BUILDING 5 - FOURTH FLOOR									
BUILDING	FLOOR	ROOM	MATERIAL DESCRIPTION	QUANTITY	FRIABLE	AHERA ASSESSMENT CATEGORY	REMARKS	Friable Cost and Air Monitoring	Non Friable Cost and Air Monitoring
5	4	401	9" x 9" Floor Tile/Mastic	480 sf	No	5	Carpeted		$15,000.00
5	4	401	Packed Fittings	34 ea	Yes	5		$3,500.00	
5	4	401	Pipe Insulation	152 lf	Yes	5		$3,500.00	
5	4	401	Transite	36 sf	No	5	Radiator		$3,500.00
5	4	402	9" x 9" Floor Tile/Mastic	192 sf	No	5	Carpeted		$3,500.00
5	4	402	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	404	9" x 9" Floor Tile/Mastic	130 sf	No	5	Carpeted		$3,500.00
5	4	404A	9" x 9" Floor Tile/Mastic	200 sf	No	5	Carpeted		$3,500.00
5	4	404A	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	405	9" x 9" Floor Tile/Mastic	126 sf	No	5	Carpeted		$3,500.00
5	4	405	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	406	9" x 9" Floor Tile/Mastic	126 sf	No	5	Carpeted		$3,500.00
5	4	406	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	407	9" x 9" Floor Tile/Mastic	280 sf	No	5	Carpeted		$4,500.00
5	4	407	Transite	48 sf	No	5	Radiator		$3,500.00
5	4	409	9" x 9" Floor Tile/Mastic	510 sf	No	5	Carpeted		$15,000.00
5	4	411	9" x 9" Floor Tile/Mastic	120 sf	No	5	Carpeted		$3,500.00
5	4	411	Transite	36 sf	No	5	Radiator		$3,500.00
5	4	431 Stair No. 4	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	433	9" x 9" Floor Tile/Mastic	135 sf	No	5	Carpeted		$3,500.00
5	4	433	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	434	9" x 9" Floor Tile/Mastic	135 sf	No	5			Abated
5	4	434	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	435	Transite	36 sf	No	5	Radiator		$3,500.00
5	4	437	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	438	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	439	9" x 9" Floor Tile/Mastic	330 sf	No	5	Carpeted		$4,500.00
5	4	439	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	441 Stair No. 3	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	442A	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	443	Texture Wall	700 sf	Yes	6		$20,000.00	
5	4	443	Transite	48 sf	No	5	Radiator		$3,500.00

sf = Square Feet, lf = Linear Feet, ea = Each, C = Corridor

BUILDING 5 - FOURTH FLOOR									
BUILDING	FLOOR	ROOM	MATERIAL DESCRIPTION	QUANTITY	FRIABLE	AHERA ASSESSMENT CATEGORY	REMARKS	Friable Cost and Air Monitoring	Non Friable Cost and Air Monitoring
5	4	443A	Transite		No	5	Radiator		$3,500.00
5	4	443B	Packed Fittings	17 ea	Yes	5		$3,500.00	
5	4	443C	Transite	36 sf	No	5	Radiator		$3,500.00
5	4	443B	Pipe Insulation	62 lf	Yes	5		$3,500.00	
5	4	443F	Transite	48 sf	No	5	Radiator		$3,500.00
5	4	443G	Transite	12 sf	No	5	Radiator		$3,500.00
5	4	445	9" x 9" Floor Tile/Mastic	336 sf	No	5	Carpeted		$4,500.00
5	4	445	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	446A	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	453 Stair No. 2	Transite	24 sf	No	5	Radiator		$3,500.00
5	4	Stair No. 5	Packed Fittings	4 ea	Yes	5		$1,390.00	
							Total	$35,390.00	$152,000.00

sf = Square Feet, lf = Linear Feet, ea = Each, C = Corridor

BUILDING 5 - FIFTH FLOOR									
BUILDING	FLOOR	ROOM	MATERIAL DESCRIPTION	QUANTITY	FRIABLE	AHERA ASSESSMENT CATEGORY	REMARKS	Friable Cost and Air Monitoring	Non Friable Cost and Air Monitoring
5	5	501 Stair No. 3	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	505	Transite	24 sf	No	5	Radiator		$3,500.00
5	5	506A	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	506B	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	506G	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	506H	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	510A	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	512	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	513	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	515	Transite	24 sf	No	5	Radiator		$3,500.00
5	5	516A	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	516E	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	516F	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	518	Transite	24 sf	No	5	Radiator		$3,500.00
5	5	520	Transite	36 sf	No	5	Radiator		$3,500.00
5	5	521	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	524	Transite	12 sf	No	5	Radiator		$3,500.00
5	5	525	Pipe Insulation	10 lf	Yes	5		$3,500.00	
5	5	525	Transite	12 sf	No	5	Radiator		$3,500.00
							Total	$3,500.00	$63,000.00

sf = Square Feet, lf = Linear Feet, ea = Each, c = Corridor

BUILDING 5 - SIXTH, SEVENTH, EIGHTH, TOWER FLOOR									
BUILDING	FLOOR	ROOM	MATERIAL DESCRIPTION	QUANTITY	FRIABLE	AHERA ASSESSMENT CATEGORY	REMARKS	Friable Cost and Air Monitoring	Non Friable Cost and Air Monitoring
5	6		10” Transite Pipe	20 lf	No	5			$3,500.00
~~5~~	~~7~~	~~N/A~~	~~NO ACM~~						
~~5~~	~~8~~	~~N/A~~	~~NO ACM~~						
~~5~~	~~TOWER~~	~~N/A~~	~~NO ACM~~						
							~~Total~~		~~$3,500.00~~

sf = Square Feet, lf = Linear Feet, ea = Each, c = Corridor

SECTION 03 30 53
(SHORT-FORM) CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place structural concrete.
2. Preparation of existing surfaces to receive concrete.
3. Preparation of existing surface to received concrete topping.

1.2 RELATED REQUIREMENTS

A. Materials Testing and Inspection During Construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Concrete Roads, Walks, and Similar Exterior Site Work: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.

1.3 APPLICABLE PUBLICATIONS

A. Comply with references to extent specified in this Section.

B. American Concrete Institute (ACI):

1. 117-15 - Tolerances for Concrete Construction, Materials and Commentary.
2. 117M-10(R2015) - Tolerances for Concrete Construction, Materials and Commentary.
3. 211.1-91(R2009) - Proportions for Normal, Heavyweight, and Mass Concrete.
4. 211.2-98(R2004) - Selecting Proportions for Structural Lightweight Concrete.
5. 301/310M-10 - Structural Concrete.
6. 305.1-14 - Hot Weather Concreting.
7. 306.1-90(R2002) - Cold Weather Concreting.
8. 318/318M-14 - Building Code Requirements for Structural Concrete and SP-66-04-ACI Detailing Manual.
9. 347-04 - Guide to Formwork for Concrete.

C. ASTM International(ASTM):

1. A615/A615M-15ae1 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
2. A996/A996M-15 - Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
3. A1064/A1064M-15 - Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
4. C33/C33M-13 - Concrete Aggregates.
5. C39/C39M-15a - Compressive Strength of Cylindrical Concrete Specimens.
6. C94/C94M-15a - Ready-Mixed Concrete.
7. C143/C143M-15 - Slump of Hydraulic Cement Concrete.

8. C150/C150M-15 - Portland Cement.
9. C171-07 - Sheet Material for Curing Concrete.
10. C192/C192M-15 - Making and Curing Concrete Test Specimens in the Laboratory.
11. C219-14a - Terminology Relating to Hydraulic Cement.
12. C260/C260M-10a - Air-Entraining Admixtures for Concrete.
13. C330/C330M-14 - Lightweight Aggregates for Structural Concrete.
14. C494/C494M-15 - Chemical Admixtures for Concrete.
15. C618-15 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
16. C881/C881M-14 - Epoxy-Resin-Base Bonding Systems for Concrete.
17. C989/C989M-14 - Slag Cement for Use in Concrete and Mortars.
18. C1240-15 - Silica Fume Used in Cementitious Mixtures.
19. D1751-04(2013el) - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
20. E1155-14 - Determining FF Floor Flatness and FL Floor Levelness Numbers.

D. International Concrete Repair Institute:
1. 310.2R-2013 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

1.4 SUBMITTALS

A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Submittal Drawings:
1. Large scale drawings of reinforcing steel.
C. Manufacturer's Literature and Data:
1. Concrete Mix Design.
2. Air-entraining admixture, chemical admixtures, and curing compounds.
3. Indicate manufacturer's recommendation for each application.
D. Certificates: Certify products comply with specifications.
a. Each ready mix concrete batch delivered to site.

1.5 DELIVERY

A. Deliver each ready-mixed concrete batch with mix certification in duplicate according to ASTM C94/C94M.

1.6 WARRANTY

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II.

B. Pozzolans:
   1. Fly Ash: ASTM C618, Class C or F including supplementary optional physical requirements.
C. Coarse Aggregate: ASTM C33/C33M.
   1. Size 7 for coarse aggregate for applied topping and metal pan stair fill.
   2. Size 67 for other applications.
D. Fine Aggregate: ASTM C33/C33M.
E. Lightweight Aggregate for Structural Concrete: ASTM C330/C330M, Table 1.
F. Mixing Water: Fresh, clean, and potable.
G. Air-Entraining Admixture: ASTM C260/C260M.
H. Chemical Admixtures: ASTM C494/C494M.
I. Vapor Barrier: ASTM E1745, Class A with a minimum puncture resistance of 2200 g (3000 lbs.); minimum 0.38 mm (15 mil) thick.
J. Reinforcing Steel: ASTM A615/A615M or ASTM A996/A996M, deformed. See Structural Drawings for grade.
K. Forms: Wood, plywood, metal, or other materials, approved by the Contracting Officers Representative (COR), of grade or type suitable to obtain type of finish specified.
   1. Plywood: Exterior grade, free of defects and patches on contact surface.
   2. Lumber: Sound, grade-marked, S4S stress graded softwood.
   3. Form coating: As recommended by Contractor.
L. Welded Wire Fabric: ASTM A1064/A1064M, plain; sized as indicated.
M. Expansion Joint Filler: ASTM D1751.
N. Sheet Materials for Curing Concrete: ASTM C171.
O. Abrasive Aggregates: Aluminum oxide grains or emery grits.
P. Liquid Densifier/Sealer: 100 percent active colorless aqueous siliconate solution.
Q. Grout, Non-Shrinking: Premixed ferrous or non-ferrous. Grout to show no settlement or vertical drying shrinkage at 3 days. Compressive strength for grout, at least 18 MPa (2500 psi) at 3 days and 35 MPa (5000 psi) at 28 days.

2.2 ACCESSORIES

A. Bonding Agent: ASTM C 1059/C 1059M, Type II.
B. Structural Adhesive: ASTM C881, 2-component material suitable for use on dry or damp surfaces. Provide material Type, Grade, and Class to suit Project requirements.
C. Water Stops: Rubber base with self-healing properties. Expanding clay based products not acceptable.
D. Weeps: Geotextile type as recommended by Contractor and approved by Contracting Officer.

2.3 CONCRETE MIXES

A. Design concrete mixes according to ASTM C94/C94M, Option C.

B. Compressive strength at 28 days: minimum 30 MPa (4,000 psi).

C. Submit mix design and results of compression tests to the Contracting Officer for his evaluation. Identify all materials, including admixtures, making-up the concrete.

D. Maximum Slump for Vibrated Concrete: 100 mm (4 inches) tested according to ASTM C143.

E. Cement and Water Factor (See Table I):

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete: Strength	Non-Air-Entrained		Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio	Min. Cement kg/cu. m (lbs./cu. yd.)	Max. Water Cement Ratio
35 (5000)1,3	375 (630)	0.45	385 (650)	0.40
30 (4000)1,3	325 (550)	0.55	340 (570)	0.50
25 (3000)1,3	280 (470)	0.65	290 (490)	0.55
25 (3000)1,2	300 (500)	*	310 (520)	*

Footnotes:

1. If trial mixes are used, achieve a compressive strength 8.3 MPa (1 200 psi) in excess of f'c. For concrete strengths greater than 35 MPa (5,000 psi), achieve a compressive strength 9.7 MPa (1,400 psi) in excess of f'c.

2. Lightweight Structural Concrete: Pump mixes may require higher cement values as specified in ACI 318/318M.

3. For Concrete Exposed to High Sulfate Content Soils: Maximum water cement ratio is 0.44.

* Laboratory Determined according to ACI 211.1 for normal weight concrete or ACI 211.2 for lightweight structural concrete.

F. Air-entrainment as specified, and conform with the following for air content table:

TABLE II - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES

Nominal Maximum Size of Coarse Aggregate	Total Air Content, percent
10 mm (3/8 inches)	6 Moderate exposure; 7.5 severe exposure
13 mm (1/2 inches)	5.5 Moderate exposure; 7 severe exposure
19 mm (3/4 inches)	5 Moderate exposure; 6 severe exposure

TABLE II - TOTAL AIR CONTENT FOR VARIOUS SIZES OF COARSE AGGREGATES	
Nominal Maximum Size of Coarse Aggregate	Total Air Content, percent
25 mm (1 inches)	4.5 Moderate exposure; 6 severe exposure
40 mm (1 1/2 inches)	4.5 Moderate exposure; 5.5 severe exposure

2.4 BATCHING AND MIXING

A. Store, batch, and mix materials according to ASTM C94/C94M.
   1. Job-Mixed: Batch mix concrete in stationary mixers as specified in ASTM C94/C94M.
   2. Ready-Mixed Concrete: Comply with ASTM C94/C94M, except use of non-agitating equipment for transporting concrete to Site is not acceptable.
   3. Mixing Structural Lightweight Concrete: Charge mixer with 2/3 of total mixing water and total aggregate for each batch. Mix ingredients minimum 30 seconds in stationary mixer or minimum 10 revolutions at mixing speed in truck mixer. Add remaining mixing water and other ingredients and continue mixing. Above procedure may be modified as recommended by aggregate producer.
   4. When aggregate producer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

PART 3 - EXECUTION

3.1 FORMWORK

A. Installation: Conform to ACI 347. Construct forms to obtain concrete of the shapes, dimensions and profiles indicated, with tight joints.

B. Design and construct forms to prevent bowing-out of forms between supports and to be removable without prying against or otherwise damaging fresh concrete.

C. When patching formed concrete, seal form edges against existing surface to prevent leakage; set forms so that patch is flush with adjacent surfaces.

D. Treating and Wetting: Treat or wet concrete contact surfaces:
   1. Coat plywood and lumber forms with non-staining form sealer.
   2. Wet wood forms thoroughly when they are not treated with form release agent.
   3. Clean and coat removable metal forms with light form oil before reinforcement is placed.
   4. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
   5. Prevent water from accumulating and remaining within forms.

E. Inserts, Sleeves, and Similar Items: Install flashing reglets, masonry ties, anchors, inserts, wires, hangers, sleeves, boxes for floor hinges, and other cast-in items specified in other Sections. Place where indicated, square, flush and secured to formwork.

F. Construction Tolerances - General: Install and maintain concrete formwork to assure completion of work within specified tolerances.

G. Adjust or replace completed work exceeding specified tolerances before placing concrete.

3.2 REINFORCEMENT

A. Install concrete reinforcement according to ACI 318 and ACI SP-66.

B. Support and securely tie reinforcing steel to prevent displacement during placing of concrete.

C. Drilling for Dowels in Existing Concrete: Use sharp bits, drill hole slightly oversize, fill with epoxy grout, inset the dowel, and remove excess epoxy.

3.3 VAPOR BARRIER

A. Except where membrane waterproofing is required, place interior concrete slabs on a continuous vapor barrier.

B. Lap joints 150 mm (6 inches) and seal with a compatible pressure-sensitive tape.

C. Patch punctures and tears.

3.4 SLABS RECEIVING RESILENT COVERING

A. Slab shall be allowed to cure for 6 weeks minimum prior to placing resilient covering. After curing, slab shall be tested by the Contractor for moisture in accordance with ASTM D4263 or ASTM F1869. Moisture content shall be less than 3 pounds per 1000 sf prior to placing covering.

B. In lieu of curing for 6 weeks, Contractor has the option, at his own cost, to utilize the Moisture Vapor Emissions & Alkalinity Control Sealer as follows:

1. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for concrete slabs either on grade, below grade or above grade receiving resilient flooring, such as sheet vinyl, vinyl composition tile, rubber, wood flooring, epoxy coatings and overlays.
2. Manufacturer’s representative will be on the site the day of concrete pour to install or train its application and document. He shall return on every application thereafter to verify that proper procedures are followed.
    a. Apply Sealer to concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain floor traffic without damage.
    b. Spray apply Sealer at the rate of 20m^2 (200 square feet) per gallon. Lightly broom product evenly over the substrate and product has completely penetrated the surface.

c. If within two (2) hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply Sealer product to these areas as soon as weather conditions permits.

3.5 PLACING CONCRETE

A. Remove water from excavations before concrete is placed. Remove hardened concrete, debris and other foreign materials from interior of forms, and from inside of mixing and conveying equipment. Obtain approval from Contracting Officer's Representative before placing concrete.

B. Install screeds at required elevations for concrete slabs.

C. Roughen and clean free from laitance, foreign matter, and loose particles before placing new concrete on existing concrete.

1. Blow-out areas with compressed air and immediately coat contact areas with adhesive in compliance with manufacturer's instructions.

D. Place structural concrete according to ACI 301 and ACI 318.

E. Convey concrete from mixer to final place of deposit by method that will prevent segregation or loss of ingredients. Do not deposit, in Work, concrete that has attained its initial set or has contained its water or cement more than 1 1/2 hours. Do not allow concrete to drop freely more than 1500 mm (5 feet) in unexposed work nor more than 900 mm (3 feet) in exposed work.

F. Place and consolidate concrete in horizontal layers not exceeding 300 mm (12 inches) in thickness. Consolidate concrete by spading, rodding, and mechanical vibrator. Do not secure vibrator to forms or reinforcement. Continuously vibrate during placement of concrete.

G. Hot Weather Concrete Placement: As recommended by ACI 305.1 to prevent adversely affecting properties and serviceability of hardened concrete.

H. Cold Weather Concrete Placement: As recommended by ACI 306.1, to prevent freezing of thin sections less than 300 mm (12 inches) and to permit concrete to gain strength properly.

1. Do not use calcium chloride without written approval from Contracting Officer's Representative.

3.6 TOLERANCES

A. Slab on Grade Finish Tolerance: Comply with ACI 117, FF-number and FL-number method.

1. Paragraph 4.8.3, Class A 3 mm (1/8 inches) for offset in form-work.
2. Table R4.8.4, "Flat" 6 mm (1/4 inch) in 3 m (10 feet) for slabs.

3.7 PROTECTION AND CURING

A. Protect exposed surfaces of concrete from premature drying, wash by rain or running water, wind, mechanical damage, and excessive hot or cold temperatures.

B. Curing Methods: Cure concrete with curing compound using wet method with sheets.

C. Formed Concrete Curing: Wet the tops and exposed portions of formed concrete and keep moist until forms are removed.
   1. If forms are removed before 14 days after concrete is cast, install sheet curing materials as specified above.

D. Concrete Flatwork Curing:
   1. Install sheet materials according to the manufacturer's instructions.
      a. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

3.8 FORM REMOVAL

A. Maintain forms in place until concrete is self-supporting, with construction operation loads.

B. Remove fins, laitance and loose material from concrete surfaces when forms are removed. Repair honeycombs, rock pockets, sand runs, spalls, or otherwise damaged surfaces by patching with the same mix as concrete minus the coarse aggregates.

C. Finish to match adjacent surfaces.

3.9 FINISHES

A. Vertical and Overhead Surface Finishes:
   1. Surfaces Concealed in Completed Construction: As-cast; no additional finishing required.
   2. Surfaces Exposed in Unfinished Areas: As-cast; no additional finishing required.
      a. Mechanical rooms.
      b. Electrical rooms.
   3. Surfaces Exposed to View Scheduled for Paint Finish: Remove fins, burrs and similar projections by mechanical means approved by Contracting Officer's Representative flush with adjacent surface. Lightly rub with fine abrasive stone or hone. Use ample amount of water during rubbing without working up a lather of mortar or changing texture of concrete.
   4. Surfaces Exposed to View in Finished Areas: Grout finish, unless otherwise shown, for uniform color and smooth finish treated.
      a. Remove laitance, fins and burrs.
      b. Scrub concrete with wire brushes. Clean stained concrete surfaces with hone or stone.
      c. Apply grout composed of 1 part Portland cement and 1 part clean, fine sand (smaller than 600 micro-m (No. 30) sieve). Work grout into surface of concrete with cork floats or fiber brushes until pits and honeycomb are filled.
      d. After grout has hardened, but is still plastic, remove surplus grout with sponge rubber float and by rubbing with clean burlap.

e. In hot, dry weather fog spray surfaces with water to keep grout wet during setting period. Complete finished areas in same day. Confine limits of finished areas to natural breaks in wall surface. Do not leave grout on concrete surface overnight.

B. Slab Finishes:

1. Allow bleed water to evaporate before surface is finished. Do not sprinkle dry cement on surface to absorb water.
2. Scratch Finish: Rake or wire broom after partial setting slab surfaces to received bonded applied cementitious application, within 2 hours after placing, to roughen surface and provide permanent bond between base slab and applied cementitious materials.
3. Float Finish: Interior ramps, interior stair treads, and platforms, both equipment pads, and slabs to receive non-cementitious materials, except as specified.
   a. Screen and float to smooth dense finish.
   b. After first floating, while surface is still soft, check surfaces for alignment using straightedge or template. Correct high spots by cutting down with trowel or similar tool. Correct low spots by filling in with material same composition as floor finish. Remove any surface projections on floated finish by rubbing or dry grinding. Refloat slab to uniform sandy texture.
4. Steel Trowel Finish: Applied toppings, concrete surfaces to receive resilient floor covering or carpet, future floor roof and other monolithic concrete floor slabs exposed to view without other finish indicated or specified.
   a. Delay final steel troweling to secure smooth, dense surface, usually when surface can no longer be dented by fingers. During final troweling, tilt steel trowel at slight angle and exert heavy pressure on trowel to compact cement paste and form dense, smooth surface.
   b. Finished surface: Free from trowel marks. Uniform in texture and appearance.
5. Finished Slab Flatness (FF) and Levelness (FL):
   a. Slab on Grade: Specified overall value FF 25/FL 20. Minimum local value FF 17/FL 15.
   b. Test flatness and levelness according to ASTM E1155.

3.10 SURFACE TREATMENTS

A. Mix and apply the following surface treatments according to manufacturer's instructions.

1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.

B. Liquid Densifier/Sealer: Use for exposed concrete floors and concrete floors to receive carpeting except those specified to receive non-slip finish.

C. Slip Resistant Finish:

1. Except where safety nosing and tread coverings are shown, apply abrasive aggregate to treads and platforms of concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms.
    a. Broadcast aggregate uniformly over concrete surface. Trowel concrete surface to smooth dense finish. After curing, rub treated surface with abrasive brick and water sufficiently to slightly expose abrasive aggregate.

3.11 APPLIED TOPPING

A. Install concrete topping with thickness and strength shown with only enough water to ensure stiff, workable, plastic mix.

B. Continuously place applied topping until entire area is complete, struck off with straightedge, compact by rolling or tamping, float and steel trowel to hard smooth finish.

3.12 RESURFACING FLOORS

A. Remove existing flooring by abrasive blasting or grinding, in areas to receive resurfacing, to expose existing structural slab. Achieve a surface profile of 2 to 4 according to ICRI 310.2R for the condition found at Site.

B. Prepare exposed structural slab surface by cleaning, wetting, and applying adhesive according to manufacturer's instructions as specified in the flooring section.

3.13 PRECAST CONCRETE ITEMS:

Precast concrete items, not specified elsewhere, shall be cast using 25 MPa (3000 psi) air-entrained concrete to shapes and dimensions shown. Finish surfaces to match corresponding adjacent concrete surfaces, Reinforce with steel as necessary for safe handling and erection.

- - E N D - -

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies structural steel shown and classified by Section 2, Code of Standard Practice for Steel Buildings and Bridges.

1.2 RELATED WORK:

A. Materials testing and inspection during construction: Section 01 45 29, TESTING LABORATORY SERVICES.

B. Painting: Section 09 91 00, PAINTING.

1.3 QUALITY ASSURANCE:

A. Fabricator and erector shall maintain a program of quality assurance in conformance with Section 8, Code of Standard Practice for Steel Buildings and Bridges. Work shall be fabricated in an AISC certified Category Std fabrication plant.

B. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the written notification required by 29 CFR 1926.752. Provide copy of this notification to the Contracting Officers Representative (COR).

1.4 TOLERANCES:

Fabrication tolerances for structural steel shall be held within limits established by ASTM A6, by AISC 303, Sections 6 and 7, Code of Standard Practice for Buildings and Bridges, except as follows:

A. Elevation tolerance for closure plates at the building perimeter and at slab openings prior to concrete placement is 6 mm (1/4 inch).

1.5 DESIGN:

A. Connections: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings or specified herein. Use details consistent with the details shown on the Drawings, supplementing where necessary. The details shown on the Drawings are conceptual and do not indicate the required weld sizes or number of bolts unless specifically noted. Use rational engineering design and standard practice in detailing, accounting for all loads and eccentricities in both the connection and the members. Promptly notify the Contracting Officers Representative (COR) of any location where the connection design criteria is not clearly indicated. The design of all connections is subject to the review and acceptance of the Contracting Officers Representative (COR). Submit structural calculations prepared and sealed by a qualified engineer registered in the state where the project is located. Submit calculations for review before preparation of detail drawings.

1.6 REGULATORY REQUIREMENTS:

A. AISC 360: Specification for Structural Steel Buildings

B. AISC 303: Code of Standard Practice for Steel Buildings and Bridges.

1.7 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop and Erection Drawings: Complete

C. Certificates:

1. Structural steel.
2. Steel for all connections.
3. Welding materials.
4. Shop coat primer paint.

D. Test Reports:

1. Welders' qualifying tests.

E. Design Calculations and Drawings:

1. Connection calculations, if required.

F. Record Surveys.

1.8 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Institute of Steel Construction (AISC):

1. AISC 360-10 Specification for Structural Steel Buildings
3. AISC 303-10 Code of Standard Practice for Steel Buildings and Bridges

C. American National Standards Institute (ANSI):

B18.22.1-65(R2008).....Plain Washers

B18.22M-81(R2000).....Metric Plain Washers

D. American Society for Testing and Materials (ASTM):

A6/A6M-11 .....Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

A36/A36M-08 .....Standard Specification for Carbon Structural Steel

A53/A53M-10 .....Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123/A123M-09 .....Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A242/A242M-04(R2009) .....Standard Specification for High-Strength Low-Alloy Structural Steel

A283/A283M-03(R2007) .....Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

A307-10.....Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A325-10.....Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
A490-12.....Standard Specification for Heat-Treated Steel Structural Bolts 150 ksi Minimum Tensile Strength
A500/A500M-10a .....Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
A501-07.....Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
A572/A572M-07 .....Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
A992/A992M-11 .....Standard Specification for Structural Steel Shapes

E. American Welding Society (AWS):
D1.1/D1.1M-10.....Structural Welding Code-Steel

F. Research Council on Structural Connections (RCSC) of The Engineering Foundation:
Specification for Structural Joints Using ASTM A325 or A490 Bolts

G. Military Specifications (Mil. Spec.):
MIL-P-21035.....Paint, High Zinc Dust Content, Galvanizing, Repair

H. Occupational Safety and Health Administration (OSHA):
29 CFR Part 1926-2001 .....Safety Standards for Steel Erection

PART 2 - PRODUCTS

2.1 MATERIALS:

A. Structural Steel: ASTM A36

B. Structural Tubing: ASTM A500, Grade B.

C. Steel Pipe: ASTM A53, Grade B.

D. Bolts, Nuts and Washers:

1. High-strength bolts, including nuts and washers: ASTM A325.
2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.
3. Plain washers, other than those in contact with high-strength bolt heads and nuts: ANSI Standard B18.22.1.

PART 3 - EXECUTION

3.1 CONNECTIONS (SHOP AND FIELD):

A. Welding: Welding in accordance with AWS D1.1. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.1 to perform type of work required.

B. High-Strength Bolts: High-strength bolts tightened to a bolt tension not less than 70% of their minimum tensile strength. Tightening done with properly calibrated wrenches, by turn-of-nut method or by use of direct tension indicators (bolts or washers). Tighten bolts in connections identified as slip-critical using Direct Tension Indicators. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.

3.2 FABRICATION:

Fabrication in accordance with Chapter M, AISC 360. .

3.3 SHOP PAINTING:

A. General: Shop paint steel with primer in accordance with AISC 303, Section 6.

B. Shop paint for steel surfaces is specified in Section 09 91 00, PAINTING.

C. Do not apply paint to following:

1. Surfaces within 50 mm (2 inches) of joints to be welded in field.
2. Surfaces which will be encased in concrete.
3. Surfaces which will receive sprayed on fireproofing.
4. Top flange of members which will have shear connector studs applied.

3.4 ERECTION:

A. General: Erection in accordance with AISC 303, Section 7B. Temporary Supports: Temporary support of structural steel frames during erection in accordance with AISC 303, Section 7

3.5 FIELD PAINTING:

A. After erection, touch-up steel surfaces specified to be shop painted. After welding is completed, clean and prime areas not painted due to field welding.

B. Finish painting of steel surfaces is specified in Section 09 91 00, PAINTING.

3.6 SURVEY:

Upon completion of finish bolting or welding on any part of the work, and prior to start of work by other trades that may be supported, attached, or applied to the structural steel work, submit a certified report of survey to Contracting Officers Representative (COR) for approval. Reports shall be prepared by Registered Land Surveyor or Registered Civil Engineer as specified in Section 01 00 00, GENERAL REQUIREMENTS. Report shall specify that location of structural steel is acceptable for plumbness, level and alignment within specified tolerances specified in the AISC Manual.

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.

B. Items specified.

1. Support for Wall and Ceiling Mounted Items: as indicated in the drawings.
2. Frames:
3. Loose Lintels
4. Shelf Angles
5. Aluminum Ladders

1.2 RELATED WORK

A. Prime and finish painting: Section 09 91 00, PAINTING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

C. Shop Drawings:

1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
3. Provide templates and rough-in measurements as required.

D. Manufacturer's Certificates:

1. Anodized finish as specified.
2. Live load designs as specified.

E. Design Calculations for specified live loads including dead loads.

F. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

1.4 QUALITY ASSURANCE

A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.

B. Each product type shall be the same and be made by the same manufacturer.

C. Assembled product to the greatest extent possible before delivery to the site.

D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Mechanical Engineers (ASME):

B18.6.1-97.....Wood Screws

B18.2.2-87(R2005).....Square and Hex Nuts

C. American Society for Testing and Materials (ASTM):

A36/A36M-12 .....Structural Steel

A47-99(R2009).....Malleable Iron Castings

A48-03(R2012).....Gray Iron Castings

A53-12.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless

A123-12.....Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

A240/A240M-14 .....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service

A307-12.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A391/A391M-07(R2012) .....Grade 80 Alloy Steel Chain

B221-13.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes

B456-11.....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium

B632-08.....Aluminum-Alloy Rolled Tread Plate

C1107-13 .....Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

F436-11.....Hardened Steel Washers

F468-06(R2012).....Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws and Studs for General Use

F593-13.....Stainless Steel Bolts, Hex Cap Screws, and Studs

F1667-11.....Driven Fasteners: Nails, Spikes and Staples

D. American Welding Society (AWS):

D1.1-10.....Structural Welding Code Steel

D1.2-08.....Structural Welding Code Aluminum

D1.3-08.....Structural Welding Code Sheet Steel

E. National Association of Architectural Metal Manufacturers (NAAMM)

AMP 500-06 .....Metal Finishes Manual

F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:

SP 1-04 .....No. 1, Solvent Cleaning

SP 2-04 .....No. 2, Hand Tool Cleaning

SP 3-04 .....No. 3, Power Tool Cleaning

G. Federal Specifications (Fed. Spec):

RR-T-650E .....Treads, Metallic and Nonmetallic, Nonskid

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.

B. Ladders and Rungs: 120 kg (250 pounds) at any point.

2.2 MATERIALS

A. Structural Steel: ASTM A36.

B. Stainless Steel: ASTM A240, Type 302 or 304.

C. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.

D. Steel Pipe: ASTM A53.

1. Galvanized for exterior locations.
2. Type S, Grade A unless specified otherwise.
3. NPS (inside diameter) as shown.

E. Cast-Iron: ASTM A48, Class 30, commercial pattern.

F. Malleable Iron Castings: A47.

G. Primer Paint: As specified in Section 09 91 00, PAINTING.

H. Stainless Steel Tubing: ASTM A269, type 302 or 304.

I. Modular Channel Units:

1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
2. Form channel within turned pyramid shaped clamping ridges on each side.

3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.3 mm (0.0125 inch) thick stainless steel.

J. Grout: ASTM C1107, pourable type.

2.3 HARDWARE

A. Rough Hardware:
   1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
   2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.

B. Fasteners:
   1. Bolts with Nuts:
      a. ASME B18.2.2.
      b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
      c. ASTM F468 for nonferrous bolts.
      d. ASTM F593 for stainless steel.
   2. Screws: ASME B18.6.1.
   3. Washers: ASTM F436, type to suit material and anchorage.
   4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

2.4 FABRICATION GENERAL

A. Material
   1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
   2. Use material free of defects which could affect the appearance or service ability of the finished product.

B. Size:
   1. Size and thickness of members as shown.

2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. Connections
1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable member's machine screws or bolts.

D. Fasteners and Anchors
1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.
5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self drilling and tapping screws or bolts.

E. Workmanship
1. General:
   a. Fabricate items to design shown.
   b. Furnish members in longest lengths commercially available within the limits shown and specified.

c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
f. Prepare members for the installation and fitting of hardware.
g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.

2. Welding:
   a. Weld in accordance with AWS.
   b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
   c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
   d. Finish welded joints to match finish of adjacent surface.
3. Joining:
   a. Miter or butt members at corners.
   b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
4. Anchors:
   a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.
   b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.
5. Cutting and Fitting:
   a. Accurately cut, machine and fit joints, corners, copes, and miters.
   b. Fit removable members to be easily removed.
   c. Design and construct field connections in the most practical place for appearance and ease of installation.

d. Fit pieces together as required.
e. Fabricate connections for ease of assembly and disassembly without use of special tools.
f. Joints firm when assembled.
g. Conceal joining, fitting and welding on exposed work as far as practical.
h. Do not show rivets and screws prominently on the exposed face.
i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.

F. Finish:
1. Finish exposed surfaces in accordance with NAAMM AMP 500 Metal Finishes Manual.
2. Aluminum: NAAMM AMP 501.
a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.
b. Clear anodic coating, AA-C22A41, chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.
c. Colored anodic coating, AA-C22A42, chemically etched medium matte with Architectural Class 1, 0.7 mils or thicker.
d. Painted: AA-C22R10.
3. Steel and Iron: NAAMM AMP 504.
a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
b. Surfaces exposed in the finished work:
1) Finish smooth rough surfaces and remove projections.
2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
c. Shop Prime Painting:
1) Surfaces of Ferrous metal:
a) Items not specified to have other coatings.
b) Galvanized surfaces specified to have prime paint.
c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
d) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
2) Non ferrous metals: Comply with MAAMM-500 series.
4. Stainless Steel: NAAMM AMP-504 Finish No. 4.

G. Protection:
   1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
   2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

A. General:
   1. Fabricate ASTM A36 structural steel shapes as shown.
   2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
   3. Field connections may be welded or bolted.

B. For Wall Mounted Items:
   1. For items supported by metal stud partitions.
   2. Steel strip or hat channel minimum of 1.5 mm (0.0598 inch) thick.
   3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
   4. Steel hat channels where shown. Flange cut and flatted for anchorage to stud.
   5. Structural steel tube or channel for grab bar at water closets floor to structure above with clip angles or end plates formed for anchors.
   6. Use steel angles for thru wall counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.

C. For Intravenous Track and Cubical Curtain Track:
   1. Fabricate assembly of steel angle as shown.
   2. Drill angle bent ends for anchor screws to acoustical suspension system and angle for hanger wires.
   3. Provide pipe sleeve welded to angle.

D. For Operating Room Light:
   1. Fabricate as shown to suit equipment furnished.
   2. Drill leveling plate for light fixture bolts.

E. Supports for Accordion Partition Tracks, Exercise Equipment, and Items at Various Conditions at Suspended Ceilings:
   1. Fabricate of structural steel shapes as shown.
   2. Drill for anchor bolts of suspended item.

2.6 FRAMES

A. Elevator Entrance Wall Opening.
   1. Fabricate of channel shapes, plates, and angles as shown.
   2. Weld or bolt head to jamb as shown.
   3. Weld clip angles to bottom of frame and top of jamb members extended to structure above for framed construction.
      a. Provide holes for anchors.
      b. Weld head to jamb members.

2.7 LOOSE LINTELS

A. Furnish lintels of sizes shown. Where size of lintels is not shown, provide the sizes specified.
B. Fabricate lintels with not less than 150 mm (6 inch) bearing at each end for nonbearing masonry walls, and 200 mm (8 inch) bearing at each end for bearing walls.
C. Provide one angle lintel for each 100 mm (4 inches) of masonry thickness as follows except as otherwise specified or shown.
   1. Openings 750 mm to 1800 mm (2-1/2 feet to 6 feet) - 100 x 90 x 8 mm (4 x 3-1/2 x 5/16 inch).
   2. Openings 1800 mm to 3000 mm (6 feet to 10 feet) - 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
D. For 150 mm (6 inch) thick masonry openings 750 mm to 3000 mm (2-1/2 feet to 10 feet) use one angle 150 x 90 x 9 mm (6 x 3-1/2 x 3/8 inch).
E. Provide bearing plates for lintels where shown.
F. Weld or bolt upstanding legs of double angle lintels together with 19 mm (3/4 inch bolts) spaced at 300 mm (12 inches) on centers.
G. Insert spreaders at bolt points to separate the angles for insertion of metal windows, louver, and other anchorage.
H. Where shown or specified, punch upstanding legs of single lintels to suit size and spacing of anchor bolts.

2.8 SHELF ANGLES

A. Fabricate from steel angles of size shown.
B. Fabricate angles with horizontal slotted holes for 19 mm (3/4 inch) bolts spaced at not over 900 mm (3 feet) on centers and within 300 mm (12 inches) of ends.
C. Provide adjustable malleable iron inserts for embedded in concrete framing.

2.9 LADDERS

A. Aluminum Ladders:
   1. Fixed-rail type, constructed of structural aluminum, with mill finish.
   2. Fabricate side rails and rungs of size and design shown, with the rungs shouldered and headed into and welded to the rails.
   3. Where shown fabrication side rails curved, twisted and formed into gooseneck.

4. Fabricate angle brackets at top and bottom and intermediate brackets where shown. Drill for bolting.
5. Rungs to be 1 ¼" minimum serrated aluminum.
6. Provide aluminum ladders with aluminum cage, safety rest platform with railing, and polyurethane safety caps covering exposed aluminum ends.
7. Safety rest platform to have bar grating floor surface, aluminum toe boards and 42" high aluminum guardrails.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

B. Items set into concrete or masonry.
   1. Provide temporary bracing for such items until concrete or masonry is set.
   2. Place in accordance with setting drawings and instructions.
   3. Build strap anchors, into masonry as work progresses.

C. Field weld in accordance with AWS.
   1. Design and finish as specified for shop welding.
   2. Use continuous weld unless specified otherwise.

D. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.

E. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

F. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.

G. Secure escutcheon plate with set screw.

3.2 INSTALLATION OF SUPPORTS

A. Anchorage to structure.
   1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
   2. Secure supports to concrete inserts by bolting or continuous welding as shown.
   3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
   4. Secure steel plate or hat channels to studs as detailed.

B. Supports for Wall Mounted items:
   1. Locate center of support at anchorage point of supported item.

2. Locate support at top and bottom of wall hung cabinets.
3. Locate support at top of floor cabinets and shelving installed against walls.
4. Locate supports where required for items shown.

C. Ceiling Support for Operating Light:
1. Anchor support to structure above as shown.
2. Set leveling plate as shown level with ceiling.
3. Secure operating light to leveling plate in accordance with light manufacturer's requirements.

D. Supports for intravenous (IV) Track and Cubicle Curtain Track:
1. Install assembly where shown after ceiling suspension grid is installed.
2. Drill angle for bolt and weld nut to angle prior to installation of tile.

E. Support for cantilever grab bars:
1. Locate channels or tube in partition for support as shown, and extend full height from floor to underside of structural slab above.
2. Anchor at top and bottom with angle clips bolted to channels or tube with two, 9 mm (3/8 inch) diameter bolts.
3. Anchor to floors and overhead construction with two 9 mm (3/8 inch) diameter bolts.
4. Fasten clips to concrete with expansion bolts, and to steel with machine bolts or welds.

3.3 OTHER FRAMES

A. Set frame flush with surface unless shown otherwise.
B. Anchor frames at ends and not over 450 mm (18 inches) on centers unless shown otherwise.
C. Set in formwork before concrete is placed.

3.4 STEEL LINTELS

A. Use lintel sizes and combinations shown or specified.
B. Install lintels with longest leg upstanding, except for openings in 150 mm (6 inch) masonry walls install lintels with longest leg horizontal.
C. Install lintels to have not less than 150 mm (6 inch) bearing at each end for nonbearing walls, and 200 mm (8 inch) bearing at each end for bearing walls.

3.5 SHELF ANGLES

A. Anchor shelf angles with 19 mm (3/4 inch) bolts unless shown otherwise in adjustable malleable iron inserts, set level at elevation shown.
B. Provide expansion space at end of members.

3.6 LADDERS

A. Anchor ladders to walls and floors with expansion bolts through turned lugs or angle clips or brackets.

3.7 STEEL COMPONENTS FOR MILLWORK ITEMS

Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

3.8 CLEAN AND ADJUSTING

A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.

B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies wood blocking, framing, sheathing, furring, nailers, sub-flooring, rough hardware, and light wood construction.

1.2 RELATED WORK:

A. Milled woodwork: Section 06 20 00, FINISH CARPENTRY.

B. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings showing framing connection details, fasteners, connections and dimensions.

C. Manufacturer's Literature and Data:

1. Submit data for lumber, panels, hardware and adhesives.
2. Submit data for wood-preservative treatment from chemical treatment manufacturer and certification from treating plants that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
3. Submit 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.
4. For products receiving a waterborne treatment, submit statement that moisture content of treated materials was reduced to levels specified before shipment to project site.

D. Manufacturer's certificate for unmarked lumber.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Protect lumber and other products from dampness both during and after delivery at site.

B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

C. Stack plywood and other board products so as to prevent warping.

D. Locate stacks on well drained areas, supported at least 152 mm (6 inches) above grade and cover with well-ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.5 QUALITY ASSURANCE:

A. Installer: A firm with a minimum of three (3) years' experience in the type of work required by this section.

1.6 GRADING AND MARKINGS:

A. Any unmarked lumber or plywood panel for its grade and species will not be allowed on VA Construction sites for lumber and material not normally grade marked, provide manufacturer's

certificates (approved by an American Lumber Standards approved agency) attesting that lumber and material meet the specified the specified requirements.

1.7 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Forest and Paper Association (AFPA):

NDS-15.....National Design Specification for Wood Construction

WCD1-01 .....Details for Conventional Wood Frame Construction

C. American Society of Mechanical Engineers (ASME):

B18.2.1-12(R2013).....Square and Hex Bolts and Screws

B18.2.2-10.....Square and Hex Nuts

B18.6.1-81(R2008).....Wood Screws

D. American Plywood Association (APA):

E30-11.....Engineered Wood Construction Guide

E. ASTM International (ASTM):

A653/A653M-13 .....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process

C954-11 .....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness

C1002-14 .....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Metal Studs

D198-14 .....Test Methods of Static Tests of Lumber in Structural Sizes

D2344/D2344M-13.....Test Method for Short-Beam Strength of Polymer Matrix Composite Materials and Their Laminates

D2559-12a .....Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions

D3498-03(R2011) .....Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems

D6108-13 .....Test Method for Compressive Properties of Plastic Lumber and Shapes

D6109-13 .....Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products

D6111-13a .....Test Method for Bulk Density and Specific Gravity of Plastic Lumber and Shapes by Displacement

D6112-13 ..... Test Methods for Compressive and Flexural Creep and Creep-Rupture of Plastic Lumber and Shapes

F844-07a(R2013) ..... Washers, Steel, Plan (Flat) Unhardened for General Use

F1667-13 ..... Nails, Spikes, and Staples

F. American Wood Protection Association (AWPA):

AWPA Book of Standards

G. Commercial Item Description (CID):

A-A-55615 ..... Shield, Expansion (Wood Screw and Lag Bolt Self Threading Anchors)

H. Forest Stewardship Council (FSC):

FSC-STD-01-001(Ver. 4-0) FSC Principles and Criteria for Forest Stewardship

I. Military Specification (Mil. Spec.):

MIL-L-19140E ..... Lumber and Plywood, Fire-Retardant Treated

J. Environmental Protection Agency (EPA):

40 CFR 59(2014) ..... National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

K. Truss Plate Institute (TPI):

TPI-85 ..... Metal Plate Connected Wood Trusses

L. U.S. Department of Commerce Product Standard (PS)

PS 1-95 ..... Construction and Industrial Plywood

PS 20-10 ..... American Softwood Lumber Standard

M. ICC Evaluation Service (ICC ES):

AC09 ..... Quality Control of Wood Shakes and Shingles

AC174 ..... Deck Board Span Ratings and Guardrail Systems (Guards and Handrails)

PART 2 - PRODUCTS

2.1 LUMBER:

A. Unless otherwise specified, each piece of lumber must bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

1. Identifying marks are to be in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Structural Members: Species and grade as listed in the AFPA NDS having design stresses as shown.

C. Lumber Other Than Structural:
   1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
   2. Framing lumber: Minimum extreme fiber stress in bending of 7584 kPa (1100 PSI).
   3. Furring, blocking, nailers and similar items 101 mm (4 inches) and narrower Standard Grade; and, members 152 mm (6 inches) and wider, Number 2 Grade.
   4. Board Sub-flooring: Shiplap edge, 25 mm (1 inch) thick, not less than 203 mm (8 inches) wide.

D. Sizes:
   1. Conforming to PS 20.
   2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.

E. Moisture Content:
   1. Maximum moisture content of wood products is to be as follows at the time of delivery to site.
      a. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
      b. Lumber over 50 mm (2 inches) thick: 25 percent or less.

F. Fire Retardant Treatment:
   1. Comply with Mil Spec. MIL-L-19140.
   2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.

G. Preservative Treatment:
   1. Do not treat Heart Redwood and Western Red Cedar.
   2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 610 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members provided in connection with roofing and flashing materials.
   3. Treat other members specified as preservative treated (PT).
   4. Preservative treat by the pressure method complying with AWPA Book use category system standards U1 and T1, except any process involving the use of Chromated Copper Arsenate (CCA) or other agents classified as carcinogenic for pressure treating wood is not permitted.

2.2 PLYWOOD:

A. Comply with PS 1.

B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.

C. Sheathing:
   1. APA rated Exposure 1 or Exterior; panel grade CD or better.
   2. Wall sheathing:
      a. Minimum 9 mm (11/32 inch) thick with supports 406 mm (16 inches) on center and 12 mm (15/32 inch) thick with supports 610 mm (24 inches) on center unless specified otherwise.
      b. Minimum 1200 mm (48 inches) wide at corners without corner bracing of framing.

2.3 STRUCTURAL-USE PANELS:

A. Comply with APA E30.

B. Bearing the mark of a recognized association or independent agency that maintains continuing control over quality of panel which identifies compliance by end use, Span Rating, and exposure durability classification.

C. Wall and Roof Sheathing:
   1. APA Rated sheathing panels, durability classification of Exposure 1 or Exterior Span Rating of 16/0 or greater for supports 406 mm (16 inches) on center and 24/0 or greater for supports 610 mm (24 inches) on center.

2.4 ROUGH HARDWARE AND ADHESIVES:

A. Anchor Bolts:
   1. ASME B18.2.1 and ASME B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
   2. Extend at least 203 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).

B. Miscellaneous Bolts: Expansion Bolts: C1D A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Provide 13 mm (1/2 inch) bolt unless shown otherwise.

C. Washers
   1. ASTM F844.
   2. Provide zinc or cadmium coated steel or cast iron for washers exposed to weather.

D. Screws:
   1. Wood to Wood: ASME B18.6.1 or ASTM C1002.
   2. Wood to Steel: ASTM C954, or ASTM C1002.

E. Nails:
   1. Size and type best suited for purpose unless noted otherwise. Provide aluminum-alloy nails, plated nails, or zinc-coated nails, for nailing wood work exposed to weather and on roof blocking.
   2. ASTM F1667:
      a. Common: Type I, Style 10.

b. Concrete: Type I, Style 11.
c. Barbed: Type I, Style 26.
d. Underlayment: Type I, Style 25.
e. Masonry: Type I, Style 27.
f. Provide special nails designed for use with ties, strap anchors, framing connectors, joists hangers, and similar items. Nails not less than 32 mm (1-1/4 inches) long, 8d and deformed or annular ring shank.

F. Adhesives:
1. For field-gluing plywood to lumber framing floor or roof systems: ASTM D3498.
2. For structural laminated Wood: ASTM D2559.
3. Adhesives to have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, (EPA Method 24).

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

A. Conform to applicable requirements of the following:
1. AFPA NDS for timber connectors.
2. AITC A190.1 Timber Construction Manual for heavy timber construction.
3. AFPA WCD1 for nailing and framing unless specified otherwise.
4. APA for installation of plywood or structural use panels.
5. TPI for metal plate connected wood trusses.

B. Fasteners:
1. Bolts:
a. Fit bolt heads and nuts bearing on wood with washers.
b. Countersink bolt heads flush with the surface of nailers.
c. Embed in concrete and solid masonry or provide expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
d. Provide toggle bolts to hollow masonry or sheet metal.
e. Provide bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 610 mm (24 inch) intervals between end bolts. Provide clips to beam flanges.
3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
b. ASTM C954 for steel over 0.84 mm (0.033 inch) thick.
4. Power actuated drive pins may be provided where practical to anchor to solid masonry, concrete, or steel.

5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Provide metal plugs, inserts or similar fastening.
6. Screws to Join Wood:
    a. Where shown or option to nails.
    b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
    c. Spaced same as nails.
7. Installation of Timber Connectors:
    a. Conform to applicable requirements of the AFPA NDS.
    b. Fit wood to connectors and drill holes for fasteners so wood is not split.

C. Cut notch, or bore in accordance with AFPA WCD1 passage of ducts wires, bolts, pipes, conduits and to accommodate other work. Repair or replace miscut, misfit or damaged work.

D. Blocking Nailers, and Furring:
1. Install furring, blocking, nailers, and grounds where shown.
2. Provide longest lengths practicable.
3. Provide fire retardant treated wood blocking where shown at openings and where shown or specified.
4. Layers of Blocking or Plates:
    a. Stagger end joints between upper and lower pieces.
    b. Nail at ends and not over 610 mm (24 inches) between ends.
    c. Stagger nails from side to side of wood member over 127 mm (5 inches) in width.

E. Sheathing:
1. Provide plywood or structural-use panels for sheathing.
2. Lay panels with joints staggered, with edge and ends 3 mm (1/8 inch) apart and nailed over bearings as specified.
3. Set nails not less than 9 mm (3/8 inch) from edges.
4. Install 50 mm by 101 mm (2 inch by 4 inch) blocking spiked between joists, rafters and studs to support edge or end joints of panels.
5. Match and align sheathing which is an extension of work in place to existing.

- - - E N D - - -

SECTION 06 20 00
FINISH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies exterior and interior millwork.

B. Items specified.

- Seats and benches
- Mounting Strips, Shelves, and Rods
- Moldings and Miscellaneous wood Trim
- Solid surface window sills

1.2 RELATED WORK

A. Fabricated Metal brackets, bench supports and countertop legs: Section 05 50 00, METAL FABRICATIONS.

B. Framing, furring and blocking: Section 06 10 00, ROUGH CARPENTRY.

C. Wood doors: Section 08 14 00, WOOD DOORS.

D. Stock Casework: Section 12 32 00, MANUFACTURED WOOD CASEWORK.

E. Other Countertops: Section 12 36 00 COUNTERTOPS.

F. Electrical light fixtures and duplex outlets: Division 26, ELECTRICAL.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Millwork items – Half full size scale for sections and details 1:50 (1/4-inch) for elevations and plans.
2. Show construction and installation.

C. Samples:

1. Plastic laminate finished plywood or particleboard, 150 mm by 300 mm (six by twelve inches).
2. Solid polymer chips 150 mm by 300 mm (six by 12 inches)

D. Certificates:

1. Indicating preservative treatment fire retardant treatment of materials meet the requirements specified.
2. Indicating moisture content of materials meet the requirements specified.

E. List of acceptable sealers for fire retardant and preservative treated materials.

F. Manufacturer's literature and data:

1. Finish hardware
2. Sinks with fittings
3. Electrical components

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect lumber and millwork from dampness, maintaining moisture content specified both during and after delivery at site.

B. Store finishing lumber and millwork in weathertight well ventilated structures or in space in existing buildings designated by Contracting Officers Representative (COR). Store at a minimum temperature of 21^0C (70^0F) for not less than 10 days before installation.

C. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.

1.5 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society of Testing and Materials (ASTM):

A36/A36M-08 ..... Structural Steel

A53-12..... Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless

A167-99 (R2009)..... Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

B26/B26M-09 ..... Aluminum-Alloy Sand Castings

B221-08..... Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

D256-06..... Pendulum Impact Resistance of Plastics

D570-98 (R2005)..... Water Absorption of Plastics

D638-08..... Tensile Properties of Plastics

D785-08..... Rockwell Hardness of Plastics and Electrical Insulating Materials

D790-07..... Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D4690-99 (2005) ..... Urea-Formaldehyde Resin Adhesives

E84-10..... Surface Burning Characteristics of Building Materials

G21-96 (R2002) ..... Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Composite Panel Association (CPA):

A208.1-09..... Particle Board

D. American Hardboard Association (AHA):

A135.4-04..... Basic Hardboard

E. Builders Hardware Manufacturers Association (BHMA):

A156.9-03..... Cabinet Hardware

A156.11-10..... Cabinet Locks

A156.16-08.....Auxiliary Hardware

F. Hardwood Plywood and Veneer Association (HPVA):

HP1-09 .....Hardwood and Decorative Plywood

G. National Particleboard Association (NPA):

A208.1-09.....Wood Particleboard

H. Architectural Woodwork Institute (AWI):

AWI-09 .....Architectural Woodwork Quality Standards and Quality Certification Program

I. National Electrical Manufacturers Association (NEMA):

LD 3-05.....High-Pressure Decorative Laminates

J. U.S. Department of Commerce, Product Standard (PS):

PS20-10 .....American Softwood Lumber Standard

K. Military Specification (Mil. Spec):

MIL-L-19140E.....Lumber and Plywood, Fire-Retardant Treated

L. Federal Specifications (Fed. Spec.):

A-A-1922A.....Shield Expansion

A-A-1936 .....Contact Adhesive

FF-N-836D .....Nut, Square, Hexagon Cap, Slotted, Castle

FF-S-111D(1) .....Screw, Wood

MM-L-736(C).....Lumber, Hardwood

PART 2 – PRODUCTS

2.1 BIO-BASED MATERIAL:

Bio-based Materials: For products designated by the USDA's Bio-Preferred program, provide products that meet or exceed USDA recommendations for bio-based content, so long as products meet all performance requirements in this specification section. For more information regarding the product categories covered by the Bio-Preferred program, visit http://www.bio-preferred.gov

2.2 LUMBER

A. Grading and Marking:

1. Lumber shall bear the grade mark, stamp, or other identifying marks indicating grades of material.
2. Such identifying marks on a material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
3. The inspection agency for lumber shall be approved by the Board of Review, American Lumber Standards Committee, to grade species used.

B. Sizes:

1. Lumber Size references, unless otherwise specified, are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which product is produced.
2. Millwork, standing and running trim, and rails: Actual size as shown or specified.

C. Hardwood: MM-L-736, species as specified for each item.

D. Softwood: PS-20, exposed to view appearance grades:
1. Use C select or D select, vertical grain for transparent finish including stain transparent finish.
2. Use Prime for painted or opaque finish.

2.3 PLYWOOD

A. Softwood Plywood:
1. Prod. Std.
2. Grading and Marking:
a. Each sheet of plywood shall bear the mark of a recognized association or independent inspection agency that maintains continuing control over the quality of the plywood.
b. The mark shall identify the plywood by species group or identification index, and shall show glue type, grade, and compliance with PS1.
3. Plywood, 13 mm (1/2 inch) and thicker; not less than five ply construction, except 32 mm (1-1/4 inch) thick plywood not less than seven ply.
4. Plastic Laminate Plywood Cores:
a. Exterior Type, and species group.
b. Veneer Grade: A-C.
5. Shelving Plywood:
a. Interior Type, any species group.
b. Veneer Grade: A-B or B-C.
6. Other: As specified for item.

B. Hardwood Plywood:
1. HPVA: HP.1
2. Species of face veneer shall be as shown or as specified in connection with each particular item.
3. Inside of Building:
a. Use Type II (interior) A grade veneer for transparent finish.
b. Use Type II (interior) Sound Grade veneer for paint finish.
4. Use plain sliced red oak // rotary cut white birch // unless specified otherwise.

2.4 SOLID WOOD

A. Wood required for edge banding, mouldings, and legs shall be of same species as wood face veneer.

2.5 PARTICLEBOARD

A. NPA A208.1

B. Plastic Laminate Particleboard Cores:

1. Use Type 1, Grade 1-M-3, or Type 2, Grade 2-M-2, unless otherwise specified for countertops with sinks. See Section 12 36 00 COUNTERTOPS.

C. General Use: Type 1, Grade 1-M-3 or Type 2, Grade 2-M-2.

2.6 PLASTIC LAMINATE

A. NEMA LD-3.

B. Exposed decorative surfaces including countertops, both sides of cabinet doors, and for items having plastic laminate finish. General Purpose, Type HGL.

C. Cabinet Interiors including Shelving: Both of following options to comply with NEMA, CLS as a minimum.

1. Plastic laminate clad plywood or particle board.
2. Resin impregnated decorative paper thermally fused to particle board.

D. Backing sheet on bottom of plastic laminate covered wood tops: Backer, Type HGP.

E. Post Forming Fabrication, Decorative Surfaces: Post forming, Type HGP.

2.7 SOLID POLYMER BENCHTOPS AND FABRICATIONS (WINDOWS SILLS)

A. Filled Methyl Methacrylic Polymer.

B. Performance properties required:

Property	Result	Test
Elongation	0.3% min.	ASTM D638
Hardness	90 Rockwell M	ASTM D785
Gloss (60^0 Gordon)	5-20	NEMA LD3.1
Color stability	No change	NEMA LD3 except 200 hour
Abrasion resistance	No loss of pattern Max wear depth 0.0762 mm (0.003 in) - 10000 cycles	NEMA LD3
Water absorption weight (5 max)	24 hours 0.9	ASTM D-570
Izod impact	14 N·m/m (0.25 ft-lb/in)	ASTM D256 (Method A)
Impact resistance	No fracture	NEMA LD-3 900 mm (36") drop 1 kg (2 lb.) ball
Boiling water surface resistance	No visible change	NEMA LD3
High temperature resistance	Slight surface dulling	NEMA LD3

C. Cast into sheet form and bowl form.

D. Color throughout with subtle veining through thickness.

E. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.

F. Bio-based products will be preferred.

2.8 BUILDING BOARD (HARDBOARD)

A. ANSI/AHA A135.4, 6 mm (1/4 inch) thick unless specified otherwise.

B. Perforated hardboard (Pegboard): Type 1, Tempered perforated 6 mm (1/4 inch) diameter holes, on 25 mm (1 inch) centers each way, smooth surface one side.

C. Wall paneling at gas chain rack: Type 1, tempered, Fire Retardant treated, smooth surface on side.

2.9 ADHESIVE

A. For Plastic Laminate: Fed. Spec. A-A-1936.

B. For Interior Millwork: Unextended urea resin, unextended melamine resin, phenol resin, or resorcinol resin.

2.10 STAINLESS STEEL

ASTM A167, Type 302 or 304.

2.11 ALUMINUM EXTRUDED

ASTM B221

2.12 HARDWARE

A. Rough Hardware:

1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electric-galvanizing process. Galvanized where specified.
2. Use galvanized coating on ferrous metal for exterior work unless non-ferrous metals or stainless is used.
3. Fasteners:
    a. Bolts with Nuts: FF-N-836.
    b. Expansion Bolts: A-A-1922A.
    c. Screws: Fed. Spec. FF-S-111.

B. Finish Hardware

1. Auxiliary Hardware: ANSI A156.16.
    a. Shelf Bracket: B04041, japanned or enameled finish.
    b. Combination Garment rod and Shelf Support: B04051 japanned or enamel finish.
    c. Closet Bar: L03131 chrome finish of required length.
    d. Handrail Brackets: L03081 or L03101.
        1) Cast Aluminum, satin polished finish.
        2) Cast Malleable Iron, japanned or enamel finish.

2. Steel Channel Frame and Leg supports for Counter top. Fabricated under Section 05 50 00, METAL FABRICATIONS.
3. Fabricated Wall Bench Supports:
    a. Steel Angles: ASTM A36 steel with chrome finish, or ASTM A167, stainless steel with countersunk wood screws, holes at 64 mm (2-1/2 inches) on center on horizontal member.
    b. Use 38 mm by 38 mm by 5 mm (1-1/2 by 1-1/2 by 3/16 inch) angle thick drilled for screw and bolt holes unless shown otherwise. Drill 6 mm (1/4 inch) holes for anchors on vertical member, not more than 200 mm (8 inches) on center between ends or corners.
    c. Stainless steel bars brackets: ASTM A167, fabricated to shapes shown, Number 4 finish. Use 50 mm by 5 mm (2 inch by 3/16 inch) bars unless shown otherwise. Drill for anchors and screws. Drill countersunk wood screw holes at 64 mm (2-1/2 inches) on center on horizontal members and not less than two 13 mm (1/4 inch) hole for anchors on vertical member.
4. Edge Strips Moldings:
    a. Driven type "T" shape with serrated retaining stem; vinyl plastic to match plastic laminate color, stainless steel, or 3 mm (1/8 inch) thick extruded aluminum.
    b. Stainless steel or extruded aluminum channels.
    c. Stainless steel, number 4 finish; aluminum, mechanical applied medium satin finish, clear anodized 0.1 mm (0.4 mils) thick.
5. Rubber or Vinyl molding
    a. Rubber or vinyl standard stock and in longest lengths practicable.
    b. Design for closures at joints with walls and adhesive anchorage.
    c. Adhesive as recommended by molding manufacturer.
6. Primers: Manufacturer's standard primer for steel providing baked enamel finish.

2.13 MOISTURE CONTENT

A. Moisture content of lumber and millwork at time of delivery to site.
    1. Interior finish lumber, trim, and millwork 32 mm (1-1/4 inches) or less in nominal thickness: 12 percent on 85 percent of the pieces and 15 percent on the remainder.
    2. Exterior treated or untreated finish lumber and trim 100 mm (4 inches) or less in nominal thickness: 15 percent.
    3. Moisture content of other materials shall be in accordance with the standards under which the products are produced.

2.14 FABRICATION

A. General:

1. Except as otherwise specified, use AWI Custom Grade for architectural woodwork and interior millwork.
2. Finish woodwork shall be free from pitch pockets.
3. Except where special profiles are shown, trim shall be standard stock molding and members of the same species.
4. Plywood shall be not less than 13 mm (1/2 inch), unless otherwise shown or specified.
5. Edges of members in contact with concrete or masonry shall have a square corner caulking rebate.
6. Fabricate members less than 4 m (14 feet) in length from one piece of lumber, back channeled and molded a shown.
7. Interior trim and items of millwork to be painted may be fabricated from jointed, built-up, or laminated members, unless otherwise shown on drawings or specified.
8. Plastic Laminate Work:
    a. Factory glued to either a plywood or a particle board core, thickness as shown or specified.
    b. Cover exposed edges with plastic laminate, except where aluminum, stainless steel, or plastic molded edge strips are shown or specified. Use plastic molded edge strips on 19 mm (3/4-inch) molded thick or thinner core material.
    c. Use backing sheet on concealed large panel surface when decorative face does not occur.

B. Seats and Benches:
1. Material: Manufacturer’s standard proprietary solid surface material.
2. Configuration: Minimum thickness of ¾ inch; other dimensions as indicated on the drawings.
3. Color and Pattern: As selected from manufacturer’s standards.
4. Round top edges and corners where exposed.

C. Mounting Strips, Shelves and Rods:
1. Cut mounting strips from 25 mm by 100 mm (1 by 4 inches) softwood stock, with exposed edge slightly rounded.
2. Cut wood shelf from softwood 1 inch stock, of width shown, exposed edge slightly rounded. Option: Use 19 mm (3/4 inch) thick plywood with 19 mm (3/4 inch) softwood edge nosing on exposed edge, slightly rounded.
3. Plastic laminate covered, 19 mm (3/4 inch) thick plywood or particle board core with edges and ends having plastic molded edge strips. Size, finish and number as shown.
4. Rod or Closet Bar: L03131. Combination Garment and Shelf Support, intermediate support for closet bar: B04051 for rods over 1800 mm (6 feet) long.

D. Crown Molding

1. Solid hardwood.

   a. Red oak, number one common grade.

2. Crown Molding:

   a. Profile as indicated on drawings.

   b. Install in maximum lengths possible with mitered corners.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain work areas and storage areas to a minimum temperature of 21^0C (70^0F) for not less than 10 days before and during installation of interior millwork.

B. Do not install finish lumber or millwork in any room or space where wet process systems such as concrete, masonry, or plaster work is not complete and dry.

3.2 INSTALLATION

A. General:

1. Millwork receiving transparent finish shall be primed and back-painted on concealed surfaces. Set no millwork until primed and back-painted.
2. Secure trim with fine finishing nails, screws, or glue as required.
3. Set nails for putty stopping. Use washers under bolt heads where no other bearing plate occurs.
4. Seal cut edges of preservative and fire retardant treated wood materials with a certified acceptable sealer.
5. Coordinate with plumbing and electrical work for installation of fixtures and service connections in millwork items.
6. Plumb and level items unless shown otherwise.
7. Nail finish at each blocking, lookout, or other nailer and intermediate points; toggle or expansion bolt in place where nails are not suitable.

B. Seats and Benches:

1. Use stainless steel countersunk screws to secure wood seats to brackets, angle, or pipe supports.
2. Use stainless steel or chrome plated steel bolts for anchorage to walls. Use 6 mm (1/4 inch) toggle bolts in steel stud walls and hollow masonry. Use 6 mm (1/4 inch) expansion bolts in solid masonry or concrete.
3. Wall Benches: Support within 150 mm (6 inches) near ends and not over 900 mm (3 feet) on centers with stainless steel bar brackets under bench secured to seat and wall.
4. Corner Seats: Support on continuous angles secured to seat and walls.

C. Shelves:

1. Install mounting strip at back wall and end wall for shelves in closets where shown secured with toggle bolts at each end and not over 600 mm (24 inch) centers between ends.

a. Nail Shelf to mounting strip at ends and to back wall strip at not over 900 mm (36 inches) on center.
b. Install metal bracket, ANSI A156.16, B04041, not over 1200 mm (4 feet) centers when shelves exceed 1800 mm (6 feet) in length.
c. Install metal bracket, ANSI A156.16, B04051, not over 1200 mm (4 feet) on centers where shelf length exceeds 1800 mm (6 feet) in length with metal rods, clothes hanger bars ANSI A156.16, L03131, of required length, full length of shelf.

2. Install vertical slotted shelf standards, ANSI A156.9, B04103 to studs with toggle bolts through each fastener opening. Double slotted shelf standards may be used where adjacent shelves terminate.
a. Install brackets ANSI A156.9, B04113, providing supports for shelf not over 900 mm (36 inches) on center and within 13 mm (1/2 inch) of shelf end unless shown otherwise.
b. Install shelves on brackets so front edge is restrained by bracket.

D. Crown Molding and Wood Trims:
1. Set and secure materials and components in place, plumb and level.
2. Ease edges of solid lumber members, using 1/8 inch radius.
3. Carefully scribe work abutting other components, with maximum gaps 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
4. Scribe wood trim where it abuts existing construction.
5. Refinish and seal cuts.
6. Use concealed shims where required for alignment.
7. Install with minimum number of joints.
8. Cope at returns and miter at corners.
9. Install finish carpentry plumb, level, true and in proper alignment with adjacent materials.
10. Conceal all fasteners where possible. Where exposed nailing is required or indicated, use finishing nails, countersink, and apply wood filler.
11. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
12. Site Finishing: See Section 19 9000

E. Solid Surface Window Sills:
1. Install solid polymer (solid surface) sills (profiles as shown) with adhesive.
2. Butt tightly to adjacent materials and seal with caulk.

F. Owner Furnished Accessories:
1. Install Owner furnished accessories in accordance with manufacturer’s instructions.

3.3 PROTECTION AND CLEANING

A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.
2. Clean at completion of work.

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SECTION 07 21 13
THERMAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies thermal and acoustical insulation for buildings.

B. Acoustical insulation is identified by thickness and words "Acoustical Insulation".

1.2 RELATED WORK

A. Safing insulation: Section 07 84 00, FIRESTOPPING.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Insulation, each type used
2. Adhesive, each type used.
3. Tape

C. Certificates: Stating the type, thickness and "R" value (thermal resistance) of the insulation to be installed.

1.4 STORAGE AND HANDLING:

A. Store insulation materials in weathertight enclosure.

B. Protect insulation from damage from handling, weather and construction operations before, during, and after installation.

1.5 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

C552-07 ..... Cellular Glass Thermal Insulation.

C553-08 ..... Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications

C578-10 ..... Rigid, Cellular Polystyrene Thermal Insulation

C591-09 ..... Unfaced Preformed Rigid Cellular Polyisocynurate Thermal Insulation

C612-10 ..... Mineral Fiber Block and Board Thermal Insulation

C665-06 ..... Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

C728-05 (R2010) ..... Perlite Thermal Insulation Board

C954-10 ..... Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) in thickness

C1002-07 .....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

E84-10.....Surface Burning Characteristics of Building Materials

F1667-11.....Driven Fasteners: Nails, Spikes and Staples.

1.6 REGULATORY REQUIREMENTS:

A. Conform to 2012 IBC for flame and smoke, concealment, and overcoat limitations.

1.7 FIELD CONDITIONS:

A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

PART 2 - PRODUCTS

2.1 INSULATION – GENERAL:

A. Where thermal resistance ("R" value) is specified or shown for insulation, the thickness shown on the drawings is nominal. Use only insulation with actual thickness that is not less than that required to provide the thermal resistance specified.

B. Where "R" value is not specified for insulation, use the thickness shown on the drawings.

C. Where more than one type of insulation is specified, the type of insulation for each use is optional, except use only one type of insulation in any particular area.

D. Insulation Products shall comply with following minimum content standards for recovered materials:

Material Type	Percent by Weight
Polyisocyanurate/polyurethane	
Foam-in-place	5 percent recovered material
Glass fiber reinforced	6 percent recovered material
Rock wool material	75 percent recovered material

The minimum-content standards are based on the weight (not the volume) of the material in the insulating core only.

2.2 EXTERIOR FRAMING OR FURRING INSULATION:

A. Batt or Blanket: Optional.

B. Mineral Fiber: ASTM C665, Type II, Class C, Category I where framing is faced with gypsum board.

C. Mineral Fiber: ASTM C665, Type III, Class A where framing is not faced with gypsum board.

D. Foamed-in-Place Insulation: Medium-density, rigid, closed cell polyurethane foam; formed on-site, using blowing agent of water or non-ozone-depleting gas.

1. Aged Thermal Resistance (R-7 per inch) 75 deg 1 inch (25.4 mm) thickness in accordance with ASTM C518.

2. Water Vapor Permeance: Vapor retarder; 1 perm (57 ng/(Pa s sqm)) maximum, when tested as intended thickness in accordance with ASTM E96/E 95M, dessicant method.

3. Water Absorbtion" 1 percent by volume, maximum, when tested in accordance with ASTM D 2842.

4. Air Permeance: 0.004 cfm/sq ft (0.2 L/second sq meter) maximum, when tested as intended thickness in accordance with ASTM E 2178 at .5 psf (75 Pa)

5. Closed Cell Content: At least 90 percent

6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E 84.

7. Off Gassing Tests (VOC Emissions): Must pass CGSB 51.23-92 with no toxic vapors.

2.3 ACOUSTICAL INSULATION:

A. Mineral Fiber boards: ASTM C553, Type II, flexible, or Type III, semirigid (4.5 pound nominal density).

B. Mineral Fiber Batt or Blankets: ASTM C665. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.

C. Thickness as shown; of widths and lengths to fit tight against framing.

D. Provide acoustical insulation capable of acquiring the sound transmission coefficient for the wall assemblies indicated on the drawing, when tested in accordance with ASTM E413.

2.4 ADHESIVE:

A. As recommended by the manufacturer of the insulation.

2.5 TAPE:

A. Pressure sensitive adhesive on one face.

B. Perm rating of not more than 0.50.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Install insulation with the vapor barrier facing the heated side, unless specified otherwise.

B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.

C. Install batt or blanket insulation with tight joints and filling framing void completely. Seal cuts, tears, and unlapped joints with tape.

D. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

3.2 EXTERIOR FRAMING OR FURRING BLANKET INSULATION:

A. Pack insulation around door frames and windows and in building expansion joints, door soffits and other voids. Pack behind outlets around pipes, ducts, and services encased in walls. Open voids are not permitted. Hold insulation in place with pressure sensitive tape.

B. Lap vapor retarder flanges together over face of framing for continuous surface. Seal all penetrations through the insulation.

C. Fasten blanket insulation between metal studs or framing and exterior wall furring by continuous pressure sensitive tape along flanged edges.

D. Ceiling Insulation and Soffit Insulation:

1. At metal framing or ceilings suspension systems, install blanket insulation above suspended ceilings or metal framing at right angles to the main runners or framing. Tape insulation tightly together so no gaps occur and metal framing members are covered by insulation.
2. In areas where suspended ceilings adjoin areas without suspended ceilings, install either blanket, batt, or mineral fiberboard extending from the suspended ceiling to underside of deck or slab above. Secure in place to prevent collapse or separation of hung blanket, batt, or board insulation and maintain in vertical position. Secure blanket or batt with continuous cleats to structure above.

3.3 FOAM-IN-PLACE INSULATION:

A. Verify work within construction spaces or crevices are complete prior to insulation application.

B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation.

C. Mask and protect adjacent surfaces from over spray or dusting.

D. Apply primer in accordance with manufacturer's instructions.

E. Apply insulation in accordance with manufacturer's instructions.

F. Apply insulation by spray method, to a uniform monolithic density without voids.

G. Apply to achieve a thermal resistance R value of 21.

H. Apply overcoat to a uniform minimum thickness to achieve fire rating required.

I. Patch damaged areas.

J. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.

K. Trim excess away for applied trim or remove as required for continuous sealant bead.

3.4 ACOUSTICAL INSULATION:

A. Fasten blanket insulation between metal studs and wall furring with continuous pressure sensitive tape along edges or adhesive.

B. Pack insulation around door frames and windows and in cracks, expansion joints, control joints, door soffits and other voids. Pack behind outlets, around pipes, ducts, and services encased in wall or partition. Hold insulation in place with pressure sensitive tape or adhesive.

C. Do not compress insulation below required thickness except where embedded items prevent required thickness.

D. Where acoustical insulation is installed above suspended ceilings install blanket at right angles to the main runners or framing. Extend insulation over wall insulation systems not extending to structure above.

E. Where semirigid insulation is used which is not full thickness of cavity, adhere to one side of cavity maintaining continuity of insulation and covering penetrations or embedments in insulation.

F. Where sound deadening board is shown, secure with adhesive to masonry or concrete walls and with screws to metal or wood framing. Secure sufficiently in place until subsequent cover is installed. Seal all cracks with caulking.

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SECTION 07 41 13
STONE COATED METAL ROOF PANELS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section specifies metal roof panels as shown on contract documents.

1.2 RELATED WORK:

A. Sealant: Section 07 92 00, JOINT SEALANTS.

1.3 QUALITY ASSURANCE:

A. Manufacturer's Qualifications: Provide metal roof panels matching existing

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples: Metal panel, (6 inch) square, showing finish, color and texture matching existing.

C. Manufacturer's Literature and Data: Roof panels

1.5 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extend referenced. The publications are referenced in the text by the basic designation only.

B. American Architecture Manufacturers Association (AAMA):

611-14 ..... Anodized Architectural Aluminum

621-02 ..... Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates

2605-13 ..... Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

C. American Iron and Steel Institute (AISI):

SG03-02 ..... Cold-Formed Steel Design Manual

D. ASTM International (ASTM):

A463/A463M-10..... Steel Sheet, Cold-Rolled, Aluminum-Coated, by the Hot-Dip Process

A653/A653M-13..... Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

A924/A924M-14..... Steel Sheet, Metallic Coated by the Hot-Dip Process

A1008/A1008M-10..... Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy
B209-14 ..... Aluminum and Aluminum Alloy Sheet and Plate
B209M-14 ..... Aluminum and Aluminum Alloy Sheet and Plate (Metric)
D2244-14 ..... Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
D4214-07 ..... Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
E119-14 ..... Fire Test of Building Construction and Materials
E1592-10 ..... Terminology Relating to Occupational Health and Safety
E1646-95(R2011) ..... Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
E1680-11 ..... Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems
E2140-01(R2009) ..... Test Method for Water Penetration of Metal Roof Panel Systems by Static Water Pressure Head

E. Cool Roof Rating Council (CRRC):
   1 Standard-14
F. FM Global:
   4471-10 ..... Class 1 Panel Roofs
G. Underwriters Laboratories (UL):
   580-05(R2013) ..... Tests for Uplift Resistance of Roof Assemblies
   Fire Resistance Directory .....

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS ROOF PANELS:

A. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance.
B. FM Global Listing: Provide metal roof panels that comply with requirements FM Global 4771 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable.
C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joints sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 BASIS OF DESIGN: MATCH EXISTING

A. Match existing Gerard Roofing Technologies stone coated metal roof shakes.

2.3 SHEET STEEL:

A. Minimum 26 Gauge (0.0179 inch) thick for roof panels. Match existing

B. Pressed formed, Aluminum-Zinc Alloy Coated Steel

2.4 FASTENERS:

A. Fasteners of size, type and holding strength as recommended by panel manufacturer. /

2.5 FABRICATION:

A. General:

1. Construct panels by pressing members together to form a structural unit with closed ends.
2. Seal joints between related components as required to make the work water-tight. Refer to Section 07 92 00, JOINT SEALANTS for sealing compounds.
3. Provide metal and bituminous closures, fastenings, flashing, clip, caulking, and related components and accessories.
    a. Accessories, fastenings, and flashings to be the same material and finish as the panels. Thickness and installation of accessories and flashing to be as recommended by the panel manufacturer.

2.6 FINISH:

A. For roof panels, provide finishes as follows for face sheets. Ceramic coated colored stone chip finish. Match existing.

B. Color: Match existing.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General: Install panels in accordance with the manufacturer's approved erection instructions and diagrams, except as specified otherwise.

B. Where panels are cut in the field, or where factory applied coverings or coatings are abraded or damaged in handling or installation, make finish repairs with material of the same type and color as the weather coating, before being installed.

C. Seal cut ends and edges, including those at openings through the sheets.

D. Correct defects or errors in the materials in a manner approved by the COR.

E. Replace defective materials which cannot be corrected with nondefective material.

F. Roof Panels:

1. Apply roofing panels with configurations matching existing.
2. Flash and seal the roof at the ridge, at eaves and rakes, at projections through the roof, and elsewhere as necessary.

3. Install closure strips, flashing, and sealing material in a manner that will assure complete weather tightness.

G. Flashing:
   1. Provide flashing and related closures and accessories in connection with the preformed metal panels as indicated and as necessary to provide a watertight installation.
   2. Install details of installation, which are not indicated, in accordance with the panel manufacturer's printed instruction and details, or the approved shop drawings.
   3. Allow for expansion and contraction of flashing.

H. Fasteners:
   1. Space fasteners in accordance with the manufacturer's recommendations, and as necessary to withstand the design loads indicated.
   2. Install fasteners in valleys or crowns as recommended by the manufacturer of the panel being used.
   3. Install fasteners in straight lines within a tolerance of 13 mm (1/2-inch) in the length of a bay.
   4. Drive exposed penetrating type fasteners normal to the surface, and to a uniform depth to seat gasketed washers properly, and drive so as not to damage factory applied coating.
   5. Exercise care in drilling pilot holes for fastenings to keep drills perpendicular and centered in valleys, or crowns, as applicable. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers. Do not torque fasteners to exceed values recommended by the manufacturer.
   6. Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.
   7. Remove metal shavings and filings from roofs on completion to prevent rusting and discoloration of the panels.

3.2 ISOLATION OF ALUMINUM:

A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze, or other metal compatible with aluminum by one of the following:
   1. Painting the dissimilar metal with a prime coat of Zinc-Molybdate followed by two coats of aluminum paint.
   2. Placing a non-abrasive tape or gasket between the aluminum and the dissimilar metal.

B. Paint aluminum in contact with, or built into mortar, concrete, plaster, or other masonry materials with a coat of alkali-resistant bituminous paint.

C. Paint aluminum in contact with wood or other absorptive materials that may become repeatedly wet, with two coats of bituminous paint, or two coats of aluminum paint. Seal joints with caulking material.

3.3 PROTECTION AND CLEANING:

A. Protect panels and other components from damage during and after erection, and until project is accepted by the COR.

B. After completion of work, all exposed finished surfaces of panels are to be cleaned of soil, discoloration and disfiguration. Touch-up abraded surfaces of panels.

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SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

Formed sheet metal work for wall and roof flashing Are specified in this Section.

1.2 RELATED WORK

A. Joint Sealants: Section 07 92 00, JOINT SEALANTS.

B. Paint materials and application: Section 09 91 00, PAINTING.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.

B. Aluminum Association (AA):

AA-C22A41 ..... Aluminum Chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.7-mil thick

AA-C22A42 ..... Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 0.7 mils thick

AA-C22A44 ..... Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class I Architectural, 0.7-mil thick finish

C. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):

ANSI/SPRI ES-1-03 ..... Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems

D. American Architectural Manufacturers Association (AAMA):

AAMA 620 ..... Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum

AAMA 621 ..... Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates

E. ASTM International (ASTM):

A240/A240M-14 ..... Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.

A653/A653M-11 ..... Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated (Galvanized) by the Hot- Dip Process

B32-08 ..... Solder Metal

B209-10 ..... Aluminum and Aluminum-Alloy Sheet and Plate

B370-12.....Copper Sheet and Strip for Building Construction
D173-03(R2011) .....Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing
D412-06(R2013) .....Vulcanized Rubber and Thermoplastic Elastomers-Tension
D1187-97(R2011) .....Asphalt Base Emulsions for Use as Protective Coatings for Metal
D1784-11 .....Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
D3656-07 .....Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns
D4586-07 .....Asphalt Roof Cement, Asbestos Free

F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.
G. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06 .....Metal Finishes Manual
H. Federal Specification (Fed. Spec):
A-A-1925A.....Shield, Expansion; (Nail Anchors)
UU-B-790A.....Building Paper, Vegetable Fiber
I. International Code Commission (ICC): International Building Code, Current Edition

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
B. Shop Drawings: For all specified items, including:
1. Flashings
C. Manufacturer's Literature and Data: For all specified items, including:
1. Two-piece counterflashing
2. Thru wall flashing
3. Nonreinforced, elastomeric sheeting
4. Polyethylene coated copper
5. Bituminous coated copper
6. Copper covered paper
D. Certificates: Indicating compliance with specified finishing requirements, from applicator and contractor.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

A. Stainless Steel: ASTM A240, Type 302B, dead soft temper.
B. Copper ASTM B370, cold-rolled temper.

C. Bituminous Coated Copper: Minimum copper ASTM B370, weight not less than 1 kg/m² (3 oz/sf). Bituminous coating shall weigh not less than 2 kg/m² (6 oz/sf); or, copper sheets may be bonded between two layers of coarsely woven bitumen-saturated cotton fabric ASTM D173. Exposed fabric surface shall be crimped.

D. Copper Covered Paper: Fabricated of electro-deposit pure copper sheets ASTM B 370, bonded with special asphalt compound to both sides of creped, reinforced building paper, UU-B-790, Type I, style 5, or to a three ply sheet of asphalt impregnated creped paper. Grooves running along the width of sheet.

E. Polyethylene Coated Copper: Copper sheet ASTM B370, weighing 1 Kg/m² (3 oz/sf) bonded between two layers of (two mil) thick polyethylene sheet.

F. Aluminum Sheet: ASTM B209, alloy 3003-H14 //except alloy used for color anodized aluminum shall be as required to produce specified color. Alloy required to produce specified color shall have the same structural properties as alloy 3003-H14//.

G. Galvanized Sheet: ASTM, A653.

H. Nonreinforced, Elastomeric Sheeting: Elastomeric substances reduced to thermoplastic state and extruded into continuous homogenous sheet (0.056 inch) thick. Sheeting shall have not less than 7 MPa (1,000 psi) tensile strength and not more than seven percent tension-set at 50 percent elongation when tested in accordance with ASTM D412. Sheeting shall show no cracking or flaking when bent through 180 degrees over a 1 mm (1/32 inch) diameter mandrel and then bent at same point over same size mandrel in opposite direction through 360 degrees at temperature of -30°C (-20 °F).

2.2 FLASHING ACCESSORIES

A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.

B. Rosin Paper: Fed-Spec. UU-B-790, Type I, Grade D, Style 1b, Rosin-sized sheathing paper, weighing approximately 3 Kg/10 m²(6 lbs/100 sf).

C. Bituminous Paint: ASTM D1187, Type I.

D. Fasteners:

1. Use copper, copper alloy, bronze, brass, or stainless steel for copper and copper clad stainless steel, and stainless steel for stainless steel and aluminum alloy. Use galvanized steel or stainless steel for galvanized steel.
2. Nails:
    a. Minimum diameter for copper nails: 3 mm (0.109 inch).
    b. Minimum diameter for aluminum nails 3 mm (0.105 inch).
    c. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.

d. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.

3. Rivets: Not less than 3 mm (1/8 inch) diameter.
4. Expansion Shields: Fed Spec A-A-1925A.

E. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

F. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):

1. Copper: 30g (10 oz) minimum 0.33 mm (0.013 inch thick).
2. Stainless steel: 0.25 mm (0.010 inch) thick.
3. Copper clad stainless steel: 0.25 mm (0.010 inch) thick.
4. Galvanized steel: 0.5 mm (0.021 inch) thick.

C. Exposed Locations:

1. Copper: 0.4 Kg (16 oz).
2. Stainless steel: 0.4 mm (0.015 inch).
3. Copper clad stainless steel: 0.4 mm (0.015 inch).

D. Thickness of aluminum or galvanized steel is specified with each item.

2.4 FABRICATION, GENERAL

A. Jointing:

1. In general, copper, stainless steel and copper clad stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
2. Jointing of copper over 0.5 Kg (20 oz) weight or stainless steel over 0.45 mm (0.018 inch) thick shall be done by lapping, riveting and soldering.
3. Joints shall conform to following requirements:
   a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
   b. Lap joints subject to stress shall finish not less than 25 mm (one inch) wide and shall be soldered and riveted.
   c. Unsoldered lap joints shall finish not less than 100 mm (4 inches) wide.
4. Flat and lap joints shall be made in direction of flow.
5. Edges of bituminous coated copper, copper covered paper, nonreinforced elastomeric sheeting and polyethylene coated copper shall be jointed by lapping not less than 100 mm (4 inches) in the direction of flow and cementing with asphalt roof cement or sealant as required by the manufacturer's printed instructions.
6. Soldering:
   a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1 1/2 inches) of uncoated copper, stainless steel, and copper clad stainless steel.

b. Wire brush to produce a bright surface before soldering lead coated copper.
c. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
d. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:
1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for copper, stainless steel, and copper clad stainless steel at intervals not exceeding 7200 mm (24 feet).
4. Space expansion and contraction joints for aluminum at intervals not exceeding 5400 mm (18 feet), except do not exceed 3000 mm (10 feet) for gravel stops and fascia-cant systems.
5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
6. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:
1. Fabricate cleats to secure flashings and sheet metal work over 300 mm (12 inches) wide and where specified.
2. Provide cleats for maximum spacing of 300 mm (12 inch) centers unless specified otherwise.
3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 50 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Edge Strips or Continuous Cleats:
1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips or minimum //0.6 Kg (24 ounce)copper, 0.6 mm (0.024 inch) thick stainless steel 1.25 mm (0.050 inch) thick aluminum.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.
5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 19 mm (3/4-inch).

6. Fabricate anchor edge maximum width of 75 mm (3 inches) or of sufficient width to provide adequate bearing area to insure a rigid installation using 1 Kg (32 oz) copper, 0.8 mm (0.031 inch) thick stainless steel, or 1.6 mm (0.0625 inch) thick aluminum.

E. Drips:
1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), fascias, gravel stops, wall copings, by folding edge back 13 mm (1/2 inch) and bending out 45 degrees from vertical to carry water away from the wall.
2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 19 mm (3/4 inch) loose lock where shown.

F. Edges:
1. Edges of flashings concealed in masonry joints opposite drain side shall be turned up 6 mm (1/4 inch) to form dam, unless otherwise specified or shown otherwise.
2. Finish exposed edges of flashing with a 6 mm (1/4 inch) hem formed by folding edge of flashing back on itself when not hooked to edge strip or cleat. Use 6 mm (1/4 inch) minimum penetration beyond wall face with drip for through-wall flashing exposed edge.
3. All metal roof edges shall meet requirements of IBC, current edition.

G. Metal Options:
1. Where options are permitted for different metals use only one metal throughout.
2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.
3. Where copper gravel stops, copings and flashings will carry water onto cast stone, stone, or architectural concrete, or stainless steel.

2.5 FINISHES

A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.

B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.

C. Finish exposed metal surfaces as follows, unless specified otherwise:
1. Copper: Mill finish.
2. Stainless Steel: Finish No. 2B or 2D.
3. Aluminum:
a. Clear Finish: AA-C22A41 medium matte, clear anodic coating, Class 1 Architectural, 18 mm (0.7 mils) thick.
b. Colored Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 18 mm (0.7 mils) thick. Dyes will not be accepted.

c. Fluorocarbon Finish: AAMA 620, high performance organic coating.

d. Mill finish.

4. Steel and Galvanized Steel:

a. Finish painted under Section 09 91 00, PAINTING unless specified as prefinished item.

b. Manufacturer's finish:

1) Baked on prime coat over a phosphate coating.

2) Baked-on prime and finish coat over a phosphate coating.

3) Fluorocarbon Finish: AAMA 621, high performance organic coating.

2.6 THROUGH-WALL FLASHINGS

A. Form through-wall flashing to provide a mechanical bond or key against lateral movement in all directions. Install a sheet having 2 mm (1/16 inch) deep transverse channels spaced four to every 25 mm (one inch), or ribbed diagonal pattern, or having other deformation unless specified otherwise.

1. Fabricate in not less than 2400 mm (8 feet) lengths; 3000 mm (10 feet) maximum lengths.
2. Fabricate so keying nests at overlaps.

B. For Masonry Work When Concealed Except for Drip:

1. Either copper, stainless steel, or copper clad stainless steel.
2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
3. Form exposed portions of flashing with drip, approximately 6 mm (1/4 inch) projection beyond wall face.

C. For Masonry Work When Exposed Edge Forms a Receiver for Counter Flashing:

1. Use same metal and thickness as counter flashing.
2. Form an integral dam at least 5 mm (3/16 inch) high at back edge.
3. Form exposed portion as snap lock receiver for counter flashing upper edge.

D. For Flashing at Architectural Precast Concrete Panels or Stone Panels.

1. Use plan flat sheet of stainless steel.
2. Form exposed portions with drip as specified or receiver.

E. Window Sill Flashing and Lintel Flashing:

1. Use either copper, stainless steel, copper clad stainless steel plane flat sheet, or nonreinforced elastomeric sheeting, bituminous coated copper, copper covered paper, or polyethylene coated copper.
2. Fabricate flashing at ends with folded corners to turn up 5 mm (3/16 inch) in first vertical masonry joint beyond masonry opening.
3. Turn up back edge as shown.
4. Form exposed portion with drip as specified or receiver.

2.7 BASE FLASHING

A. Use metal base flashing at vertical surfaces intersecting built-up roofing without cant strips or where shown.
   1. Use either copper, or stainless steel, thickness specified unless specified otherwise.
   2. When flashing is over 250 mm (10 inches) in vertical height or horizontal width use either 0.5 Kg (20 oz) copper or 0.5 mm (0.018 inch) stainless steel.
   3. Use stainless steel at aluminum roof curbs where flashing contacts the aluminum.
   4. Use either copper, or stainless steel at pipe flashings.

B. Fabricate metal base flashing up vertical surfaces not less than 200 mm (8 inch) nor more than 400 mm (16 inch).

C. Fabricate roof flange not less than 100 mm (4 inches) wide unless shown otherwise. When base flashing length exceeds 2400 mm (8 feet) form flange edge with 13 mm (1/2 inch) hem to receive cleats.

D. Form base flashing bent from strip except pipe flashing. Fabricate ends for riveted soldered lap seam joints. Fabricate expansion joint ends as specified.

E. Pipe Flashing: (Other than engine exhaust or flue stack)
   1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
   2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
   3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
      a. Form top of sleeve to turn down into the pipe at least 25 mm (one inch).
      b. Allow for loose fit around and into the pipe.
   4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
      a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
      b. Allow for loose fit around pipe.

2.8 COUNTERFLASHING

A. Either copper or stainless steel, unless specified otherwise.

B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:
   1. Form lock seams for outside corners. Allow for lap joints at ends and inside corners.
   2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
   3. Two-piece, lock in type flashing may be used in-lieu-of one piece counter-flashing.
   4. Manufactured assemblies may be used.
   5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.

6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. One-piece Counterflashing:
   1. Back edge turned up and fabricate to lock into reglet in concrete.
   2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).

D. Two-Piece Counterflashing:
   1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
   2. Counterflashing upper edge designed to snap lock into receiver.

E. Surface Mounted Counterflashing; one or two piece:
   1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
   2. One piece fabricate upper edge folded double for 65 mm (2 1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
   3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.

F. Pipe Counterflashing:
   1. Form flashing for water-tight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
   2. Fabricate 100 mm (4 inch) over lap at end.
   3. Fabricate draw band of same metal as counter flashing. Use 0.6 Kg (24 oz) copper or 0.33 mm (0.013 inch) thick stainless steel or copper coated stainless steel.
   4. Use stainless steel bolt on draw band tightening assembly.
   5. Vent pipe counter flashing may be fabricated to omit draw band and turn down 25 mm (one inch) inside vent pipe.

G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

2.9 REGLETS

A. Fabricate reglets of one of the following materials:

1. 0.4 Kg (16 ounce) copper.
2. Stainless steel, not less than 0.3 mm (0.012 inch) thick.
3. Plastic coated extruded aluminum, not less than 1.4 mm (0.055 inch) thick prefilled with butyl rubber sealer and complete with plastic wedges inserted at 1000 mm (40 inches) on centers.
4. Plastic, ASTM D1784, Type II, not less than 2 mm (0.075 inch) thick.

B. Fill open-type reglets with fiberboard or other suitable separator, to prevent crushing of the slot during installation.

C. Bend edges of reglets for setting into concrete to an angle of not less than 45 degrees, and make wide enough to provide firm anchorage in the concrete.

D. Fabricate reglets for building into horizontal masonry mortar joints not less than 19 mm (3/4 inch) deep, nor more than 25 mm (one inch) deep.

E. Fabricate mitered corners, fittings, and special shapes as may be required by details.

F. Reglets for concrete may be formed to receive flashing and have a 10 mm (3/8 inch), 45 degree snap lock.

2.10 ENGINE EXHAUST PIPE OR FLUE OR STACK FLASHING

A. Flashing at penetrations through roofing shall consist of a metal collar, sheet metal flashing sleeve and hood.

B. Fabricate collar with roof flange of 1.2 mm (0.047 inch) minimum thick black iron or galvanized steel sheet.
   1. Fabricate inside diameter of collar 100 mm (4 inches) larger than the outside diameter of the item penetration the roofing.
   2. Extend collar height from structural roof deck to not less than 350 mm (14 inches) above roof surface.
   3. Fabricate collar roof flange not less than 100 mm (4 inches) wide.
   4. Option: Collar may be of steel tubing 3 mm (0.125 inch) minimum wall thickness, with not less than four, 50 mm x 100 mm x 3 mm (2 inch by 4 inch by 0.125 inch) thick tabs bottom edge evenly spaced around tube in lieu of continuous roof flange. Full butt weld joints of collar.

C. Fabricate sleeve base flashing with roof flange of either copper, stainless steel, or copper clad stainless steel.
   1. Fabricate sleeve roof flange not less than 100 mm (4 inches) wide.
   2. Extend sleeve around collar up to top of collar.
   3. Flange bottom of sleeve out not less than 13 mm (1/24 inch) and soldered to 100 mm (4 inch) wide flange to make watertight.
   4. Fabricate interior diameter 50 mm (2 inch) greater than collar.

D. Fabricate hood counter flashing from same material and thickness as sleeve.

1. Fabricate the same as pipe counter flashing except allow not less than 100 mm (4 inch) lap below top of sleeve and to form vent space minimum of 100 mm (4 inch) wide.
2. Hem bottom edge of hood 13 mm (1/2 inch).
3. Provide a 50 mm (2 inch) deep drawband.

E. Fabricate insect screen closure between sleeve and hood. Secure screen to sleeve with sheet metal screws.

2.11 GOOSENECK ROOF VENTILATORS

A. Form of 1.3 mm (0.0508 inch) thick sheet aluminum, reinforce as necessary for rigidity, stiffness, and connection to curb, and to be watertight.
   1. Form lower-edge to sleeve to curb.
   2. Curb:
      a. Form for 100 mm (4 inch) high sleeve to ventilator.
      b. Form for concealed anchorage to structural curb and to bear on structural curb.
      c. Form bottom edge of curb as counterflashing to lap base flashing.

B. Provide open end with 1.6 mm (16 gage), stainless steel wire guard of 13 mm (1/2 inch) square mesh.
   1. Construct suitable aluminum angle frame to retain wire guard.
   2. Rivet angle frame to end of gooseneck.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
   2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
   3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
   4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
   5. Coordinate with masonry work for the application of a skim coat of mortar to surfaces of unit masonry to receive flashing material before the application of flashing.
   6. Apply a layer of 7 Kg (15 pound) saturated felt followed by a layer of rosin paper to wood surfaces to be covered with copper. Lap each ply 50 mm (2 inch) with the slope and nail with large headed copper nails.

7. Confine direct nailing of sheet metal to strips 300 mm (12 inch) or less wide. Nail flashing along one edge only. Space nail not over 100 mm (4 inches) on center unless specified otherwise.
8. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
9. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
10. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
11. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
12. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
13. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
14. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
    a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
    b. Paint dissimilar metal with a coat of bituminous paint.
    c. Apply an approved caulking material between aluminum and dissimilar metal.
15. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.
16. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete, or stone copings and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches)and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.

4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Turn back edge up 6 mm (1/4 inch) unless noted otherwise where flashing terminates in mortar joint or hollow masonry unit joint.
6. Terminate interior raised edge in masonry backup unit approximately 38 mm (1 1/2 inch) into unit unless shown otherwise.
7. Under copings terminate both edges beyond face of wall approximately 6 mm (1/4 inch) with drip edge.
8. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
9. Where dowels, reinforcing bars and fastening devices penetrate flashing, seal penetration with sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.
10. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
11. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
12. Turn flashing up not less than 200 mm (8 inch) between masonry or behind exterior veneer.
13. When flashing terminates in reglet extend flashing full depth into reglet and secure with lead or plastic wedges spaced 150 mm (6 inch) on center.
14. Continue flashing around columns:
    a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
    b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).

B. Flashing at Top of Concrete Floors (except where shelf angles occur): Place flashing in horizontal masonry joint not less than 200 mm (8 inch) below floor slab and extend into backup masonry joint at floor slab 38 mm (1 1/2 inch).

C. Flashing at Cavity Wall Construction: Where flashing occurs in cavity walls turn vertical portion up against backup under waterproofing, if any, into mortar joint. Turn up over insulation, if any, and horizontally through insulation into mortar joint.

D. Flashing at Veneer Walls:
    1. Install near line of finish floors over shelf angles or where shown.
    2. Turn up against sheathing.

3. At stud framing, hem top edge 19 mm (3/4 inch) and secure to each stud with stainless steel fasteners through sheathing.
4. At concrete backing, extend flashing into reglet as specified.
5. Coordinate with installation of waterproofing or asphalt felt for lap over top of flashing.

E. Lintel Flashing when not part of shelf angle flashing:
1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
2. Turn ends up 25 mm (one inch) and fold corners to form dam and extend end to face of wall.
3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.

F. Window Sill Flashing:
1. Install flashing to extend not less than 100 mm (4 inch) beyond ends of sill into vertical joint of masonry or veneer.
2. Turn back edge up to terminate under window frame.
3. Turn ends up 25 mm (one inch) and fold corners to form dam and extend to face of wall.

G. Flashing at Masonry, Stone, or Precast Concrete Copings:
1. Install flashing with drips on both wall faces unless shown otherwise.
2. Form penetration openings to fit tight against dowel or other item with edge turned up. Seal penetrations with sealant.

3.3 BASE FLASHING

A. Install where roof membrane type base flashing is not used and where shown.
1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (ten feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.4 COUNTERFLASHING

A. General:

1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One Piece Counterflashing:

1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
3. Where flashing is surface mounted on flat surfaces.
    a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
        1) Locate fasteners in masonry mortar joints.
        2) Use screws to sheet metal or wood.
    b. Fill joint at top with sealant.
4. Where flashing or hood is mounted on pipe.
    a. Secure with draw band tight against pipe.
    b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
    c. Completely fill joint at top with sealant.

C. Two-Piece Counterflashing:

1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
2. Surface applied type receiver:
    a. Secure to face construction in accordance, with manufacturers instructions.

b. Completely fill space at the top edge of receiver with sealant.

3. Insert counter flashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.

D. Where vented edge occur install so lower edge of counterflashing is against base flashing.

E. When counter flashing is a component of other flashing install as shown.

3.5 REGLETS

A. Install reglets in a manner to provide a watertight installation.

B. Locate reglets not less than 225 mm (9 inch) nor more than 400 mm (16 inch) above roofing, and not less than 125 mm (5 inch) nor more than 325 mm (13 inch) above cant strip.

C. Butt and align end joints or each section of reglet and securely hold in position until concrete or mortar are hardened:

1. Coordinate reglets for anchorage into concrete with formwork construction.

2. Coordinate reglets for masonry to locate horizontally into mortar joints.

3.6 ENGINE EXHAUST PIPE OR STACK FLASHING

A. Set collar where shown and secure roof tabs or flange of collar to structural deck with 13 mm (1/2 inch) diameter bolts.

B. Set flange of sleeve base flashing not less than 100 mm (4 inch) beyond collar on all sides as specified for base flashing.

C. Install hood to above the top of the sleeve 50 mm (2 inch) and to extend from sleeve same distance as space between collar and sleeve beyond edge not sleeve:

1. Install insect screen to fit between bottom edge of hood and side of sleeve.

2. Set collar of hood in high temperature sealant and secure with one by 3 mm (1/8 inch) bolt on stainless steel draw band type, or stainless steel worm gear type clamp. Install sealant at top of head.

3.7 GOOSENECK ROOF VENTILATORS

A. Install on structural curb not less than 200 mm (8 inch) high above roof surface.

B. Securely anchor ventilator curb to structural curb with fasteners spaced not over 300 mm (12 inch) on center.

C. Anchor gooseneck to curb with screws having nonprene washers at 150 mm (6 inch) on center.

- - - E N D - - -

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.1 DESCRIPTION:

A. Provide UL or equivalent approved firestopping system for the closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.

B. Provide UL or equivalent approved firestopping system for the closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK:

A. Sealants and application: Section 07 92 00, JOINT SEALANTS.

B. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.

C. List of FM, UL, or WH classification number of systems installed.

D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

E. Submit certificates from manufacturer attesting that firestopping materials comply with the specified requirements.

1.4 DELIVERY AND STORAGE:

A. Deliver materials in their original unopened containers with manufacturer's name and product identification.

B. Store in a location providing protection from damage and exposure to the elements.

1.5 QUALITY ASSURANCE:

A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

1.6 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. ASTM International (ASTM):

E84-14.....Surface Burning Characteristics of Building Materials

E814-13a.....Fire Tests of Through-Penetration Fire Stops

C. FM Global (FM):

Annual Issue Approval Guide Building Materials

4991-13 .....Approval of Firestop Contractors

D. Underwriters Laboratories, Inc. (UL):
Annual Issue Building Materials Directory
Annual Issue Fire Resistance Directory
723-10(2008).....Standard for Test for Surface Burning Characteristics of Building Materials
1479-04(R2014) .....Fire Tests of Through-Penetration Firestops

E. Intertek Testing Services - Warnock Hersey (ITS-WH):
Annual Issue Certification Listings

F. Environmental Protection Agency (EPA):
40 CFR 59(2014) .....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS:

A. Provide either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke. Firestop systems to accommodate building movements without impairing their integrity.

B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 101 mm (4 in.) nominal pipe or 0.01 sq. m (16 sq. in.) in overall cross sectional area.

C. Products requiring heat activation to seal an opening by its intumescence are not permitted by VA Fire and Safety for use in firestop systems.

D. Firestop sealants used for firestopping or smoke sealing to have the following properties:
1. Contain no flammable or toxic solvents.
2. Release no dangerous or flammable out gassing during the drying or curing of products.
3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
4. When installed in exposed areas, capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

E. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials to have following properties:
1. Classified for use with the particular type of penetrating material used.
2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.

F. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84 or UL 723. Material to be an approved firestopping material as listed in UL Fire Resistance Directory or by a nationally recognized testing laboratory.

G. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.

H. Materials to be nontoxic and noncarcinogen at all stages of application or during fire conditions and to not contain hazardous chemicals. Provide firestop material that is free from Ethylene Glycol, PCB, MEK, and asbestos.

I. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.

1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
2. For floor penetrations with annular spaces exceeding 101 mm (4 in.) or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means acceptable to the firestop manufacturer.
3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS:

A. Provide silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.

B. Provide mineral fiber filler and bond breaker behind sealant.

C. Sealants to have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with ASTM E84.

D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Submit product data and installation instructions, as required by article, submittals, after an on-site examination of areas to receive firestopping.

B. Examine substrates and conditions with installer present for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

A. Remove dirt, grease, oil, laitance and form-release agents from concrete, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.

B. Remove insulation on insulated pipe for a distance of 150 mm (6 inches) on each side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

C. Prime substrates where required by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

D. Masking Tape: Apply masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 INSTALLATION:

A. Do not begin firestopping work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.

B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.

C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP:

A. As work on each floor is completed, remove materials, litter, and debris.

B. Clean up spills of liquid type materials.

C. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.

D. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated firestopping immediately and install new materials to provide firestopping complying with specified requirements.

3.5 INSPECTIONS AND ACCEPTANCE OF WORK:

A. Do not conceal or enclose firestop assemblies until inspection is complete and approved by the Contracting Officer Representative (COR).

B. Furnish service of approved inspector to inspect firestopping in accordance with ASTM E2393 and ASTM E2174 for firestop inspection, and document inspection results. Submit written reports indicating locations of and types of penetrations and type of firestopping used at each location; type is to be recorded by UL listed printed numbers.

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SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section covers interior and exterior sealant and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK (INCLUDING BUT NOT LIMITED TO THE FOLLOWING):

A. Firestopping Penetrations: Section 07 84 00, FIRESTOPPING.

B. Glazing: Section 08 80 00, GLAZING.

C. Sound Rated Gypsum Partitions/Sound Sealants: Section 09 29 00, GYPSUM BOARD.

D. Mechanical Work: Section 21 05 11, COMMON WORK RESULTS FOR FIRE SUPPRESSION and Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING and Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

1.3 QUALITY ASSURANCE:

A. Installer Qualifications: An experienced installer with a minimum of three (3) years' experience and who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance. Submit qualification.

B. Source Limitations: Obtain each type of joint sealant through one (1) source from a single manufacturer.

C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
3. Test elastomeric joint sealants according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion under cyclic movement, adhesion-in peel, and indentation hardness.
4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.4 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's installation instructions for each product used.

C. Cured samples of exposed sealants for each color.

D. Manufacturer's Literature and Data:

1. Primers

2. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

H. Manufacturer warranty.

1.5 PROJECT CONDITIONS:

A. Environmental Limitations:

1. Do not proceed with installation of joint sealants under following conditions:
   a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C (40 degrees F).
   b. When joint substrates are wet.

B. Joint-Width Conditions:

1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions:

1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 DELIVERY, HANDLING, AND STORAGE:

A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.

B. Carefully handle and store to prevent inclusion of foreign materials.

C. Do not subject to sustained temperatures exceeding 32 degrees C (90 degrees F) or less than 5 degrees C (40 degrees F).

1.7 DEFINITIONS:

A. Definitions of terms in accordance with ASTM C717 and as specified.

B. Backing Rod: A type of sealant backing.

C. Bond Breakers: A type of sealant backing.

D. Filler: A sealant backing used behind a back-up rod.

1.8 WARRANTY:

A. Construction Warranty: Comply with FAR clause 52.246-21 "Warranty of Construction".

B. Manufacturer Warranty: Manufacturer shall warranty their sealant for a minimum of five (5) years from the date of installation and final acceptance by the Government. Submit manufacturer warranty.

1.9 APPLICABLE PUBLICATIONS:

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. ASTM International (ASTM):

C509-06 .....Elastomeric Cellular Preformed Gasket and Sealing Material

C612-14 .....Mineral Fiber Block and Board Thermal Insulation

C717-14a .....Standard Terminology of Building Seals and Sealants
C734-06(R2012) .....Test Method for Low-Temperature Flexibility of Latex Sealants after Artificial Weathering
C794-10 .....Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
C919-12. .....Use of Sealants in Acoustical Applications.
C920-14a .....Elastomeric Joint Sealants.
C1021-08(R2014) .....Laboratories Engaged in Testing of Building Sealants
C1193-13 .....Standard Guide for Use of Joint Sealants.
C1248-08(R2012) .....Test Method for Staining of Porous Substrate by Joint Sealants
C1330-02(R2013) .....Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants
C1521-13 .....Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints
D217-10 .....Test Methods for Cone Penetration of Lubricating Grease
D412-06a(R2013) .....Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
D1056-14 .....Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
E84-09.....Surface Burning Characteristics of Building Materials

C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

D. Environmental Protection Agency (EPA):
40 CFR 59(2014) .....National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

PART 2 - PRODUCTS

2.1 SEALANTS:

A. Exterior Sealants:

1. S-1 Vertical surfaces, provide non-staining ASTM C920, Type S or M, Grade NS, Class 25,
2. S-2 Horizontal surfaces, provide ASTM C920, Type S or M, Grade P, Class 25, Use T.
3. Provide location(s) of exterior sealant as follows:
   a. Joints formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Provide sealant at exterior surfaces of exterior wall penetrations.
   b. Metal to metal.
   c. Masonry to masonry or stone.
   d. Stone to stone.

e. Cast stone to cast stone.

f. Masonry expansion and control joints.

g. Wood to masonry.

h. Masonry joints where shelf angles occur.

i. Voids where items penetrate exterior walls.

j. Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.

B. Floor Joint Sealant:

1. ASTM C920, Type S or M, Grade P, Class 25, S-3
2. S-3 Provide location(s) of floor joint sealant as follows.

a. Seats of metal thresholds exterior doors.

b. Control and expansion joints in floors, slabs, ceramic tile, and walkways.

C. Interior Sealants:

1. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system are to comply with the following limits for VOC content when calculated according to 40 CFR 59, (EPA Method 24):

a. Architectural Sealants: 250 g/L.

b. Sealant Primers for Nonporous Substrates: 250 g/L.

c. Sealant Primers for Porous Substrates: 775 g/L.

2. S-4 Vertical and Horizontal Surfaces: ASTM C920, Type S or M, Grade NS, Class 25,
3. Provide location(s) of interior sealant as follows:

a. Typical narrow joint 6 mm, (1/4 inch) or less at walls and adjacent components.

b. Perimeter of doors, windows, access panels which adjoin concrete or masonry surfaces.

c. Interior surfaces of exterior wall penetrations.

d. Joints at masonry walls and columns, piers, concrete walls or exterior walls.

e. Perimeter of lead faced control windows and plaster or gypsum wallboard walls.

f. Exposed isolation joints at top of full height walls.

g. Joints between bathtubs and ceramic tile; joints between shower receptors and ceramic tile; joints formed where nonplanar tile surfaces meet.

h. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.

i. Behind escutcheon plates at valve pipe penetrations and showerheads in showers.

D. Acoustical Sealant:

1. Conforming to ASTM C919; flame spread of 25 or less; and a smoke developed rating of 50 or less when tested in accordance with ASTM E84. Acoustical sealant have a consistency of

250 to 310 when tested in accordance with ASTM D217; remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C734; and be non-staining.

2. Provide location(s) of acoustical sealant as follows:

a. Exposed acoustical joint at sound rated partitions.

b. Concealed acoustic joints at sound rated partitions.

c. Joints where item pass-through sound rated partitions.

2.2 COLOR:

A. Sealants used with exposed masonry are to match color of mortar joints.

B. Sealants used with unpainted concrete are to match color of adjacent concrete.

C. Color of sealants for other locations to be light gray or aluminum, unless otherwise indicated in construction documents.

2.3 JOINT SEALANT BACKING:

A. General: Provide sealant backings of material and type 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 C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

1. Type C: Closed-cell material with a surface skin.

C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D1056 or synthetic rubber (ASTM C509), nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 32 degrees C (minus 26 degrees F). Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. 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 where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.4 FILLER:

A. Mineral fiberboard: ASTM C612, Class 1.

B. Thickness same as joint width.

C. Depth to fill void completely behind back-up rod.

2.5 PRIMER:

A. As recommended by manufacturer of caulking or sealant material.

B. Stain free type.

2.6 CLEANERS-NON POROUS SURFACES:

A. Chemical cleaners compatible with sealant and acceptable to manufacturer of sealants and sealant backing material. Cleaners to be free of oily residues and other substances capable of

staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.

B. Coordinate for repair and resolution of unsound substrate materials.

C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

A. Prepare joints in accordance with manufacturer's instructions and SWRI (The Professionals' Guide).

B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.

1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include but are not limited to the following:
    a. Concrete.
    b. Masonry.
    c. Unglazed surfaces of ceramic tile.
3. Remove laitance and form-release agents from concrete.
4. Clean nonporous 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 surfaces include but are not limited to the following:
    a. Metal.
    b. Glass.
    c. Porcelain enamel.
    d. Glazed surfaces of ceramic tile.

C. Do not cut or damage joint edges.

D. Apply non-staining masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.

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.

E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions or as indicated by pre-construction joint sealant substrate test.
1. Apply primer prior to installation of back-up rod or bond breaker tape.
2. Use brush or other approved means that will reach all parts of joints. Avoid application to or spillage onto adjacent substrate surfaces.

3.3 BACKING INSTALLATION:

A. Install backing material, to form joints enclosed on three sides as required for specified depth of sealant.

B. Where deep joints occur, install filler to fill space behind the backing rod and position the rod at proper depth.

C. Cut fillers installed by others to proper depth for installation of backing rod and sealants.

D. Install backing rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.

E. Where space for backing rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.

3.4 SEALANT DEPTHS AND GEOMETRY:

A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.

B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

A. General:
1. Apply sealants and caulking only when ambient temperature is between 5 degrees C and 38 degrees C (40 degrees and 100 degrees F).
2. Do not install polysulfide base sealants where sealant may be exposed to fumes from bituminous materials, or where water vapor in continuous contact with cementitious materials may be present.
3. Do not install sealant type listed by manufacture as not suitable for use in locations specified.
4. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
5. Avoid dropping or smearing compound on adjacent surfaces.
6. Fill joints solidly with compound and finish compound smooth.
7. Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C1193 unless shown or specified

otherwise in construction documents. Remove masking tape immediately after tooling of sealant and before sealant face starts to “skin” over. Remove any excess sealant from adjacent surfaces of joint, leaving the working in a clean finished condition.

8. Finish paving or floor joints flush unless joint is otherwise detailed.
9. Apply compounds with nozzle size to fit joint width.
10. Test sealants for compatibility with each other and substrate. Use only compatible sealant. Submit test reports.
11. Replace sealant which is damaged during construction process.

b. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise. Take all necessary steps to prevent three-sided adhesion of sealants.

c. Interior Sealants: Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.

1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cutouts to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 FIELD QUALITY CONTROL:

A. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.

B. Inspect tested joints and report on following:

1. 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 type of product and joint substrate.
2. Compare these results to determine if adhesion passes sealant manufacturer’s field-adhesion hand-pull test criteria.
3. Whether sealants filled joint cavities and are free from voids.
4. Whether sealant dimensions and configurations comply with specified requirements.

C. 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.

D. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.

E. Evaluation of Field-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.

3.7 CLEANING:

A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by manufacturer of the adjacent material or if not otherwise indicated by the caulking or sealant manufacturer.

B. Leave adjacent surfaces in a clean and unstained condition.

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies steel doors, steel frames and related components.

B. Terms relating to steel doors and frames as defined in ANSI A123.1 and as specified.

1.2 RELATED WORK

A. Frames fabricated of structural steel: Section 05 50 00, METAL FABRICATIONS.

B. Door Hardware: Section 08 71 00, DOOR HARDWARE.

C. Card readers and biometric devices: Section 28 13 00, ACCESS CONTROL.

1.3 TESTING

An independent testing laboratory shall perform testing.

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturers Literature and Data:

1. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements and temperature rise rating for stairwell doors. Submit proof of temperature rating.
2. Sound rated doors, including test report from Testing Laboratory.

1.5 SHIPMENT

A. Prior to shipment label each door and frame to show location, size, door swing and other pertinent information.

B. Fasten temporary steel spreaders across the bottom of each door frame.

1.6 STORAGE AND HANDLING

A. Store doors and frames at the site under cover.

B. Protect from rust and damage during storage and erection until completion.

1.7 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

B. Door and Hardware Institute (DHI):

A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)

C. Steel Door Institute (SDI):

113-01 (R2006).....Thermal Transmittance of Steel Door and Frame Assemblies

128-09.....Acoustical Performance for Steel Door and Frame Assemblies

D. American National Standard Institute:

A250.8-2003 (R2008).....Specifications for Standard Steel Doors and Frames

E. American Society for Testing and Materials (ASTM):

A167-99(R2009)	Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
A568/568-M-11	Steel, Sheet, Carbon, and High-Strength, Low-alloy, Hot-Rolled and Cold-Rolled
A1008-10	Steel, sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy and High Strength Low Alloy with Improved Formability
B209/209M-10	Aluminum and Aluminum-Alloy Sheet and Plate
B221/221M-12	Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
D1621-10	Compressive Properties of Rigid Cellular Plastics
D3656-07	Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns
E90-09	Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

F. The National Association Architectural Metal Manufactures (NAAMM):
Metal Finishes Manual (AMP 500-06)

G. National Fire Protection Association (NFPA):
80-13 ..... Fire Doors and Fire Windows

H. Underwriters Laboratories, Inc. (UL):
Fire Resistance Directory

I. Intertek Testing Services (ITS):
Certifications Listings…Latest Edition

J. Factory Mutual System (FM):
Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A167, Type 302 or 304; finish, NAAMM Number 4.

B. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.

C. Anchors, Fastenings and Accessories: Fastenings anchors, clips connecting members and sleeves from zinc coated steel.

D. Aluminum Sheet: ASTM B209/209M.

E. Aluminum, Extruded: ASTM B221/221M.

F. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 FABRICATION GENERAL

A. GENERAL:

1. Follow ANSI A250.8 for fabrication of standard steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per ANSI A250.8. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
2. Close top edge of exterior doors flush and seal to prevent water intrusion.
3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.

2.3 METAL FRAMES

A. General:
   1. ANSI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
   2. Frames for labeled fire rated doors and windows.
      a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
      b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
   3. Frames for doors specified to have automatic door operators; Security doors (Type 36); service window: minimum 1.7 mm (0.067 inch) thick.
   4. Knocked-down frames are not acceptable.

B. Reinforcement and Covers:
   1. ANSI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
   2. Provide mortar guards securely fastened to back of hardware reinforcements except on lead-lined frames.
   3. Where concealed door closers are installed within the head of the door frames, prepare frames for closers and provide 1 mm (0.042 inch) thick steel removable stop sections for access to concealed face plates and control valves, except when cover plates are furnished with closer.

C. Terminated Stops: ANSI A250.8.

D. Glazed Openings:
   a. Integral stop on exterior, corridor, or secure side of door.
   b. Design rabbet width and depth to receive glazing material or panel shown or specified.

E. Frame Anchors:
   1. Floor anchors:
      a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.

b. At bottom of jamb use 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts. Use 50 mm x 50 mm (2 inch by 2 inch) 9 mm by (3/8 inch) clip angle for lead lined frames, drilled for 9 mm (3/8 inch) floor bolts.
c. Where mullions occur, provide 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two 6 mm (1/4 inch) floor bolts and frame anchor screws.
d. Where sill sections occur, provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for 6 mm (1/4 inch) floor bolts and frame anchor screws. Space floor bolts at 50 mm (24 inches) on center.

2. Jamb anchors:
a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart, except for fire rated frames space anchors as required by labeling authority.
b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.
c. Anchors set in masonry: Use adjustable anchors designed for friction fit against the frame and for extension into the masonry not less than 250 mm (10 inches). Use one of following type:
1) Wire loop type of 5 mm (3/16 inch) diameter wire.
2) T-shape or strap and stirrup type of corrugated or perforated sheet steel.
d. Anchors for stud partitions: Either weld to frame or use lock-in snap-in type. Provide tabs for securing anchor to the sides of the studs.
e. Anchors for frames set in prepared openings:
1) Steel pipe spacers with 6 mm (1/4 inch) inside diameter welded to plate reinforcing at jamb stops or hat shaped formed strap spacers, 50 mm (2 inches) wide, welded to jamb near stop.
2) Drill jamb stop and strap spacers for 6 mm (1/4 inch) flat head bolts to pass thru frame and spacers.
3) Two piece frames: Subframe or rough buck drilled for 6 mm (1/4 inch) bolts.
f. Anchors for observation windows and other continuous frames set in stud partitions.
1) In addition to jamb anchors, weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.
2) Anchors spaced 600 mm (24 inches) on centers maximum.
g. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

2.4 TRANSOM PANELS

A. Fabricate panels as specified for flush doors.

B. Fabricate bottom edge with rabbet stop to fit top of door where no transom bar occurs.

2.5 SHOP PAINTING

ANSI A250.8.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Plumb, align and brace frames securely until permanent anchors are set.
   1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.
   2. Use wood spreaders at bottom of frame if the shipping spreader is removed.
   3. Protect frame from accidental abuse.
   4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.
   5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.

B. Floor Anchors:
   1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts. Use 9 mm (3/8 inch) bolts on lead lined frames.
   2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:
   1. Anchors in masonry walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.
   2. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
   3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
   4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where subframes or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers. Secure two piece frames to subframe or rough buck with machine screws on both faces.

D. Install anchors for labeled fire rated doors to provide rating as required.

E. Frames for Sound Rated Doors: Coordinate to line frames for sound rated doors with insulation.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

Install doors and hardware as specified in Sections Section 08 14 00, WOOD DOORS and Section 08 71 00, DOOR HARDWARE.

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SECTION 08 14 00
INTERIOR WOOD DOORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies interior flush doors with prefinish, prefit option.

B. Section includes fire rated doors, sound retardant doors, and smoke doors.

1.2 RELATED WORK

A. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.

B. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.

C. Installation of doors and hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, WOOD DOORS, or Section 08 71 00, DOOR HARDWARE.

D. Glazing: Section 08 80 00, GLAZING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Veneer sample 200 mm (8 inch) by 275 mm (11 inch) by 6 mm (1/4 inch) showing specified wood species sanded to receive a transparent finish. Factory finish veneer sample where the prefinished option is accepted.

C. Shop Drawings:

1. Show every door in project and schedule location in building.
2. Indicate type, grade, finish and size; include detail of glazing, sound gasketing and other pertinent details.
3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.

D. Manufacturer's Literature and Data:

1. Sound rated doors, including test report indicating STC rating per ASTM E90 from test laboratory.
2. Labeled fire rated doors showing conformance with NFPA 80.

E. Laboratory Test Reports:

1. Screw holding capacity test report in accordance with WDMA T.M.10.
2. Split resistance test report in accordance with WDMA T.M.5.
3. Cycle/Slam test report in accordance with WDMA T.M.7.
4. Hinge-Loading test report in accordance with WDMA T.M.8.

1.4 WARRANTY

A. Doors are subject to terms of Article titled “Warranty of Construction”, FAR clause 52.246-21, except that warranty shall be as follows:

1. For interior doors, manufacturer’s warranty for lifetime of original installation.

2. Specified STC RATING for sound retardant rated door assembly in place.

1.5 DELIVERY AND STORAGE

A. Factory seal doors and accessories in minimum of 6 mill polyethylene bags or cardboard packages which shall remain unbroken during delivery and storage.

B. Store in accordance with WDMA I.S.1-A, Job Site Information.

C. Label package for door opening where used.

1.6 APPLICABLE PUBLICATIONS

Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

A. Window and Door Manufacturers Association (WDMA):

I.S.1A-13 .....Architectural Wood Flush Doors

I.S.4-13.....Water-Repellent Preservative Non-Pressure Treatment for Millwork

T.M.6-14.....Adhesive (Glue Bond) Durability Test Method

T.M.7-14.....Cycle-Slam Test Method

T.M.8-14.....Hinge Loading Test Method

T.M.10-14.....Screwholding Test Method

B. National Fire Protection Association (NFPA):

80-13 .....Fire Doors and Other Opening Protectives

252-12 .....Fire Tests of Door Assemblies

C. ASTM International (ASTM):

E90-09.....Laboratory Measurements of Airborne Sound Transmission Loss

PART 2 - PRODUCTS

2.1 FLUSH DOORS

A. General:

1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.
2. Adhesive: Type II
3. Thickness: 45 mm (1-3/4 inches) unless otherwise shown or specified.

B. Face Veneer:

1. In accordance with WDMA I.S.1-A.
2. One species throughout the project unless scheduled or otherwise shown.
3. For transparent finishes: Premium Grade. rotary cut, red oak.
    a. A grade face veneer standard optional.
    b. AA grade face veneer
    c. Match face veneers for doors for uniform effect of color and grain at joints.
    d. Door edges shall be same species as door face veneer except maple may be used for stile face veneer on birch doors.

e. In existing buildings, where doors are required to have transparent finish, use wood species and grade of face veneers to match adjacent existing doors.

4. For painted finishes: Custom Grade, mill option close grained hardwood, premium or medium density overlay. Do not use Lauan.
5. Factory sand doors for finishing.

C. Wood for stops, louvers, muntins and moldings of flush doors required to have transparent finish:
1. Solid Wood of same species as face veneer, except maple may be used on birch doors.
2. Glazing:
a. On non-labeled doors use applied wood stops nailed tight on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers.
b. Use stainless steel or dull chrome plated brass screws for exterior doors.

D. Fire rated wood doors:
1. Fire Performance Rating:
a. “B” label, 1-1/2 hours.
b. “C” label, 3/4 hour.
2. Labels:
a. Doors shall conform to the requirements of ASTM E2074, or NFPA 252, and, carry an identifying label from a qualified testing and inspection agency for class of door or opening shown designating fire performance rating.
b. Metal labels with raised or incised markings.
3. Performance Criteria for Stiles of doors utilizing standard mortise leaf hinges:
a. Hinge Loading: WDMA T.M.8. Average of 10 test samples for Extra Heavy Duty doors.
b. Direct screw withdrawal: WDMA T.M.10 for Extra Heavy Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.
c. Cycle Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with WDMA
T.M.7.
4. Additional Hardware Reinforcement:
a. Provide fire rated doors with hardware reinforcement blocking.
b. Size of lock blocks as required to secure hardware specified.
c. Top, bottom and intermediate rail blocks shall measure not less than 125 mm (five inches) minimum by full core width.
d. Reinforcement blocking in compliance with manufacturer's labeling requirements.
e. Mineral material similar to core is not acceptable.

5. Other Core Components: Manufacturer's standard as allowed by the labeling requirements.
6. Provide steel frame approved for use in labeled doors for vision panels.
7. Provide steel astragal on pair of doors.

E. Smoke Barrier Doors:
1. For glazed openings use steel frames approved for use in labeled doors.
2. Provide a steel astragal on one leaf of pairs of doors, including double egress doors.

F. Sound Rated Doors:
1. Fabricated as specified for flush wood doors with additional construction requirements to meet specified sound transmission class (STC).
2. STC Rating of the door assembly in place when tested in accordance with ASTM E90 by an independent nationally recognized acoustical testing laboratory not less than 36.
3. Accessories:
a. Frame Gaskets: Continuous closed cell sponge neoprene with stop adjusters.
b. Automatic Door Bottom Seal:
1) Steel spring operated, closed cell sponge neoprene metal mounted removable in extruded aluminum housing with a medium matte 0.1 mm (4.0 mil) thick clear Anodized finish.
2) Concealed or Surface Mounted.

2.2 PREFINISH, PREFIT OPTION

A. Flush doors may be factory machined to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.

B. Factory fitting to conform to specification for shop and field fitting, including factory application of sealer to edge and routings.

C. Flush doors to receive transparent finish (in addition to being prefit) may be factory finished as follows:
1. WDMA I.S.1-A Section F-3 specification for System TR-4, Conversion Varnish or System TR-5, Catalyzed Vinyl.
2. Use stain when required to produce the finish specified in Section 09 06 00 SHEDULE FOR FINISHES.

2.3 IDENTIFICATION MARK:

A. On top edge of door.

B. Either a stamp, brand or other indelible mark, giving manufacturer’s name, door’s trade name, construction of door, code date of manufacture and quality.

C. Accompanied by either of the following additional requirements:
1. An identification mark or a separate certification including name of inspection organization.
2. Identification of standards for door, including glue type.

3. Identification of veneer and quality certification.
4. Identification of preservative treatment for stile and rail doors.

2.4 SEALING:

Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

PART 3 - EXECUTION

3.1 DOOR PREPARATION

A. Field, shop or factory preparation: Do not violate the qualified testing and inspection agency label requirements for fire rated doors.

B. Clearances between Doors and Frames and Floors:
   1. Maximum 3 mm (1/8 inch) clearance at the jambs, heads, and meeting stiles, and a 19 mm (3/4 inch) clearance at bottom, except as otherwise specified.
   2. Maximum clearance at bottom of sound rated doors, light-proofed doors, doors to operating rooms, and doors designated to be fitted with mechanical seal: 10 mm (3/8 inch).

C. Provide cutouts for special details required and specified.

D. Rout doors for hardware using templates and location heights specified in Section, 08 71 00 DOOR HARDWARE.

E. Fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness undercut where shown.

F. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.

G. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.

H. Apply a steel astragal on the opposite side of active door on pairs of fire rated doors.

I. Apply a steel astragal to meeting style of active leaf of pair of doors or double egress smoke doors.

3.2 INSTALLATION OF DOORS APPLICATION OF HARDWARE

Install doors and hardware as specified in this Section.

3.3 DOOR PROTECTION

A. As door installation is completed, place polyethylene bag or cardboard shipping container over door and tape in place.

B. Provide protective covering over knobs and handles in addition to covering door.

C. Maintain covering in good condition until removal is approved by Contracting Officers Representative (COR).

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION:

Section specifies access doors or panels.

1.2 RELATED WORK:

A. Lock Cylinders: Section 08 71 00, DOOR HARDWARE.

B. Access doors in acoustical ceilings: Section 09 51 00, ACOUSTICAL CEILINGS.

C. Locations of access doors for duct work cleanouts: Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS:

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings: Access doors, each type, showing construction, location and installation details.

C. Manufacturer's Literature and Data: Access doors, each type.

1.4 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.

B. American Society for Testing and Materials (ASTM):

A167-99(R-2009) ..... Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip

A1008-10..... Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy

C. American Welding Society (AWS):

D1.3-08..... Structural Welding Code Sheet Steel

D. National Fire Protection Association (NFPA):

80-10 ..... Fire Doors and Windows

E. The National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500 Series ..... Metal Finishes Manual

F. Underwriters Laboratories, Inc. (UL):

Fire Resistance Directory

PART 2 - PRODUCTS

2.1 FABRICATION, GENERAL

A. Fabricate components to be straight, square, flat and in same plane where required.

1. Slightly round exposed edges and without burrs, snags and sharp edges.
2. Exposed welds continuous and ground smooth.
3. Weld in accordance with AWS D1.3.

B. Number of locks and non-continuous hinges as required to maintain alignment of panel with frame. For fire rated doors, use hinges and locks as required by fire test.

C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening. Provide anchors as required by fire test.

2.2 ACCESS DOORS, FIRE RATED:

A. Shall meet requirements for "B" label 1-1/2 hours with maximum temperature rise of 120-degree C (250 degrees F).

B. Comply with NFPA 80 and have Underwriters Laboratories Inc., or other nationally recognized laboratory label for Class B opening.

C. Door Panel: Form of 0.9 mm (0.0359 inch) thick steel sheet, insulated sandwich type construction.

D. Frame: Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in concrete masonry or gypsum board openings.

1. Weld exposed joints in flange and grind smooth.
2. Provide frame flange at perimeter where installed in concrete masonry or gypsum board.
3. Provide expanded galvanized metal lath perimeter wings when installed in plaster except veneer plaster.

E. Automatic Closing Device: Provide automatic closing device for door.

F. Hinge: Continuous steel hinge with stainless steel pin.

G. Lock:

1. Self-latching, with provision for fitting flush a standard screw-in type lock cylinder. Lock cylinder specified in Section 08 71 00, DOOR HARDWARE.
2. Provide latch release device operable from inside of door. Mortise case in door.

2.3 ACCESS DOORS, FLUSH PANEL:

A. Door Panel:

1. Form of 1.9 mm (0.0747 inch) thick steel sheet.
2. Reinforce to maintain flat surface.

B. Frame:

1. Form of 1.5 mm (0.0598 inch) thick // steel // stainless steel // sheet of depth and configuration to suit material and type of construction where installed.
2. Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
3. Weld exposed joints in flange and grind smooth.

4. Provide expanded galvanized metal lath perimeter wings when installed in plaster except veneer plaster.

C. Hinge:
1. Concealed spring hinge to allow panel to open 175 degrees.
2. Provide removable hinge pin to allow removal of panel from frame.

D. Lock:
1. Flush, screwdriver operated cam lock.

2.4 FINISH:

A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.

B. Steel Surfaces: Baked-on prime coat over a protective phosphate coating.

C. Stainless Steel: No. 4 for exposed surfaces.

2.5 SIZE:

Minimum 600 mm (24 inches) square door unless otherwise shown on drawings or required to suit opening in suspension system of ceiling.

PART 3 - EXECUTION

3.1 LOCATION:

A. Provide access panels or doors wherever any valves, traps, dampers, cleanouts, and other control items of mechanical, electrical and conveyor work are concealed in wall or partition or are above ceiling of gypsum board or plaster.

B. Use fire rated doors in fire rated partitions and ceilings.

C. Use flush panels in partitions and gypsum board or plaster ceilings, except lay-in acoustical panel ceilings or upward access acoustical tile ceilings.

3.2 INSTALLATION, GENERAL:

A. Install access doors in openings to have sides vertical in wall installations, and parallel to ceiling suspension grid or side walls when installed in ceiling.

B. Set frames so that edge of frames without flanges will finish flush with surrounding finish surfaces.

C. Set frames with flanges to overlap opening and so that face will be uniformly spaced from the finish surface.

3.3 ANCHORAGE:

A. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.

B. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.

C. Anchors for fire rated access doors shall meet requirements of applicable fire test.

3.4 ADJUSTMENT:

A. Adjust hardware so that door panel will open freely.

B. Adjust door when closed so door panel is centered in the frame.

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SECTION 08 51 13
ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Aluminum windows of type and size shown, complete with hardware, related components and accessories.

B. Types:

1. Hung windows

1.2 DEFINITIONS

A. Accessories: Mullions, staff beads, casings, closures, trim, moldings, panning systems, sub-sills, clips anchors, fasteners, weather-stripping, insect screens and other necessary components required for fabrication and installation of window units.

B. Uncontrolled Water: Water not drained to the exterior, or water appearing on the room side of the window.

1.3 RELATED WORK

A. Steel subframes: Section 05 50 00, METAL FABRICATIONS.

B. Glazing: Section 08 80 00, GLAZING.

1.4 DELIVERY, STORAGE AND HANDLING

A. Protect windows from damage during handling and construction operations before, during and after installation.

B. Store windows under cover, setting upright.

C. Do not stack windows flat.

D. Do not lay building materials or equipment on windows.

1.5 QUALITY ASSURANCE

A. Approval by contracting officer is required of products or service of proposed manufacturers and installers.

B. Approval will be based on submission of certification by Contractor that:

1. Manufacturer regularly and presently manufactures the specified windows as one of its principal products.
2. Installer has technical qualifications, experience, trained personnel and facilities to install specified items.

C. Provide each type of window produced from one source of manufacture.

D. Quality Certified Labels or certificate:

1. Architectural Aluminum Manufacturers Association, "AAMA label" affixed to each window indicating compliance with specification.
2. Certificates in lieu of label with copy of recent test report (not more than 4 years old) from an independent testing laboratory and certificate signed by window manufacturer stating that

windows provided comply with specified requirements and AAMA 101/I.S.2/A440 for type of window specified.

1.6 SUBMITTAL

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Minimum of 1/2 full scale types of windows on project.
2. Identifying parts of window units by name and kind of metal or material, show construction, locking systems, mechanical operators, trim, installation and anchorages.
3. Include glazing details and standards for factory glazed units.

C. Manufacturer's Literature and Data:

1. Window.
2. Sash locks, keepers, and key.

D. Certificates:

1. Certificates as specified in paragraph QUALITY ASSURANCE.
2. Indicating manufacturers and installers qualifications.
3. Manufacturer's Certification that windows delivered to project are identical to windows tested.

E. Test Reports:

Copies of test reports as specified in paragraph QUALITY ASSURANCE.

F. Samples: Provide 150 mm (six-inch) length samples showing finishes, specified.

1.7 WARRANTY

Warrant windows against malfunctions due to defects in thermal breaks, hardware, materials and workmanship, subject to the terms of Article “WARRANTY OF CONSTRUCTION”, FAR clause 52.246-21, except provide 10 year warranty period.

1.8 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.

B. American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)

90.1-07 ..... Energy Standard of Buildings

C. American Architectural Manufacturers Association (AAMA):

101/I.S.2/A440-11 ..... Windows, Doors, and Unit Skylights

505-09 ..... Dry Shrinkage and Composite Performance Thermal Cycling Test Procedures

2605-05 ..... Superior Performing Organic Coatings on Architectural Aluminum Extrusions and Panels

TIR-A8-08.....Structural Performance of Poured and Debridged Framing Systems

D. American Society for Testing and Materials (ASTM):

A653/A653M-09 .....Steel Sheet, Zinc Coated (Galvanized), Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-dip Process

E 90-09.....Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions

E. National Fenestration Rating Council (NFRC):

NFRC 100-10 .....Determining Fenestration Product U-Factors

NFRC 200-10 .....Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

F. National Association of Architectural Metal Manufacturers (NAAMM):

AMP 500-06 .....Metal Finishes Manual

PART 2- PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions; Sheet and Plate: AAMA 101/I.S.2/A440.

B. Sheet Steel, Galvanized: ASTM A653; G90 galvanized coating.

C. Weather-strips: AAMA 101/I.S.2/A440; except leaf type weather-stripping is not permitted.

D. Insect Screening:

1. Regular mesh, 18 by 18, AAMA 101/I.S.2/A440.
2. Aluminum with dark bronze anodized finish unless specified otherwise.

E. Fasteners: AAMA 101/I.S.2/A440. Screws, bolts, nuts, rivets and other fastening devices to be non-magnetic stainless steel.

1. Fasteners to be concealed when window is closed. Where wall thickness is less than 3 mm (0.125 inch) thick, provide backup plates or similar reinforcements for fasteners.
2. Stainless steel self tapping screws may be used to secure Venetian blind hanger clips, vent guide blocks, friction adjuster, and limit opening device.
3. Attach locking and hold-open devices to windows with concealed fasteners. Provide reinforcing plates where wall thickness is less than 3 mm (0.125 inch) thick.

F. Weather-strips: AAMA 101/I.S.2/A440.

G. Hardware:

1. Locks: Two position locking bolts or cam type tamperproof custodial locks with a single point control located not higher than five feet from floor level. Locate locking devices in the vent side rail. Fastenings for locks and keepers shall be concealed or nonremovable.

2. Locking Device Strikes: Locate strikes in frame jamb. Strikes shall be adjustable for locking tension. Fabricate strikes from Type 304 stainless steel or white bronze.
3. Fabricate hinges of noncorrosive metal. Hinges may be either fully concealed when window is closed or semi-concealed with exposed knuckles. All exposed knuckle hinges shall have hospital tips, at both ends. Surface mounted hinges will not be accepted.
4. Guide Blocks: Fabricate guide blocks of injection molded nylon. Install guide block fully concealed in vent/frame sill.
5. Hardware for Emergency Ventilation of Windows:
    a. Provide windows with a hold open linkage for emergency ventilation.
    b. Hold open hardware shall provide for maximum six inches of window opening and shall include an adjustable friction shoe to provide resistance when closing the window.
    c. Handles shall be removable.
6. Hardware for Maintenance Opening of Windows: Opening beyond the six inch position shall be accomplished with a window washers key. The release device shall capture the key when window is in the open position.
7. Design operating device to prevent opening with standard tools, coins or bent wire devices.

2.2 THERMAL AND CONDENSATION PERFORMANCE

A. Condensation Resistance Factor (CRF): Minimum CRF of C 53 at frame, and C 57 at glass.
B. Thermal Transmittance:
    1. Maximum U value class for insulating glass windows: 50 (U=0.50).
    2. Maximum U value class for dual glazed windows: 70 (U=0.70), or as required by ASHRAE 90.1.
C. Solar Heat Gain Coefficient (SHGC): SHGC shall comply with State or local energy code requirement.

2.3 FABRICATION

A. Fabrication to exceed or meet requirements of Physical Load Tests, Air Infiltration Test, and Water Resistance Test of AAMA 101/I.S.2/A440.
B. Glazing:
    1. Factory or field glazing optional.
    2. Glaze in accordance with Section 08 80 00, GLAZING.
    3. Windows reglazable without dismantling sash framing.
    4. Design rabbet to suit glass thickness and glazing method specified.
    5. Glaze from interior except where not accessible.
    6. Provide removable fin type glazing beads.
C. Trim:

1. Trim includes casings, closures, and muttins.
2. Fabricate to shapes shown of aluminum not less than 1.6 mm (0.062 inch) thick
3. Extruded or formed sections, straight, true, and smooth on exposed surfaces.
4. Exposed external corners mitered and internal corners coped; fitted with hairline joints.
5. Reinforce 1.6 mm (0.062 inch) thick members with not less than 3 mm (1/8-inch) thick aluminum.
6. Except for strap anchors, provide reinforcing for fastening near ends and at intervals not more than 305 mm (12 inches) between ends.
7. Design to allow unrestricted expansion and contraction of members and window frames.
8. Secure to window frames with machine screws or expansion rivets.
9. Exposed screws, fasteners or pop rivets are not acceptable on exterior of the casing or trim cover system.

D. Thermal-Break Construction:
1. Manufacturer's Standard.
2. Low conductance thermal barrier.
3. Capable of structurally holding sash in position and together.
4. All Thermal Break Assemblies (Pour & Debridge, Insulbar or others) shall be tested as per AAMA TIR A8 and AAMA 505 for Dry Shrinkage and Composite Performance.
5. Location of thermal barrier and design of window shall be such that, in closed position, outside air shall not come in direct contact with interior frame of the window.

E. Mullions: AAMA 101/I.S.2/A440.
1. Flat Grid Applied mullions on #1and #4 Surface of insulation glass unit. Mullions to be colored to match window frame.

F. Subsills and Stools:
1. Fabricate to shapes shown of not less than 2 mm (0.080 inch) thick extruded aluminum.
2. One piece full length of opening with concealed anchors.
3. Sills turned up back edge not less than 6 mm (1/4 inch). Front edge provide with drip.
4. Sill back edge behind face of window frame. Do not extend to interior surface or bridge thermal breaks.
5. Do not perforate for anchorage, clip screws, or other requirements.

G. Insect Screens:
1. AAMA 101/I.S.2/A440.
2. Aluminum.

2.4 SINGLE HUNG WINDOWS:

A. AAMA 101/I.S.2/A440. Single hung type H- AW60.

B. AAMA certified product to the AAMA 101/I.S.2/A440.-11 standard.

1. Tilt Lock: Design windows and provide with tamperproof, key-operated tilt latch and pivot bar hardware to permit tilting of sash inward for cleaning both side of sashes from interior. Finger operated tilt latches not acceptable.
2. Sash Balance: Two per sash.
3. Handle: Continuous, integral, sash lift bar on bottom rail of forward-placed operating sash.
4. Locks: Cam action sweep lock and strike, one per meeting rail.
5. Muntins: Provide external applied muntin grid as shown on drawings.
6. Sash Limit Device: Keyed sash limit device; for each operable sash located at jamb; one per sash. The release device shall capture the key when window is in the open position.

C. Windows shall match existing windows previously installed at the VA on this floor.

2.5 FINISH

A. In accordance with NAAMM AMP 500 series.

B. Finish exposed aluminum surfaces as follows:

1. Anodized Aluminum:
   a. Finish in accordance with AMP 501 letters and numbers.
   b. Finish to match existing windows. Contractor to provide samples of full range of manufacturer’s option for architect selection and approval.
   c. Colored anodized Finish: AA-C22A42 (anodized) or AA-C22A44 (electrolytically deposited metallic compound) medium matte, integrally colored coating, Class 1 Architectural, 0.7 mils thick.
      1) Dyes not accepted.
      2) Variation of more than 50 percent of maximum shade range approved will not be accepted in a single window or in adjacent windows and mullions on a continuous series.

C. Hardware: Finish hardware exposed when window is in the closed position: Match window color.

PART 3 - EXECUTION

3.1 PROTECTION (DISSIMILAR MATERIALS): AAMA 101/I.S.2/A440.

3.2 INSTALLATION, GENERAL

A. Install window units in accordance with manufacturer's specifications and recommendations for installation of window units, hardware, operators and other components of work.

B. Where type, size or spacing of fastenings for securing window accessories or equipment to building construction is not shown or specified, use expansion or toggle bolts or screws, as best suited to construction material.

1. Provide bolts or screws minimum 6 mm (1/4-inch) in diameter.
2. Sized and spaced to resist the tensile and shear loads imposed.
3. Do not use exposed fasteners on exterior, except when unavoidable for application of hardware.
4. Provide non-magnetic stainless steel Phillips flat-head machine screws for exposed fasteners, where required, or special tamper-proof fasteners.
5. Locate fasteners to not disturb the thermal break construction of windows.

C. Set windows plumb, level, true, and in alignment; without warp or rack of frames or sash.

D. Anchor windows on four sides with anchor clips or fin trim.
1. Do not allow anchor clips to bridge thermal breaks.
2. Use separate clips for each side of thermal breaks.
3. Make connections to allow for thermal and other movements.
4. Do not allow building load to bear on windows.
5. Use manufacturer's standard clips at corners and not over 600 mm (24 inches) on center.
6. Where fin trim anchorage is shown build into adjacent construction, anchoring at corners and not over 600 mm (24 inches) on center.

E. Sills and Stools:
1. Set in bed of mortar or other compound to fully support, true to line shown.
2. Do not extend sill to inside window surface or past thermal break.
3. Leave space for sealants at ends and to window frame unless shown otherwise.

F. Replacement Windows:
1. Do not remove existing windows until new replacement is available, ready for immediate installation.
2. Remove existing work carefully; avoid damage to existing work to remain.
3. Perform all other operations as necessary to prepare openings for proper installation and operation of new units.
4. Do not leave openings uncovered at end of working day, during precipitation or temperatures below 16 degrees C (60 degrees F.).

3.3 MULLIONS CLOSURES AND TRIM

A. Cut mullion full height of opening and anchor directly to window frame on each side.

B. Closures and Trim: External corners mitered and internal corners coped, fitted with hairline, tightly closed joints.

C. Secure to concrete or solid masonry with expansion bolts, expansion rivets, split shank drive bolts, or powder actuated drive pins.

D. Toggle bolt to hollow masonry units. Screwed to wood or metal.

E. Fasten except for strap anchors, near ends and corners and at intervals not more than 300 mm (12 inches) between.

F. Seal units following installation to provide weathertight system.

3.4 ADJUST AND CLEAN

A. Adjust ventilating sash and hardware to provide tight fit at contact points, and at weather-stripping for smooth operation and weathertight closure.

B. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage to protective coatings and finishes.

C. Remove excess glazing and sealant compounds, dirt, and other substances.

D. Lubricate hardware and moving parts.

E. Clean glass promptly after installation of windows. Remove glazing and sealant compound, dirt and other substances.

F. Except when a window is being adjusted or tested, keep locked in the closed position during the progress of work on the project.

3.5 OPERATION DEVICES

A. Provide wrenches, keys, or removable locking operating handles, as specified to operate windows.

B. Provide 6 maintenance or window washer operating handles.

C. Provide one operating pole and one pole hanger in a room or space where pole operation of windows is required.

- - - E N D - - -

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

A. Caulking: Section 07 92 00 JOINT SEALANTS.

B. Application of Hardware: Section 08 14 00, WOOD DOORS, Section 08 11 13, HOLLOW METAL DOORS AND FRAMES;

C. Painting: Section 09 91 00, PAINTING.

D. Card Readers: Section 28 13 11, PHYSICAL ACCESS CONTROL SYSTEMS.

E. Electrical: Division 26, ELECTRICAL.

F. Fire Detection: Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 GENERAL

A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.

B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).

C. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.

D. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.

E. The following items shall be of the same manufacturer, except as otherwise specified:

1. Cylindrical Locksets.
2. Hinges for hollow metal and wood doors.
3. Surface applied overhead door closers.
4. Exit devices.
5. Floor closers.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of FAR Clause 52.246-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:

1. Locks, latch sets, and panic hardware: 5 years.
2. Door closers and continuous hinges: 10 years.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation

C. Samples and Manufacturers' Literature:

1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

1.7 DELIVERY AND MARKING

A. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Contracting Officers Representative (COR) for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in COR's office until all other similar items have been installed in project, at which time the COR will deliver items on file to Contractor for installation in predetermined locations on the project.

1.8 PREINSTALLATION MEETING

A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including Contractor and Installer, Architect, Project Engineer and VA Locksmith, Hardware Consultant, and Hardware Manufacturer's Representative. Review the following:

1. Inspection of door hardware.
2. Job and surface readiness.
3. Coordination with other work.
4. Protection of hardware surfaces.
5. Substrate surface protection.
6. Installation.
7. Adjusting.
8. Repair.
9. Field quality control.
10. Cleaning.

1.9 INSTRUCTIONS

A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.

B. Keying: All cylinders shall be keyed into existing Falcon D-keyway Great Grand Master Key System. Provide removable core cylinders that are removable only with a special key without disassembly of knob or lockset. Cylinders shall be 6 pin "D" keyway uncombinated standard cores. Keying information shall be furnished at a later date by the COR.

1.10 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.

B. American Society for Testing and Materials (ASTM):

E2180-07.....Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-06.....Butts and Hinges

A156.2-03.....Bored and Pre-assembled Locks and Latches

A156.3-08.....Exit Devices, Coordinators, and Auto Flush Bolts
A156.4-08.....Door Controls (Closers)
A156.5-14.....Cylinders and Input Devices for Locks.
A156.6-05.....Architectural Door Trim
A156.8-05.....Door Controls-Overhead Stops and Holders
A156.11-14.....Cabinet Locks
A156.12-05 .....Interconnected Locks and Latches
A156.13-05.....Mortise Locks and Latches Series 1000
A156.14-07 .....Sliding and Folding Door Hardware
A156.15-06.....Release Devices-Closer Holder, Electromagnetic and Electromechanical
A156.16-08.....Auxiliary Hardware
A156.17-04 .....Self-Closing Hinges and Pivots
A156.18-06.....Materials and Finishes
A156.20-06 .....Strap and Tee Hinges, and Hasps
A156.21-09.....Thresholds
A156.22-05.....Door Gasketing and Edge Seal Systems
A156.23-04.....Electromagnetic Locks
A156.24-03.....Delayed Egress Locking Systems
A156.25-07 .....Electrified Locking Devices
A156.26-06.....Continuous Hinges
A156.28-07 .....Master Keying Systems
A156.29-07 .....Exit Locks and Alarms
A156.30-03 .....High Security Cylinders
A156.31-07 .....Electric Strikes and Frame Mounted Actuators
A156.36-10.....Auxiliary Locks
A250.8-03.....Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):
80-10 .....Fire Doors and Other Opening Protectives
101-09 .....Life Safety Code

E. Underwriters Laboratories, Inc. (UL):
Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

A. ANSI A156.1. Provide only three-knuckle hinges, except five-knuckle where the required hinge type is not available in a three-knuckle version (e.g., some types of swing-clear hinges). The

following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:

1. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc. shall be of stainless steel material.

B. Provide quantity and size of hinges per door leaf as follows:
   1. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
   2. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
   3. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
   4. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
   5. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
   6. Provide heavy-weight hinges where specified.
   7. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.

C. See Articles "MISCELLANEOUS HARDWARE" and "HARDWARE SETS" for pivots and hinges other than butts specified above and continuous hinges specified below.

2.2 CONTINUOUS HINGES

A. ANSI/BHMA A156.26, Grade 1-600.
   1. Listed under Category N in BHMA's "Certified Product Directory."

B. General: Minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete

C. Continuous, Barrel-Type Hinges: Hinge with knuckles formed around a Teflon-coated 6.35mm (0.25-inch) minimum diameter pin that extends entire length of hinge.
   1. Base Metal for Exterior Hinges: Stainless steel.
   2. Base Metal for Interior Hinges: Stainless steel.
   3. Base Metal for Hinges for Fire-Rated Assemblies: Stainless steel.
   4. Provide with non-removable pin (hospital tip option) at lockable outswing doors.
   5. Where required to clear adjacent casing, trim, and wall conditions and allow full door swing, provide wide throw hinges of minimum width required.
   6. Provide with manufacturer’s cut-outs for separate mortised power transfers and/or mortised automatic door bottoms where they occur.

7. Where thru-wire power transfers are integral to the hinge, provide hinge with easily removable portion to allow easy access to wiring connections.
8. Where models are specified that provide an integral wrap-around edge guard for the hinge edge of the door, provide manufacturer's adjustable threaded stud and machine screw mechanism to allow the door to be adjusted within the wrap-around edge guard.

2.3 DOOR CLOSING DEVICES

A. Closing devices shall be products of one manufacturer for each type specified.

B. All closers shall be adjusted such that the opening force shall not exceed 5 pounds and closing time is not less than 5 seconds from 90 degree open position.

2.4 OVERHEAD CLOSERS

A. Conform to ANSI A156.4, Grade 1.

B. Closers shall conform to the following:

1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
2. Where specified, closer shall have hold-open feature.
3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.
4. Material of closer body shall be forged or cast.
5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
7. Closers shall have full size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.
12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.

13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 ½" (38mm) minimum piston diameter.

2.5 DOOR STOPS

A. Conform to ANSI A156.16.

B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.

C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.

D. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.

E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.

F. Provide stop Type L02011, as applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76mm (3-inch) core-drilled hole and filled with quick-setting cement.

G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.

H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.

I. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.

J. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.

K. Provide door stops on doors where combination closer magnetic holders are specified, except where wall stops cannot be used or where floor stops cannot be installed within 4-inches of the wall.

L. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.6 OVERHEAD DOOR STOPS AND HOLDERS

A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only

at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

2.7 FLOOR DOOR HOLDERS

A. Conform to ANSI Standard A156.16. Provide extension strikes for Types L01301 and L01311 holders where necessary.

2.8 LOCKS AND LATCHES

A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Lock cylinders shall have six pins. Cylinders for all locksets shall be removable core type. Cylinders shall be furnished with construction removable cores and construction master keys. Cylinder shall be removable by special key. Construct all cores so that they will be interchangeable into the core housings of all rim locks, cylindrical locks, and any other type lock included in the Falcon Type D Great Grand Master Key System. Disassembly of lever or lockset shall not be required to remove core from lockset. All locksets or latches on double doors with fire label shall have latch bolt with 19 mm (3/4 inch) throw, unless shorter throw allowed by the door manufacturer's fire label. The COR will provide a construction core to allow opening and closing during construction and prior to the installation of final cores.

B. In addition to above requirements, locks and latches shall comply with following requirements:

1. Cylindrical Lock and Latch Sets: levers shall meet ADA (Americans with Disabilities Act) requirements. Cylindrical locksets shall be series 4000 Grade I. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Provide lever design to match design selected by Architect or to match existing lever design. Where two turn pieces are specified for privacy lock ANSI F76, turn piece on inside knob shall lock and unlock inside knob, and turn piece on outside knob shall unlock outside knob when inside knob is in the locked position. (This function is intended to allow emergency entry into these rooms without an emergency key or any special tool.)
3. Auxiliary locks shall be as specified under hardware sets and conform to ANSI A156.36.
4. Privacy locks in non-mental-health patient rooms shall have an inside thumbturn for privacy and an outside thumbturn for emergency entrance. Single occupancy patient privacy doors shall typically swing out; where such doors cannot swing out, provide center-pivoted doors with rescue hardware.

2.9 CARD READERS

Provide and install card readers where indicated. Integrate card readers with other specified systems and systems that are in place. Refer to Section 28 13 00, Physical Access Control Systems, for card reader requirements.

2.10 ELECTRIC STRIKES

A. ANSI/ BHMA A156.31 Grade 1.

B. General: Use fail-secure electric strikes at fire-rated doors.

2.11 KEYS

A. Stamp all keys with change number and key set symbol. Furnish keys in quantities as follows:

Locks/Keys	Quantity
Cylinder locks	2 keys each
Cylinder lock change key blanks	100 each different key way
Master-keyed sets	6 keys each
Grand Master sets	6 keys each
Great Grand Master set	5 keys
Control key	2 keys

2.12 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

A. Conform to ANSI Standard A156.6.

B. Provide protective plates and door edging as specified below:

1. Kick plates, mop plates and armor plates of metal, Type J100 series.
2. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
3. Kick plates and/or mop plates are not required on following door sides:
   a. Armor plate side of doors;
   b. Exterior side of exterior doors;
   c. Closet side of closet doors;
   d. Both sides of aluminum entrance doors.
4. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be thickness as noted in the hardware set, 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Provide armor plates beveled on all 4 edges (B4E). Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. Where top of intermediate rail of door is less than 875 mm (35 inches) from door bottom, extend armor plates to within 13 mm (1/2 inch) of top of intermediate rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt push bar.

5. Where louver or grille occurs in lower portion of doors, substitute stretcher plate and kick plate in place of armor plate. Size of stretcher plate and kick plate shall be 254 mm (10 inches) high.
6. Provide stainless steel edge guards where so specified at wood doors. Provide mortised type instead of surface type except where door construction and/or ratings will not allow. Provide edge guards of bevel and thickness to match wood door. Provide edge guards with factory cut-outs for door hardware that must be installed through or extend through the edge guard. Provide full-height edge guards except where door rating does not allow; in such cases, provide edge guards to height of bottom of typical lockset armor front. Forward edge guards to wood door manufacturer for factory installation on doors.

2.13 EXIT DEVICES

A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.

B. Surface vertical rod panics shall only be provided less bottom rod; provide fire pins as required by exit device and door fire labels. Do not provide surface vertical rod panics at exterior doors.

C. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.

D. Where removable mullions are specified at pairs with rim panic devices, provide mullion with key-removable feature.

E. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.

F. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.14 FLUSH BOLTS (AUTOMATIC)

A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).

2.15 DOOR PULLS WITH PLATES

A. Conform to ANSI A156.6. Pull Type J401, 152 mm (6 inches) high by 19 mm (3/4 inches) diameter with plate Type J302, 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Provide pull with projection of 70 mm (2 3/4 inches) and a clearance of 51 mm (2 inches). Cut plates of door pull plate for cylinders, or turn pieces where required.

2.16 PUSH PLATES

A. Conform to ANSI A156.6. Metal, Type J302, 200 mm (8 inches) wide by 350 mm (14 inches) high. Provide metal Type J302 plates 100 mm (4 inches wide by 350 mm (14 inches) high) where push plates are specified for doors with stiles less than 200 mm (8 inches) wide. Cut plates for cylinders, and turn pieces where required.

2.17 COMBINATION PUSH AND PULL PLATES

A. Conform to ANSI 156.6. Type J303, stainless steel 3 mm (1/8 inch) thick, 80 mm (3-1/3 inches) wide by 800 mm (16 inches) high), top and bottom edges shall be rounded. Secure plates to wood doors with 38 mm (1-1/2 inch) long No. 12 wood screws. Cut plates for turn pieces, and cylinders where required. Pull shall be mounted down.

2.18 COORDINATORS

A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on exterior pairs of doors where either door will close independently regardless of the position of the other door. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back strike shall not be used on labeled doors. Paint coordinators to match door frames, unless coordinators are plated. Provide bar type coordinators, except where gravity coordinators are required at acoustic pairs. For bar type coordinators, provide filler bars for full width and, as required, brackets for push-side surface mounted closers, overhead stops, and vertical rod panic strikes.

2.19 THRESHOLDS

A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with ¼-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.

B. For thresholds at elevators entrances see other sections of specifications.

C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.

D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) beyond face of frame.

2.20 AUTOMATIC DOOR BOTTOM SEAL AND RUBBER GASKET FOR LIGHT PROOF OR SOUND CONTROL DOORS

A. Conform to ANSI A156.22. Provide mortise or under-door type, except where not practical. For mortise automatic door bottoms, provide type specific for door construction (wood or metal).

2.21 MISCELLANEOUS HARDWARE

A. Access Doors (including Sheet Metal, Screen and Woven Wire Mesh Types): Except for fire-rated doors and doors to Temperature Control Cabinets, equip each single or double metal access door with Lock Type E07213, conforming to ANSI A156.11. Key locks as directed. Ship lock prepaid to the door manufacturer. Hinges shall be provided by door manufacturer.

B. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame, except at fire-rated frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

2.22 FINISHES

A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.

B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.

C. Miscellaneous Finishes:

1. Hinges --exterior doors: 626 or 630.
2. Hinges --interior doors: 652 or 630.
3. Pivots: Match door trim.
4. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
5. Thresholds: Mill finish aluminum.
6. Cover plates for floor hinges and pivots: 630.
7. Other primed steel hardware: 600.

D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces // except where otherwise specified. //

E. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.23 BASE METALS

A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to VA Contracting Officers Representative (COR) for approval.

B. Typical Hardware Heights from Finished Floor:

1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1219 mm (48 inches).
4. Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
5. Centerline of door pulls to be 1016 mm (40 inches).
6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
7. Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
8. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

B. Hinge Size Requirements:

Door Thickness	Door Width	Hinge Height
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.

D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by COR. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.

E. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts
Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or raw plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.

G. After locks have been installed; coordinate with the Contracting Officers Representative (COR) for installation of final cores.

3.3 FINAL INSPECTION

A. Installer to provide letter to VA Contracting Officers Representative (COR) that upon completion, installer has visited the Project and has accomplished the following:
   1. Re-adjust hardware.
   2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
   3. Identify items that have deteriorated or failed.
   4. Submit written report identifying problems.

3.4 DEMONSTRATION

A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of Contracting Officers Representative (COR) and VA Locksmith.

3.5 HARDWARE SETS

A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.

B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA

standards.

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ELECTRIC HARDWARE ABBREVIATIONS LEGEND:
ADO  = Automatic Door Operator
EMCH = Electro-Mechanical Closer-Holder
MHO  = Magnetic Hold-Open (wall- or floor-mounted)
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HARDWARE GROUP NO. 01

DOOR NUMBER: 507 510A 510C

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	CONT. HINGE	
1	EA	PUSH PLATE	J302
1	EA	PULL PLATE	J401 X J302
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	MOP PLATE	J103
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
3	EA	SILENCER	L03011

HARDWARE GROUP NO. 02

DOOR NUMBER: 510B 510D

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	KEY PRIVACY INDICATOR LOCK	F13 X OCCUPANCY INDICATOR
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	MOP PLATE	J103 AT INSWING DOORS
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
1	SET	SEALS	R0Y154
1	EA	THRESHOLD	BY OTHERS

HARDWARE GROUP NO. 03

DOOR NUMBER: 503 544 545

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	KEY PRIVACY INDICATOR LOCK	F13 X OCCUPANCY INDICATOR
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	MOP PLATE	J103
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
2	SET	SEALS	R0Y154
1	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
1	EA	THRESHOLD	BY OTHERS

HARDWARE GROUP NO. 04

DOOR NUMBER: 536

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	LATCHSET	F04
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 05

DOOR NUMBER: 522

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	CONT. HINGE	X INTERGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	EA	APARTMENT EXIT LOCK	F09
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	ARMOR PLATE	J101 X 1.275 MM THICKNESS
1	EA	DOOR EDGE GUARD	J208M/J211 (VERIFY), CUT: HARDWARE
1	EA	WALL STOP	L02101 CONVEX AT INSWING DOORS
1	EA	FLOOR STOP	L02121 X 3 FASTENERS AT OUTSWING DOORS
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 06

DOOR NUMBER: 501

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	ENTRANCE LOCK	F08
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	FIRE/LIFE WALL MAG	C00011 TRI-VOLTAGE
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 07

DOOR NUMBER: 508

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	APARTMENT EXIT LOCK	F09
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
2	SET	SEALS	R0Y154
1	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
1	EA	THRESHOLD	J32300 X 57MM WIDTH

HARDWARE GROUP NO. 08

DOOR NUMBER: 524 543

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	STOREROOM LOCK	F07
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	WALL STOP	L02101 CONVEX AT OUTSWING DOORS
1	EA	FLOOR STOP	L02121 X 3 FASTENERS AT INSWING DOORS
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 09

DOOR NUMBER: 515

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	CONT. HINGE	X INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS
1	EA	STOREROOM LOCK	F07
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	ARMOR PLATE	J101 X 3.175 MM THICKNESS
1	EA	DOOR EDGE GUARD	J208M/J211 (VERIFY), CUT: HARDWARE
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 10

DOOR NUMBER: 523

QTY		DESCRIPTION	CATALOG NUMBER
2	EA	CONT. HINGE	
			X INTEGRAL HINGE GUARD CHANNEL
			X ADJUSTA-SCREWS
2	SET	AUTO FLUSH BOLT	TYPE 25 LESS BOTTOM BOLT
1	EA	ENTRANCE LOCK	F08
1	EA	COORDINATOR	TYPE 21A
2	EA	SURFACE CLOSER	C02011/C02021
2	EA	ARMOR PLATE	J101 X 3.175 MM THICKNESS
2	EA	DOOR EDGE GUARD	J208M/J211 (VERIFY), CUT: HARDWARE AT WOOD DOORS
2	EA	FLOOR STOP	L02121 X 3 FASTENERS
2	SET	SEALS	R0Y154
1	EA	ASTRAGAL	R0Y634 X ROY154 X THRU-BOLTS
2	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
1	EA	THRESHOLD	J32300 X 57MM WIDTH

NOTE: INSTALL LOCK TRIM PROTECTOR BAR ON PUSH SIDE OF ACTIVE LEAF TO PROTECT LEVER TRIM.

HARDWARE GROUP NO. 11

DOOR NUMBER: 534

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	SET	AUTO FLUSH BOLT	TYPE 25 LESS BOTTOM BOLT
1	EA	STOREROOM LOCK	F07
1	EA	COORDINATOR	TYPE 21A
2	EA	SURFACE CLOSER	C02011/C02021
2	EA	ARMOR PLATE	J101 X 3.175 MM THICKNESS
2	EA	FLOOR STOP	L02121 X 3 FASTENERS
1	SET	SEALS	R0Y154
1	EA	ASTRAGAL	R0Y634 X ROY154 X THRU-BOLTS

HARDWARE GROUP NO. 12

DOOR NUMBER: 510

QTY		DESCRIPTION	CATALOG NUMBER
2	EA	CONT. HINGE	X INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS X 8-THRUWIRE TRANSFER X IN-HINGE ACCESS PANEL
1	EA	CYLINDER	TYPE AS REQUIRED
1	EA	FIRE EXIT HARDWARE	TYPE 7 OR 8 F01 (E04)
1	EA	FIRE EXIT HARDWARE	TYPE 7 OR 8 F08 LEVER (E04)
2	EA	KICK PLATE	J102
2	EA	DOOR EDGE GUARD	J208M/J211 (VERIFY), CUT: HARDWARE AT WOOD DOORS
2	EA	FLOOR STOP	L02121 X 3 FASTENERS
1	EA	MEETING STILE SEAL	R0Y834
2	SET	SEALS	R0Y154
2	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
2	EA	CARD READER	BY OTHERS (ONE IN EACH DIRECTION OF TRAVEL)
2	EA	AUTO DOOR OPERATOR	6010
2	EA	“TOUCHLESS ACTUATOR SWITCH	697
2	EA	DOOR POSITION SWITCH	DPS SERIES
1	EA	EXIT MOTION SENSOR	XMS
1	EA	EMERGANCY EXIT BUTTON	EEB2
1	EA	24/7 TIMER	BY ACCESS CONTROL SYSTEM
1	EA	POWER SUPPLY	BY EXIT DEVICE MF. FOR E04 FUNCTION

NOTE: POWER TRANSFERS SHARED BY ELECTRIC PANIC AND RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13).
AUTO DOOR OPERATORS AND CONTROLS BY SECTION 08 71 13.

HARDWARE GROUP NO.13

DOOR NUMBER: 510F

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	PASSAGE SET	F01
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	WALL STOP	L02101 CONVEX
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 14

DOOR NUMBER: 527

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	STOREROOM LOCK	F07
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	WALL STOP	L02101 CONVEX
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 15

DOOR NUMBER: 500E 500F

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	STOREROOM LOCK	F07
1	EA	SURFACE CLOSER	C02011/C02021 WITH STOP ARM
1	EA	KICK PLATE	J102
1	SET	SEALS	R0Y154

HARDWARE GROUP NO. 16

DOOR NUMBER: 510E

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED X 4-THRUWIRE TRANSFER
1	EA	ELECTRIFIED LOCK	F07 (E01-REX, E06) 24VDC
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	WALL STOP	L02101 CONVEX
1	SET	SEALS	R0Y154
1	EA	CARD READER	BY OTHERS (LEADING FROM ENTRY LOBBY INTO CORRIDOR 510)
1	EA	POWER SUPPLY	REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED

HARDWARE GROUP NO. 17

DOOR NUMBER: 534B

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	FIRE EXIT HARDWARE	TYPE 1 F14
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	WALL STOP	L02101 CONVEX
1	SET	SEALS	R0Y154

HARDWARE GROUP NO.18

DOOR NUMBER: 500C

QTY		DESCRIPTION	CATALOG NUMBER
2	EA	CONT. HINGE	
2	EA	FIRE EXIT HARDWARE	TYPE 7 OR 8 F01 (E04)
2	EA	SURFACE CLOSER	C02011/C02021
2	EA	KICK PLATE	J102
2	EA	FIRE/LIFE WALL MAG	C00011 TRI-VOLTAGE
1	EA	MEETING STILE SEAL	R0Y834
1	SET	SEALS	R0Y154
	EA	N/C F/A CONTACT	BY F/A CONTRACTOR

HARDWARE GROUP NO. 19

DOOR NUMBER: 518 519

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	CONT. HINGE	
1	EA	LATCHSET	F04
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	WALL STOP	L02101 CONVEX
2	SET	SEALS	R0Y154
1	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
1	EA	THRESHOLD	J32300 X 57MM WIDTH

HARDWARE GROUP NO. 20

DOOR NUMBER: 502 505 506 525 528 529 530 531 532 533 535 537 538 539 540 541 542

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	LATCHSET	F04
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
1	SET	SEALS	R0Y154
1	EA	COAT AND HAT HOOK	L03121

NOTE: OMIT COAT HOOK WHERE GLASS LITE PREVENTS INSTALLATION.

HARDWARE GROUP NO. 21

DOOR NUMBER: 504 509 526

QTY		DESCRIPTION	CATALOG NUMBER
	EA	HINGE	QUANTITY AND TYPE AS REQUIRED
1	EA	LATCHSET	F04
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	KICK PLATE	J102
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
2	SET	SEALS	R0Y154
1	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
1	EA	THRESHOLD	J32300 X 57MM WIDTH
1	EA	COAT AND HAT HOOK	L03121
1	EA	DOOR VIEWER	L03221 - 190 DEG. (VIEW INTO CORRIDOR)

NOTE: OMIT VIEWER IF DOOR PROVIDED WITH VISION LITE.
OMIT COAT HOOK WHERE GLASS LITE PREVENTS INSTALLATION.

HARDWARE GROUP NO. 22

DOOR NUMBER: 511 512

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	CONT. HINGE	X INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS X 4-THRUWIRE TRANSFER X IN-HINGE ACCESS PANEL
1	EA	PUSH/PULL LATCH	F09 X PADDLES POINTING DOWN
1	EA	ELECTRIC STRIKE	E09321
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	ARMOR PLATE	J101 X 1.275 MM THICKNESS
1	EA	DOOR EDGE GUARD	J208M/J211 (VERIFY), CUT: HARDWARE
1	EA	FLOOR STOP	L02121 X 3 FASTENERS
1	SET	SEALS	R0Y154
1	EA	POWER SUPPLY	REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED

NOTE: POWER TRANSFER PIVOT IS FOR RE-ACTIVATION SENSOR WIRING (RE-ACTIVATION SENSORS PROVIDED BY SECTION 08 71 13)
AUTOMATIC DOOR OPERATOR AND CONTROLS BY SECTION 08 71 13, AUTOMATIC DOOR OPERATORS.

HARDWARE GROUP NO. 23

DOOR NUMBER: 513 514 516 517

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	CONT. HINGE	X INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS X 4-THRUWIRE TRANSFER X IN-HINGE ACCESS PANEL
1	EA	ELECTRIFIED LOCK	F07 (E01-REX, E06) 24VDC
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	ARMOR PLATE	J101 X 1.275 MM THICKNESS
1	EA	DOOR EDGE GUARD	J208M/J211 (VERIFY), CUT: HARDWARE
	SET	SEALS	R0Y154
1	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
1	EA	THRESHOLD	J32300 X 57MM WIDTH
1	EA	ALARM CONTACT	.
1	EA	POWER SUPPLY	REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED

HARDWARE GROUP NO. 24

DOOR NUMBER: 502A

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	HEAD TRACK	K.N. CROWDER C108XC110F
1	EA	HANGERS	K.N. CROWDER C106-4
1	EA	CONCEALED FLOOR GUIDE	K.N. CROWDER C913 X C-914
1	EA	ANGLE STOP	K.N. CROWDER CAS-2
1	EA	DOOR LOCK AND PULL	K.N. CROWDER C90L WITH KEYED CYLINDER

HARDWARE GROUP NO. 25

DOOR NUMBER: 520 521

QTY		DESCRIPTION	CATALOG NUMBER
1	EA	CONT. HINGE	X INTEGRAL HINGE GUARD CHANNEL X ADJUSTA-SCREWS X 4-THRUWIRE TRANSFER X IN-HINGE ACCESS PANEL
1	EA	ELECTRIFIED LOCK	F07 (E01-REX, E06) 24VDC
1	EA	SURFACE CLOSER	C02011/C02021
1	EA	ARMOR PLATE	J101 X 1.275 MM THICKNESS
1	EA	DOOR EDGE GUARD	J208M/J211 (VERIFY), CUT: HARDWARE
	SET	SEALS	R0Y154
1	EA	AUTO DOOR BOTTOM	R0Y346 - HEAVY DUTY
1	EA	THRESHOLD	J32300 X 57MM WIDTH
1	EA	ALARM CONTACT	.
1	EA	CARD READER	BY OTHERS (LEADING FROM CLEAN CORE INTO ROOM)
1	EA	POWER SUPPLY	REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED

- - - E N D - - -

SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies equipment, controls and accessories for automatic operation of swing doors.

1.2 RELATED WORK

A. Door hardware; Section 08 71 00, DOOR HARDWARE.

B. Section 28 13 00, ACCESS CONTROL.

C. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.

D. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.

E. Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 QUALITY ASSURANCE

A. Automatic door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.

B. One type of automatic door equipment shall be used throughout the building.

C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

1.4 WARRANTY

A. Automatic door operators shall be subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the Warranty period shall be two years in lieu of one year.

1.5 MAINTENANCE MANUALS

A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on automatic door operators.

1.6 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.

C. Shop Drawings:

1. Showing location of controls and safety devices in relationship to each automatically operated door.
2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.

D. Submit in writing to Contracting Officers Representative (COR) that items listed in Article 1.3 are in compliance.

1.7 DESIGN CRITERIA

A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in five seconds maximum time interval, when speed adjustment is at maximum setting.

B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation.

C. Electrical Wiring, Connections and Equipment: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

1.8 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. Builders Hardware Manufacturers Association, Inc. (BHMA):
A156.10-05.....Power Operated Pedestrian Doors (BHMA 1601)

C. National Fire Protection Association (NFPA):
101-09 .....Life Safety Code

D. Underwriters Laboratory (UL):
325-10 .....Door, Drapery, Gate, Louver, and Window Operators and Systems

1.9 DELIVERY AND STORAGE

A. Delivery shall be in factory's original, unopened, undamaged container with identification labels attached.

PART 2 - PRODUCTS

2.1 SWING DOOR OPERATORS

A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to exceed 300 kg (600 pounds), electric operated for overhead mounting within the header or transom. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are electrically locked from opening.

B. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.

C. Operator, enclosed in housing, shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power or controlled by hydraulic closer in electro-hydraulic operators. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:
   1. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
   2. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.
   3. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. Door shall not pivot on shaft of operator.
   4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers, and other electronic components for proper operation and switching of power operator. All connecting harnesses shall have interlocking plugs.

2.2 MICROPRCESSOR CONTROLS

A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1–30 seconds), LED indications for sensor input signals and operator status and power assist close options. Control shall be capable of receiving activation signals from any device with normally open dry contact output. All activation modes shall provide fully adjustable opening speed:

B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and stops the opening direction of the door if an obstruction is sensed. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle. The control shall include a standard three position key switch with functions for ON, OFF, and HOLD OPEN, mounted on operator enclosure, door frame, or wall, as indicated in the architectural drawings.

2.3 POWER UNITS

Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 – ELECTRICAL.

2.4 DOOR CONTROLS

A. Opening and closing actions of doors shall be actuated by controls and safety devices specified and conform to ANSI 156.10. Controls shall cause doors to open instantly when control device is actuated; hold doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.

B. Manual Controls:

1. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (l/2-inch) high letters "To Operate Door--Push" engraved on face of plate.

C. Motion Detector: The motion detector may be surface mounted or concealed, to provide a signal to actuate the door operator, and monitor the immediate zone, to detect intrusion by persons, carts or similar objects. The zone which the detector monitors shall be 1500 mm (five feet) deep and 1500 mm (five feet) across, plus or minus 150 mm (six inches) on all dimensions. The maximum response time shall be no less than 25 milliseconds. Unit shall be designed to operate on 24 volts AC. The control shall not be affected by cleaning material, solvents, dust, dirt and outdoor weather conditions.

2.5 SAFETY DEVICES

A. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device.

B. At sliding doors, provide two photoelectric beams mounted at heights of 600 mm (24 inches) and 1200 mm (48 inches) in the door frame on sliding doors. Provide overhead safety presence sensors at door head on each side of the opening. Beams shall parallel door openings to prevent doors from closing when anyone is in the center of the door or doors. When beams are activated, doors shall recycle to full open position. Actuation shall include a motion detector mounted on each side of the door for detection of traffic in each direction.

C. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.

D. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

E. Decals with sign "In" or "Do Not Enter" shall be installed on both faces of each door where shown.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment, in finish work.

B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.

C. Operators shall be adjusted and must function properly for the type o£ traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.

D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Contracting Officers Representative (COR).

3.2 INSTRUCTIONS

A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel for 2 hours on the operating, servicing and safety requirements for the swing and sliding automatic door operators.

B. Coordinate instruction to VA personnel with Contracting Officers Representative (COR).

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