller shall be any of the following:
 - 1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - 2. Hubless cast-iron soil pipe and fittings standard, shielded, stainless-steel couplings; and hubless-coupling joints.
 - 3. Schedule 40 PVC pipe.
- B. Underground, soil and waste piping NPS 2" to 12" shall be the following:

FIRE STATION 54

PROJECT 10914

1. Solid-wall, Schedule 40, PVC pipe; PVC socket fittings; and solvent-cemented joints.
- C. Aboveground and below ground sanitary-sewage force mains NPS 2" to 4" shall be any of the following:
1. Steel pipe, pressure fittings, and threaded joints.
 2. Schedule 40 PVC pipe.

3.2 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- C. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.
- D. Install cast-iron sleeve at each service pipe penetration through foundation wall.
- E. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- F. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- G. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- H. Install soil and waste drainage piping at 1/8"/FT unless otherwise noted and vent piping to drain dry.
- I. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- J. Install soil and waste drainage and vent piping according to ASTM D 2661.
- K. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- L. Install underground PVC soil and waste drainage piping according to ASTM D 2321.

FIRE STATION 54

PROJECT 10914

- M. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results for Plumbing."
- B. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- C. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
- D. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- E. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- F. Grooved Joints: Assemble joint with keyed coupling, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- G. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.

3.4 VALVE INSTALLATION

- A. General valve installation requirements are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
- B. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
 - 1. Install gate or full-port ball valve for piping NPS 2 and smaller.
 - 2. Install gate valve for piping NPS 2-1/2 and larger.
- C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.
- D. Backwater Valves: Install backwater valves in piping subject to sewage backflow.
 - 1. Horizontal Piping: Horizontal backwater valves. Use normally closed type, unless otherwise indicated.
 - 2. Install backwater valves in accessible locations.
 - 3. Backwater valve are specified in Division 22 Section "Sanitary Waste Piping Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

- A. Pipe hangers and supports are specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Install individual, straight, horizontal piping runs according to the following:
 - a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

FIRE STATION 54

PROJECT 10914

- b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet, if Indicated: MSS Type 49, spring cushion rolls.
 3. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 4. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Install supports according to Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
 2. NPS 3: 60 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
 4. NPS 6: 60 inches with 3/4-inch rod.
 5. NPS 8 to NPS 12: 60 inches with 7/8-inch rod.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 1-1/4: 84 inches with 3/8-inch rod.
 2. NPS 1-1/2: 108 inches with 3/8-inch rod.
 3. NPS 2: 10 feet with 3/8-inch rod.
 4. NPS 2-1/2: 11 feet with 1/2-inch rod.
 5. NPS 3: 12 feet with 1/2-inch rod.
 6. NPS 4 and NPS 5: 12 feet with 5/8-inch rod.
 7. NPS 6: 12 feet with 3/4-inch rod.
 8. NPS 8 to NPS 12: 12 feet with 7/8-inch rod.
- H. Install supports for vertical steel piping every 15 feet.
- I. Install hangers for stainless-steel piping with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 2: 84 inches with 3/8-inch rod.
 2. NPS 3: 96 inches with 1/2-inch rod.
 3. NPS 4: 108 inches with 1/2-inch rod.
 4. NPS 6: 10 feet with 5/8-inch rod.
- J. Install supports for vertical stainless-steel piping every 10 feet.
- K. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 1. NPS 1-1/4: 72 inches with 3/8-inch rod.
 2. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
 3. NPS 2-1/2: 108 inches with 1/2-inch rod.

FIRE STATION 54

PROJECT 10914

4. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
 5. NPS 6: 10 feet with 5/8-inch rod.
 6. NPS 8: 10 feet with 3/4-inch rod.
- L. Install supports for vertical copper tubing every 10 feet.
- M. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
 2. NPS 3: 48 inches with 1/2-inch rod.
 3. NPS 4 and 5: 48 inches with 5/8-inch rod.
 4. NPS 6: 48 inches with 3/4-inch rod.
 5. NPS 8 to NPS 12: 48 inches with 7/8-inch rod.
- N. Install supports for vertical PVC piping every 48 inches.
- O. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect drainage and vent piping to the following:
1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 and larger.

3.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

FIRE STATION 54

PROJECT 10914

- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 5-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 5. Prepare reports for tests and required corrective action.
- E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 2. Cap and subject piping to static-water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - 3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 4. Prepare reports for tests and required corrective action.

3.8 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains during remainder of construction period to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.

3.9 PROTECTION

- A. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

END OF SECTION 221316

FIRE STATION 54

PROJECT 10914

**SECTION 230500
COMMON WORK RESULTS FOR HVAC**

PART 1 - GENERAL**1.01 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. See Editing Instruction No. 3 in the Evaluations for discussion about how this Section supplements other Division 23 Sections.
- B. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. Equipment installation requirements common to equipment sections.
 - 9. Painting and finishing.
 - 10. Concrete bases.
 - 11. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to

COMMON WORK RESULTS FOR HVAC

230500 -1

CAM 17-0531
EXHIBIT 1B
Page 549 of 600

FIRE STATION 54

PROJECT 10914

outdoor ambient temperatures. Examples include installations within unheated shelters.

- F. The following are industry abbreviations for plastic materials:
 - 1. CPVC: Chlorinated polyvinyl chloride plastic.
 - 2. PE: Polyethylene plastic.
 - 3. PVC: Polyvinyl chloride plastic.

- G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Adjust list below to suit Project.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Escutcheons.

- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

- B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

- C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

FIRE STATION 54

PROJECT 10914

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual Division 23 piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by

FIRE STATION 54

PROJECT 10914

pipng system manufacturer, unless otherwise indicated.

- E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- H. Solvent Cements for Joining Plastic Piping:
 - 1. CPVC Piping: ASTM F 493.
 - 2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
- I. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

2.4 TRANSITION FITTINGS

- A. Plastic-to-Metal Transition Fittings: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 - 1. Available Manufacturers:
 - a. Eslon Thermoplastics.
- B. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 - 1. Available Manufacturers:
 - a. Thompson Plastics, Inc.
- C. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC and PVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
 - 1. Available Manufacturers:
 - a. NIBCO INC.
 - b. NIBCO, Inc.; Chemtrol Div.

2.5 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
 - 1. Available Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Eclipse, Inc.

COMMON WORK RESULTS FOR HVAC

230500 -4

CAM 17-0531
EXHIBIT 1B
Page 552 of 600

FIRE STATION 54

PROJECT 10914

- d. Epco Sales, Inc.
 - e. Hart Industries, International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
- 1. Available Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
- 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.
- F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.
- 1. Available Manufacturers:
 - a. Calpico, Inc.
 - b. Lochinvar Corp.
- G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.
- 1. Available Manufacturers:
 - a. Perfection Corp.
 - b. Precision Plumbing Products, Inc.
 - c. Sioux Chief Manufacturing Co., Inc.
 - d. Victaulic Co. of America.

2.6 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- 1. Available Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.

COMMON WORK RESULTS FOR HVAC

230500 -5

CAM 17-0531
EXHIBIT 1B
Page 553 of 600

FIRE STATION 54

PROJECT 10914

2. Sealing Elements: EPDM and NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel and Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating and Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 1. Underdeck Clamp: Clamping ring with set screws.
- E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe: ASTM D 1785, Schedule 40.
- G. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.8 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 1. Finish: Polished chrome-plated and rough brass.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 1. Finish: Polished chrome-plated and rough brass.
- E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.
- F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.
- G. One-Piece, Floor-Plate Type: Cast-iron floor plate.

COMMON WORK RESULTS FOR HVAC

230500 -6

CAM 17-0531
EXHIBIT 1B
Page 554 of 600

FIRE STATION 54

PROJECT 10914

- H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.9 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 2. Design Mix: 5000-psi, 28-day compressive strength.
 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION**3.01 PIPING SYSTEMS - COMMON REQUIREMENTS**

- A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- F. Install piping to permit valve servicing.
- G. Install piping at indicated slopes.
- H. Install piping free of sags and bends.
- I. Install fittings for changes in direction and branch connections.
- J. Install piping to allow application of insulation.
- K. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 1. New Piping:

COMMON WORK RESULTS FOR HVAC

230500 -7

CAM 17-0531
EXHIBIT 1B
Page 555 of 600

FIRE STATION 54

PROJECT 10914

- a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Insulated Piping: One-piece, stamped-steel type with spring clips.
 - d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
 - g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge and set screw.
 - h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
 - j. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
 - k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
 - l. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
- 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. PVC or Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above

FIRE STATION 54

PROJECT 10914

finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

- 1) Seal space outside of sleeve fittings with grout.
4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

FIRE STATION 54

PROJECT 10914

- D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
- E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 4. PVC Nonpressure Piping: Join according to ASTM D 2855.
- J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- K. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- L. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.
- M. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

3.3 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
 - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

COMMON WORK RESULTS FOR HVAC

230500 -10

CAM 17-0531
EXHIBIT 1B
Page 558 of 600

FIRE STATION 54

PROJECT 10914

2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
4. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES (Furnished & Installed by General Contractor)

- A. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
 2. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 3. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
 5. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 6. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete or Miscellaneous Cast-in-Place Concrete."

FIRE STATION 54

PROJECT 10914

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Division 05 Section "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.8 ERECTION OF WOOD SUPPORTS AND ANCHORAGES (Where Indicated on the Drawings)

- A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.
- B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
- C. Attach to substrates as required to support applied loads.

3.9 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 230500

COMMON WORK RESULTS FOR HVAC

230500 -12

CAM 17-0531
EXHIBIT 1B
Page 560 of 600

FIRE STATION 54

PROJECT 10914

**SECTION 230513
COMMON MOTOR REQUIREMENTS FOR HVAC 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 general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS**2.1 GENERAL MOTOR REQUIREMENTS**

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

COMMON MOTOR REQUIREMENT FOR HVAC EQUIPMENT

230513 -1

FIRE STATION 54

PROJECT 10914

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: Class F.
- J. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - 2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

FIRE STATION 54

PROJECT 10914

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
1. Permanent-split capacitor.
 2. Split phase.
 3. Capacitor start, inductor run.
 4. Capacitor start, capacitor run.
- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)**END OF SECTION 230513**

COMMON MOTOR REQUIREMENT FOR HVAC EQUIPMENT

230513 -3

SECTION 23 0529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following hangers and supports for HVAC system piping and equipment:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Pipe stands.
 - 7. Equipment supports.
- B. Related Sections include the following:
 - 1. Division 21 Section "Wet Pipe Fire Protection Systems" for pipe hangers for fire-protection piping.
 - 2. Division 23 Section "Vibration Controls for HVAC Piping and Equipment" for vibration isolation devices.
 - 3. Division 23 Section(s) "Metal Ducts" and "Nonmetal Ducts" for duct hangers and supports

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for the Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Supports for multiple pipes, including pipe stands, shall be capable of supporting combined weight of supported systems, system contents, and test water.
- B. Equipment supports shall be capable of supporting combined operating weight of supported equipment and connected systems and components.

FIRE STATION 54

PROJECT 10914

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Fiberglass pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Powder-actuated fastener systems.

- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Fiberglass strut systems. Include Product Data for components.
 - 4. Pipe stands. Include Product Data for components.
 - 5. Equipment supports.

- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
 - 4. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
 - 5. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

- B. Available Manufacturers:
 - 1. AAA Technology & Specialties Co., Inc.
 - 2. Bergen-Power Pipe Supports.
 - 3. B-Line Systems, Inc.; a division of Cooper Industries.
 - 4. Carpenter & Paterson, Inc.
 - 5. Empire Industries, Inc.

FIRE STATION 54

PROJECT 10914

6. ERICO/Michigan Hanger Co.
7. Globe Pipe Hanger Products, Inc.
8. Grinnell Corp.
9. GS Metals Corp.
10. National Pipe Hanger Corporation.
11. PHD Manufacturing, Inc.
12. PHS Industries, Inc.
13. Piping Technology & Products, Inc.
14. Tolco Inc.

- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Available Manufacturers:
1. B-Line Systems, Inc.; a division of Cooper Industries.
 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
 3. GS Metals Corp.
 4. Power-Strut Div.; Tyco International, Ltd.
 5. Thomas & Betts Corporation.
 6. Tolco Inc.
 7. Unistrut Corp.; Tyco International, Ltd.
- C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.
- B. Available Manufacturers:
1. Carpenter & Paterson, Inc.
 2. ERICO/Michigan Hanger Co.
 3. PHS Industries, Inc.

FIRE STATION 54

PROJECT 10914

4. Pipe Shields, Inc.
 5. Rilco Manufacturing Company, Inc.
 6. Value Engineered Products, Inc.
- C. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

- A. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Available Manufacturers:
 - a. Hilti, Inc.
 - b. ITW Ramset/Red Head.
 - c. Masterset Fastening Systems, Inc.
 - d. MKT Fastening, LLC.
 - e. Powers Fasteners.
- B. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated or stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
1. Available Manufacturers:
 - a. B-Line Systems, Inc.; a division of Cooper Industries.
 - b. Empire Industries, Inc.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head.
 - e. MKT Fastening, LLC.
 - f. Powers Fasteners.

2.7 PIPE STAND FABRICATION

- A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
1. Available Manufacturers:
 - a. ERICO/Michigan Hanger Co.

FIRE STATION 54

PROJECT 10914

- b. MIRO Industries.
- C. Low-Type, Single-Pipe Stand: One-piece plastic or stainless-steel base unit with plastic roller, for roof installation without membrane penetration.
 - 1. Available Manufacturers:
 - a. MIRO Industries.
- D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 - 1. Available Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
 - 2. Base: Stainless steel.
 - 3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 - 4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
- E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
 - 1. Available Manufacturers:
 - a. Portable Pipe Hangers.
 - 6. Bases: One or more plastic.
 - 7. Vertical Members: Two or more protective-coated-steel channels.
 - 8. Horizontal Member: Protective-coated-steel channel.
 - 9. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
- F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.8 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural- steel shapes.

2.9 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION**3.1 HANGER AND SUPPORT APPLICATIONS**

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

FIRE STATION 54

PROJECT 10914

- B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.
- C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.
- D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
- E. Use padded hangers for piping that is subject to scratching.
- F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated on the drawings and except as specified in piping system Sections, install the following types:
 - 1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 to NPS 16, requiring up to 4 inches of insulation.
 - 3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, NPS 3/4 to NPS 24, requiring clamp flexibility and up to 4 inches of insulation.
 - 4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 - 5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 6. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated stationary pipes, NPS 3/4 to NPS 8.
 - 7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 8. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 8.
 - 9. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated stationary pipes, NPS 1/2 to NPS 2.
 - 10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 8.
 - 11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated stationary pipes, NPS 3/8 to NPS 3.
 - 12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 to NPS 30.
 - 13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
 - 15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
 - 16. Adjustable, Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, NPS 2-1/2 to NPS 36, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

FIRE STATION 54

PROJECT 10914

17. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30, from 2 rods if longitudinal movement caused by expansion and contraction might occur.
 18. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20, from single rod if horizontal movement caused by expansion and contraction might occur.
 19. Complete Pipe Rolls (MSS Type 44): For support of pipes, NPS 2 to NPS 42, if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 20. Pipe Roll and Plate Units (MSS Type 45): For support of pipes, NPS 2 to NPS 24, if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 21. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes, NPS 2 to NPS 30, if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
 3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.
- I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
 3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 6. C-Clamps (MSS Type 23): For structural shapes.
 7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.

FIRE STATION 54

PROJECT 10914

9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 11. Malleable Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb.
 - b. Medium (MSS Type 32): 1500 lb.
 - c. Heavy (MSS Type 33): 3000 lb.
 13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
 3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 5. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
 6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from base support.
 7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
 8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - a. Horizontal (MSS Type 54): Mounted horizontally.
 - b. Vertical (MSS Type 55): Mounted vertically.

- c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
 - 1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
 - 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Fiberglass Pipe Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.
- D. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- E. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled fiberglass struts.
- F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- G. Fastener System Installation:
 - 1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- H. Pipe Stand Installation:
 - 1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - 2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 Section "Roof Accessories" for curbs.

FIRE STATION 54

PROJECT 10914

- I. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- J. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- K. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
- L. Install lateral bracing with pipe hangers and supports to prevent swaying.
- M. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
- N. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- O. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
- P. Insulated Piping: Comply with the following:
 - 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.
 - 2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
 - 4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
 - b. NPS 4: 12 inches long and 0.06 inch thick.
 - c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
 - d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
 - e. NPS 16 to NPS 24: 24 inches long and 0.105 inch thick.
 - 5. Pipes NPS 8 and Larger: Include wood inserts.

FIRE STATION 54

PROJECT 10914

6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

- A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
- B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
- C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

- A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
- B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING (Reference other Section of the General Construction portion of the Specification)

- A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

FIRE STATION 54

PROJECT 10914

- B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 230529

FIRE STATION 54

PROJECT 10914

SECTION 230548
VIBRATION CONTROLS FOR HVAC PIPING AND 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. This Section includes the following:
1. Isolation pads.
 2. Isolation mounts.
 3. Restrained elastomeric isolation mounts.
 4. Freestanding and restrained spring isolators.
 5. Housed spring mounts.
 6. Elastomeric hangers.
 7. Spring hangers.
 8. Spring hangers with vertical-limit stops.
 9. Pipe riser resilient supports.
 10. Resilient pipe guides.
 11. Freestanding and restrained air-mounting system.
 12. Restrained vibration isolation roof-curb rails.
 13. Snubbers.
 14. Restraining braces and cables.
 15. Steel and inertia, vibration isolation equipment bases.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Loading:
1. Basic Wind Speed: 140 mph.
 2. Minimum 10 lb/sq. ft. multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

1.5 SUBMITTALS

- A. Product Data: For the following:

VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

230548-1
CAM 17-0531
EXHIBIT 1B
Page 576 of 600

FIRE STATION 54

PROJECT 10914

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of component used.
 3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
- B. Delegated-Design Submittal: For vibration isolation details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, wind forces required to select vibration isolators, wind restraints, and for designing vibration isolation bases.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Division 22 Sections for equipment mounted outdoors.
 2. Riser Supports: Include riser diagrams showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and loads. Include certification that riser system has been examined for excessive stress and that none will exist.
 3. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
 4. Wind-Restraint Details:
 - a. Design Analysis: To support selection and arrangement of wind restraints. Include calculations of combined tensile and shear loads, prepared by the manufacturer and structural engineer's consultant.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure. Indicate association with vibration isolation devices.
 - c. Coordinate restraint and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Division 22 Sections for equipment mounted outdoors.
- C. Coordination Drawings: Show coordination of bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and restraints.
- D. Welding certificates.
- E. Qualification Data: For professional engineer and testing agency.
- F. Air-Mounting System Performance Certification: Include natural frequency, load, and damping test data performed by an independent agency.
- G. Field quality-control test reports.

FIRE STATION 54

PROJECT 10914

- H. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS**2.1 VIBRATION ISOLATORS**

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.
 - 8. Vibration Isolation.
 - 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil- and water-resistant neoprene, rubber, and hermetically sealed compressed fiberglass.
- C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
 - 1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene.
- D. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - 1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

FIRE STATION 54

PROJECT 10914

5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch-thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- E. Spring Isolators: Freestanding, steel, open-spring isolators with limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch-thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
- F. Housed Spring Mounts: Housed spring isolator with integral snubbers.
1. Housing: Ductile-iron or steel housing to provide all-directional restraint.
 2. Base: Factory drilled for bolting to structure.
 3. Snubbers: Vertically adjustable to allow a maximum of 1/4-inch travel up or down before contacting a resilient collar.
- G. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.
- H. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- I. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.

FIRE STATION 54

PROJECT 10914

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- J. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch- thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig and for equal resistance in all directions.
- K. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of 1/2-inch- thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.2 RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Isolation Technology, Inc.
 4. Kinetics Noise Control.
 5. Mason Industries.
 6. Thybar Corporation.
 7. Vibration Eliminator Co., Inc.
 8. Vibration Isolation.
 9. Vibration Mountings & Controls, Inc.
- B. Retain option in first two paragraphs below if required by authorities having jurisdiction.
- C. General Requirements for Restrained Vibration Isolation Roof-Curb Rails: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand wind forces.

FIRE STATION 54

PROJECT 10914

- D. Lower Support Assembly: Formed sheet-metal section containing adjustable and removable steel springs that support upper frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist wind forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches of rigid, glass-fiber insulation on inside of assembly.
- E. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on 1/4-inch-thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.
1. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with wind restraint.
 - a. Housing: Steel with resilient vertical-limit stops and adjustable equipment mounting and leveling bolt.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 2. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - a. Resilient Material: Oil- and water-resistant standard neoprene, natural rubber, or hermetically sealed compressed fiberglass.
- F. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch thick.
- G. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

2.3 VIBRATION ISOLATION EQUIPMENT BASES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Isolation Technology, Inc.
 4. Kinetics Noise Control.
 5. Mason Industries.
 6. Vibration Eliminator Co., Inc.
 7. Vibration Isolation.
 8. Vibration Mountings & Controls, Inc.

FIRE STATION 54

PROJECT 10914

- B. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
 - 1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - a. Include supports for suction and discharge elbows for pumps.
 - 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - 3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
- C. Inertia Base: Factory-fabricated, welded, structural-steel bases and rails ready for placement of cast-in-place concrete.
 - 1. Design Requirements: Lowest possible mounting height with not less than 1-inch clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - a. Include supports for suction and discharge elbows for pumps.
 - 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - 3. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
 - 4. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

2.4 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.
- B. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and wind-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

FIRE STATION 54

PROJECT 10914

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

3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to forces.
- C. Strength of Support and Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future loads within specified loading limits.

3.3 VIBRATION-CONTROL DEVICE INSTALLATION

- A. Comply with requirements in Division 07 Section "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- B. Equipment Restraints:
 - 1. Install snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
 - 2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
- C. Piping Restraints:
 - 1. Comply with requirements in MSS SP-127.
 - 2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 3. Brace a change of direction longer than 12 feet.
- D. Install cables so they do not bend across edges of adjacent equipment or building structure.
- E. Install restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- F. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- G. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- H. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

FIRE STATION 54

PROJECT 10914

- I. Drilled-in Anchors (Where indicated on the drawings):
 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless post connection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent of rated proof load of device.
 6. Measure isolator restraint clearance.
 7. Measure isolator deflection.
 8. Verify snubber minimum clearances.
 9. Test and adjust air-mounting system controls and safeties.
 10. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Prepare test and inspection reports.

3.5 ADJUSTING

- A. Adjust isolators after piping system is at operating weight.

FIRE STATION 54

PROJECT 10914

- B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
- C. Adjust air-spring leveling mechanism.
- D. Adjust active height of spring isolators.
- E. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain air-mounting systems. Refer to Division 01 Section "Demonstration And Training."

END OF SECTION 230548

FIRE STATION 54

PROJECT 10914

SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND 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. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Duct labels.
 - 5. Stencils.
 - 6. Valve tags.
 - 7. Warning tags.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For color, letter style, and graphic representation required for each identification material and device.
- C. Equipment Label Schedule: Include a listing of all equipment to be labeled with the proposed content for each label.
- D. Valve numbering scheme.
- E. Valve Schedules: For each piping system to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- B. Coordinate installation of identifying devices with locations of access panels and doors.
- C. Install identifying devices before installing acoustical ceilings and similar concealment.

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

230553 -1

FIRE STATION 54

PROJECT 10914

PART 2 - PRODUCTS**2.1 EQUIPMENT LABELS**

- A. Metal Labels for Equipment:
1. Material and Thickness: Brass, 0.032-inch or anodized aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 4. Fasteners: Stainless-steel rivets or self-tapping screws.
 5. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- B. Plastic Labels for Equipment:
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
 2. Letter Color: White.
 3. Background Color: Black.
 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
 6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets or self-tapping screws.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- C. Label Content: Include equipment's Drawing designation or unique equipment number, drawing numbers where equipment is indicated (plans, details, and schedules).
- D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules). Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Red.

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

230553 -2

FIRE STATION 54

PROJECT 10914

- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semi rigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.
- C. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
- D. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.4 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch Insert dimension thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

230553 -3

CAM 17-0531
EXHIBIT 1B
Page 588 of 600

FIRE STATION 54

PROJECT 10914

- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
- F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
- G. Fasteners: Stainless-steel rivets or self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches high.

2.5 STENCILS

- A. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of 1-1/4 inches for ducts; and minimum letter height of 3/4 inch for access panel and door labels, equipment labels, and similar operational instructions.
 - 1. Stencil Material: Brass.
 - 2. Stencil Paint: Exterior, gloss, acrylic enamel black unless otherwise indicated. Paint may be in pressurized spray-can form.
 - 3. Identification Paint: Exterior, acrylic enamel in colors according to ASME A13.1 unless otherwise indicated.

2.6 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Brass, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - 1. Valve-tag schedule shall be included in operation and maintenance data.

FIRE STATION 54

PROJECT 10914

2.7 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: 3 by 5-1/4 inches minimum.
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in Division 09 Section "Interior Painting."
- B. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels, complying with ASME A13.1, on each piping system.
 - 1. Identification Paint: Use for contrasting background.
 - 2. Stencil Paint: Use for pipe marking.
- C. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - 1. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

FIRE STATION 54

PROJECT 10914

- D. Pipe Label Color Schedule:
 - 1. Refrigerant Piping:
 - a. Background Color: Red.
 - b. Letter Color: White.

3.4 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:
 - 1. Blue: For cold-air supply ducts.
 - 2. Yellow: For hot-air supply ducts.
 - 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 - 4. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- B. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction, may be provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than 1 inch high is needed for proper identification because of distance from normal location of required identification.
- C. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

- A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - 1. Valve-Tag Size and Shape:
 - a. Refrigerant: 1-1/2 inches, round.
 - 2. Valve-Tag Color:
 - a. Refrigerant: Natural.
 - 3. Letter Color:
 - a. Refrigerant: Black.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 230553

FIRE STATION 54

PROJECT 10914

**SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC**

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. Balancing Air Systems:
 - a. Constant-volume air systems.

1.3 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

- A. Qualification Data: Within 45 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 45 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
- D. Certified TAB reports.
- E. Sample report forms.
- F. Instrument calibration reports, to include the following:
 - 1. Instrument type and make.
 - 2. Serial number.
 - 3. Application.

TESTING-ADJUSTING AND BALANCING FOR HVAC

230593 - 1
CAM 17-0531
EXHIBIT 1B
Page 592 of 600

FIRE STATION 54

PROJECT 10914

4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

- A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC NEBB or TABB.
 1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC NEBB or TABB.
 2. TAB Technician: Employee of the TAB contractor and who is certified by AABC NEBB or TABB as a TAB technician.
- B. TAB Conference: Meet with Architect, Owner, Construction Manager, and, when required, Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.
 1. Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Coordination and cooperation of trades and subcontractors.
 - d. Coordination of documentation and communication flow.
- C. Certify TAB field data reports and perform the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
- D. TAB Report Forms: Use standard TAB contractor's forms approved by Architect, Owner, Construction Manager, and, when required, Commissioning Authority.
- E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

- A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

FIRE STATION 54

PROJECT 10914

- B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
- B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section "Metal Ducts" and "Nonmetal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
- F. Examine equipment performance data including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

FIRE STATION 54

PROJECT 10914

- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
- K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
- L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- M. Examine operating safety interlocks and controls on HVAC equipment.
- N. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system-readiness checks and prepare reports. Verify the following:
 - 1. Permanent electrical-power wiring is complete.
 - 2. Automatic temperature-control systems are operational.
 - 3. Equipment and duct access doors are securely closed.
 - 4. Balance, smoke, and fire dampers are open.
 - 5. Isolating and balancing valves are open and control valves are operational.
 - 6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - 7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" or ASHRAE 111 and in this Section.
 - 1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

FIRE STATION 54

PROJECT 10914

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts.
- C. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- D. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- F. Verify that motor starters are equipped with properly sized thermal protection.
- G. Check dampers for proper position to achieve desired airflow path.
- H. Check for airflow blockages.
- I. Check condensate drains for proper connections and functioning.
- J. Check for proper sealing of air-handling-unit components.
- K. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts."

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - 1. Measure total airflow.
 - a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - 2. Measure fan static pressures as follows to determine actual static pressure:
 - a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

FIRE STATION 54

PROJECT 10914

- a. Report the cleanliness status of filters and the time static pressures are measured.
 4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 6. Obtain approval from Architect, Owner, Construction Manager, and, when required, Commissioning Authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure airflow of submain and branch ducts.
 - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure air outlets and inlets without making adjustments.
1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR CONDENSING UNITS

- A. Verify proper rotation of fans.
- B. Measure entering- and leaving-air temperatures.
- C. Record compressor data.

FIRE STATION 54

PROJECT 10914

3.7 PROCEDURES FOR HEAT-TRANSFER COILS (AS APPLICABLE)

- A. Measure, adjust, and record the following data for each electric heating coil:
 - 1. Nameplate data.
 - 2. Airflow.
 - 3. Entering- and leaving-air temperature at full load.
 - 4. Voltage and amperage input of each phase at full load and at each incremental stage.
 - 5. Calculated kilowatt at full load.
 - 6. Fuse or circuit-breaker rating for overload protection.

- B. Measure, adjust, and record the following data for each refrigerant coil:
 - 1. Dry-bulb temperature of entering and leaving air.
 - 2. Wet-bulb temperature of entering and leaving air.
 - 3. Airflow.
 - 4. Air pressure drop.
 - 5. Refrigerant suction pressure and temperature.

- C. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent.
 - 3. Heating-Water Flow Rate: Plus or minus 10 percent.
 - 4. Cooling-Water Flow Rate: Plus or minus 10 percent.
 - 5. Fans, Inlets, Equipment related to the smoke control system: Plus or minus 5 percent.

3.8 REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.9 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.

FIRE STATION 54

PROJECT 10914

- B. Final Report Contents: In addition to certified field-report data, include the following:
1. Fan curves.
 2. Manufacturers' test data.
 3. Field test reports prepared by system and equipment installers.
 4. Other information relative to equipment performance; do not include Shop Drawings and product data.
- C. General Report Data: In addition to form titles and entries, include the following data:
1. Title page.
 2. Name and address of the TAB contractor.
 3. Project name.
 4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Face and bypass damper settings at coils.
 - e. Fan drive settings including settings and percentage of maximum pitch diameter.
 - f. Inlet vane settings for variable-air-volume systems.
 - g. Settings for supply-air, static-pressure controller.
 - h. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Duct, outlet, and inlet sizes.
 3. Pipe and valve sizes and locations.
 4. Terminal units.
 5. Balancing stations.
 6. Position of balancing devices.

FIRE STATION 54

PROJECT 10914

- E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.
 - g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and rpm.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
 3. Test Data (Indicated and Actual Values):
 - a. Total air flow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg.
 - e. Filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. Outdoor airflow in cfm.
 - j. Return airflow in cfm.
 - k. Outdoor-air damper position.
 - l. Return-air damper position.
 - m. Vortex damper position.
- F. Apparatus-Coil Test Reports:
1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft.
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
 2. Test Data (Indicated and Actual Values):